USDA

United States Department of Agriculture

Forest Service

Alaska Region
Tongass National Forest

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File Code: 1950-3
Date: January 23, 2008

Dear Planning Participant:

This letter accompanies the Record of Decision (ROD), Final Environmental Impact Statement (Final EIS) and Amended Land and Resource Management Plan (Forest Plan) which respond to a decision issued by the 9th Circuit Court of Appeals.

In August 2005, the U.S. Court of Appeals for the Ninth Circuit issued a decision in *Natural Resources Defense Council, et al., v. United States Forest Service, et al., 421 F.3d 797 (9th Cir. 2005)* that found deficiencies in the process used to develop the 1997 Forest Plan revision. Specifically, the Court found inadequacies related to timber demand, the range of alternatives considered relative to timber demand and potential effects on roadless areas, and cumulative effects from activities conducted on non-National Forest System lands. The Court ordered additional analysis and the development of an environmental impact statement (EIS) to correct these deficiencies. The documents being released today address all of the deficiencies identified by the Court, as well as a number of needs identified by the 5 Year Review of the Forest Plan.

The Tongass' extensive collaboration with many new and existing partners has played a very important role in the development of this Amendment and will continue to be an integral part of the forest management in the future. The Forest worked with State and Federal agencies, Tribal Governments, SE Alaska Communities, organizations and individuals to develop this Amended Forest Plan. One of the most significant partnerships is with the State of Alaska, designated as a Cooperating Agency for this analysis. Governor Sarah Palin and Forest Service Chief Abigail R. Kimbell signed a Preamble to the ROD, which sets the vision for sustainability of the Tongass and for Southeast Alaska's communities in a coordinated effort to improve and promote natural resource management.

Approximately 84,500 comments were received on the Draft EIS. These comments were used to refine the analysis and shape the decision. A summary of comments and Forest Service responses can be found in Appendix H of the Final EIS.

One important element of the Plan that many have been anticipating is the amount of timber the Forest can offer for timber sales over the life of this Plan. The Allowable Sales Quantity, or ASQ, in the Amendment remains unchanged from the 1997 Plan of approximately 267 million board feet a year over the next 10 years. The total suitable land base the Plan outlines for timber harvest is comparable to the 1997 Plan at about 773,000 acres.

What is a significant change in the Amended Plan is how the Forest will plan and offer timber sales. The ROD introduces a new strategy, referred to as the Timber Sale Adaptive Management Strategy, which limits the lands available for timber harvest to that necessary to support demonstrated levels of demand. While the majority of higher value roadless areas are not available for timber harvest, this strategy will ensure those areas that are available are not impacted until timber demand rises.

The new Timber Sale Adaptive Management Strategy will be implemented in three phases, based upon performance. Under Phase 1 timber harvests will be restricted to roaded and mostly lower value inventoried roadless areas (areas in close proximity to existing roads) until the level of timber harvest reaches 100 million board feet a year for two consecutive years.

Phase 2 restricts harvest to Phase 1 lands and additional moderate value inventoried roadless areas (areas farther from existing roads with multiple-use value for recreation, fish and wildlife use) until the level of timber harvest reaches 150 million board feet a year for two consecutive years. Finally, Phase 3 of the Strategy applies, and includes the remaining suitable land base. A map of these phases is included on the CD and on the website at *www.fs.fed.us/r10/tongass/*.

The ROD, Final EIS and Amended Forest Plan will be published in the Federal Register in early to mid February. The Amended Forest Plan can be implemented 30 days from that date. Publication in the Federal Register also begins a 90 day appeal period. See the ROD for more information.

All of these documents as well as more information about the amendment process can be found at *www.fs.fed.us/r10/tongass/*. Please contact Lee Kramer, the Project Manager at 907-789-6246 for more information.

Sincerely,

FORREST COLE
Forest Supervisor

USDA
United States
Department of
Agriculture

Forest Service
R10-MB-603a

January 2008

Tongass Land and Resource Management Plan

Final Environmental Impact Statement

Plan Amendment

Record of Decision

A Shared Vision
For the Tongass National Forest

For untold millennia, people in Southeast Alaska have been tied to the land and the seas, and lived within their embrace. Still today, 73,000 people live in intimate contact with this marvelous environment. Hundreds of thousands more visit every year, hoping to sense in some small way what Alaskans experience daily. Much of what local residents experience - and what visitors sense - comes directly from that wondrous treasure, the Tongass National Forest.

The Record of Decision you have before you is a complex legal document, filled with technical details and references to the laws, policies, regulations, and court cases that make up the fabric of modern resource management. That's pretty obvious. What is not so obvious is the new partnership between the State of Alaska and the U.S. Forest Service that is foundational to this decision. The previous Chief of the Forest Service and State of Alaska administration opened a new door to collaborative relations almost two years ago, which has expanded to include many vital, dynamic, and diverse interests as this decision was formed. We are working together in productive ways that were literally unthinkable just a few years ago. Today, we renew our commitment to work together and support a new collaborative model of management.

It is vital that you see this shared vision for this Forest, and that you understand the thinking and hope that this decision can bring more stability to its management. Above all, we want to see sustainability, of the Tongass and of Southeast Alaska's communities, in perpetuity. The Tongass National Forest is one of the few places left where people still live connected to the land and make their living surrounded by unparalleled abundance and wildness. We want to see it stay that way.

We believe that the Tongass National Forest is a unique public treasure entrusted to our care. Through this decision, we are conserving its intrinsic value for future generations. The Tongass will continue to be a rich, healthy forest of wild places with abundant wildlife and fish. Most of the Forest will be protected as Wilderness and as remote backcountry, and will remain one of the world's most important intact ecosystems.

The lands of the Forest must also provide the foundation of the economic well-being of the communities embedded within it. A healthy commercial fishing industry depends on the Forest's abundant fish habitat. Mining and timber have long provided jobs for the people of Southeast, and through responsible resource management they can continue to do so. And the remote and isolated communities within the Forest must have opportunities to connect to each other, for both transportation and energy.

We also want to help stabilize the economic and social viability of communities in Southeast Alaska. Without sufficient timber resources, a crucial element of these communities is in danger of disappearing. Because people in this country, as well as the rest of the world, require a lot of timber products, the wood product industry offers one of the best ways to retain that viability. Helping businesses succeed is important to both the health of the forest and its people. We are committed to them, because the people who live in Southeast Alaska are crucial to the health of the landscape in which they live.

At the same time, the Tongass is part of a global community, influenced by the effects of international markets and trends. Preserving special places requires engaging local people and responding to their interests and values. Alaska's forests are increasingly valued for the global environmental services they provide, such as plentiful clean air and water, abundant fish and wildlife, carbon sequestration, biodiversity, and opportunities to enjoy outdoor recreation.

The new State-Federal cooperation is key to the successful implementation of the Plan. We must strengthen our coordination of wildlife conservation monitoring and timber sale operations, while recognizing that full implementation will require adequate funding. With this decision, we also renew our commitment to work together to ensure subsistence protections guaranteed under the Alaska National Interest Lands Conservation Act. We hope, and believe, that our efforts to work together will strike a chord with your own interest in the Tongass National Forest and Southeast Alaska.

Our vision of the future says this new plan will meet the needs of the people of Southeast Alaska while protecting the wild places we all love. The framework is here, and with our newfound sense of State-Federal cooperation, and the addition of an adaptive management strategy, we believe we can also work together on how best to make the plan work for all of us.

That is our vision – we hope you will join with us in making it a reality.

Sarah Palin

Sarah Palin
Governor, State of Alaska

Abigail R. Kimbell

Abigail R. Kimbell
Chief, Forest Service

Tongass National Forest
Land and Resource Management Plan
Amendment

2008 Environmental Impact Statement

Record of Decision

United States Department of Agriculture
Forest Service–Alaska Region

January 2008

Federal Recycling Program
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ABBREVIATIONS

ADOT&PF	Alaska Department of Transportation and Public Facilities
AFA	Alaska Forest Association
AFHA	Anadromous Fish Habitat Assessment
ANILCA	Alaska National Interest Lands Conservation Act
ASQ	Allowable Sale Quantity
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CZMA	Coastal Zone Management Act
EIS	Environmental Impact Statement
FWS	Fish and Wildlife Service
KIC	Ketchikan Indian Community
LUD	Land Use Designation
MDF	Medium Density Fiberboard
MMBF	Million Board Feet
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System
NIC	Non-Interchangeable Component
P.L.	Public Law
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
RPA	Forest and Rangeland Renewable Resources Planning Act
TTRA	Tongass Timber Reform Act
TUS	Transportation and Utility System
U.S.C.	United States Code
USDA	United States Department of Agriculture
VCU	Value Comparison Unit

Record of Decision

Introduction

This document is a public Record of Decision (ROD) that documents my decision to approve the 2008 Amendment to the Tongass Land and Resource Management Plan (Forest Plan), and the rationale for making that decision. The amended Forest Plan is contained in the document titled *Land and Resource Management Plan – Tongass National Forest*, dated January 2008, and is based on Alternative 6 in the *Tongass Land and Resource Management Plan Amendment Final Environmental Impact Statement* (Final EIS), with four modifications as described in this document. The map of record for the amended Forest Plan is labeled "Tongass National Forest, Land Use Designations, January 2008."

Under the National Forest Management Act (NFMA), the Secretary of Agriculture is required to "develop, maintain, and, as appropriate, revise land and resource management plans [forest plans] for units of the National Forest System." 16 U.S.C. § 1604(a). Forest plans are expected to be reviewed every 5 years, and revised every 15 years. 16 U.S.C. § 1604(f)(5)(A); 36 CFR § 219.10(g). Pursuant to 16 U.S.C. § 1604(g), the Secretary of Agriculture promulgated regulations at 36 CFR Part 219[1] establishing procedures for the development, amendment, and revision of forest plans. Because this amendment essentially completes the process of revising the Tongass Forest Plan that was initiated in 1987, the Forest Plan will not need to be revised again for 10 to 15 years, unless changed conditions require it sooner.

Forest planning on the Tongass National Forest has long been a complex and contentious undertaking. This history is described in detail in Chapter 1 of the Final EIS, so I will offer only a brief summary of it here. In 1979, the Tongass National Forest was the first to complete a forest plan under NFMA. As required by NFMA's implementing regulations, the Forest Service completed a 5-year review of the Forest Plan in 1984, which led to an amendment of the Forest Plan that was completed in 1986. The agency began work to revise the Forest Plan in 1987. The Tongass Timber Reform Act became law in November 1990, which resulted in a second amendment to the Plan in 1991. The Revised Forest Plan was approved in 1997, and was appealed by several parties. The Under Secretary of Agriculture affirmed the 1997 decision, but also issued a new ROD that modified the 1997 Plan, mainly to prohibit timber harvest and road construction in 18 "areas of special interest." As a result of subsequent litigation, the 1999 ROD was vacated, and the Forest Service was directed to prepare a Supplemental EIS to determine whether additional wilderness areas should be recommended. That Supplemental EIS was completed in 2003; based on that analysis, I recommended no additional wilderness.

The validity of the 1997 Forest Plan was challenged, and that litigation eventually resulted in a decision by the U.S. Court of Appeals for the Ninth Circuit in *Natural Resources Defense Council vs. U.S. Forest Service* (421 F.3d 797) in August 2005. The Forest Service had erroneously nearly doubled the market demand for timber from the Tongass that was projected by Forest Service economists. The court found that this error influenced the selection of Alternative 11 in the 1997 ROD. The court also found inadequacies in the 1997 EIS, including the following:

- The EIS did not provide decision makers and the public with an accurate assessment of information relevant to evaluating the Tongass Plan; had the accurate market demand forecast and related potential employment and earnings information been used, an alternative may have been selected with less environmental impact and in less environmentally sensitive areas.

[1] The Forest Service promulgated new planning regulations in 2000, and again in 2005. In accordance with the transition provisions of the 2005 regulations, the 2008 Tongass Forest Plan Amendment was prepared pursuant to the pre-2000 regulations. All citations in this ROD to regulations in Part 219 refer to the pre-2000 regulations.

- The Forest Service had not considered alternatives that set the Allowable Sale Quantity (the maximum amount of timber allowed to be cut) equal to the correct demand scenarios.
- Each of the alternatives considered allocated some currently roadless areas to the Land Use Designations (LUDs) that allow development; the EIS omitted an alternative that allocated less undeveloped land to the development LUDs.
- The EIS did not fully consider the cumulative effects of disproportionate high-volume logging on non-federal land because the EIS did not include: (1) a catalog of past projects; (2) a discussion of how those projects (and differences between the projects) have harmed the environment; (3) a discussion of the connection between individual non-federal high-volume harvests and the prior environmental harm from those harvests; and (4) an assessment of the potential impacts of reasonably foreseeable continued "highgrading" in the future.
- A cumulative effects analysis in a programmatic EIS is necessary for the Forest Service and the public to make a rational evaluation of the proposed action balancing the competing goals of timber harvest, environmental preservation, and recreational use in the Tongass.

The 2008 Tongass Forest Plan Amendment and the associated EIS have been prepared in response to the Ninth Circuit court's decision. The Amendment also responds to the 5-Year Review of the Plan completed in early 2005, which recommended several updates to the Plan.

Forest plans are programmatic in nature; they do not, by themselves, authorize activities such as timber harvest or road construction that affect the environment. Rather, when an individual project (such as a timber sale) is proposed, the Forest Service undertakes a site-specific analysis of its likely environmental effects and renders a formal decision regarding it. *See Inland Empire Public Lands Council v. U.S. Forest Service*, 88 F.3d 754 (9th Cir. 1996); *Sierra Club v. Robertson*, 28 F.3d 753, 758 (8th Cir. 1994). Thus, forest plans do not have environmental effects. *Ohio Forestry Ass'n v. Sierra Club,* 523 U.S. 726, 729 (1998). However, the planning regulations governing the 2008 Tongass Forest Plan Amendment require the preparation of Environmental Impact Statements for forest plans. 36 CFR § 219.10(b).

My objectives for the 2008 Forest Plan Amendment and the associated EIS have consistently been to correct the deficiencies identified by the Ninth Circuit and bring the Plan up to date, while balancing the competing goals cited by the court. My overall intent has always been to ensure that the Tongass National Forest continues to be managed in a sustainable manner. NFMA requires forest plans to "provide for multiple use and sustained yield of the products and services" obtained from the National Forest System. 16 U.S.C. § 1604(e)(1). Sustained yield of products and services is defined as "the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the national forests without impairment of the productivity of the land." 16 U.S.C. § 531(b). I also recognize the State of Alaska's authority and responsibility to ensure sustainable management of fish and wildlife on all lands in Alaska. Multiple use management is a deceptively simple term that describes the enormously complicated task of striking a balance among the many competing uses to which land can be put, including outdoor recreation, range, timber, watershed, wildlife, fish, and wilderness. The additional goal of sustained yield requires the Forest Service to control consumptive uses of natural resources of the National Forest System to ensure a high level of valuable uses in the future.

For reasons that will be explained throughout this ROD, I conclude the amended Forest Plan meets all of these very challenging requirements.

The Decision

The decision I am making today is to approve the amended Forest Plan, which is based on Alternative 6 as described in the Final EIS, with the four modifications that are described in this ROD. The components of this decision are listed below. These decision components are fully supported by the environmental analysis documented in the Final EIS, as required by law and regulation. The details of these decision components may be found in the Forest Plan chapters or appendices noted.

I have made my decision after careful consideration of the public comments on the Draft EIS for the 2008 Tongass Land and Resource Management Plan Amendment, which was prepared pursuant to the National Environmental Policy Act (NEPA). I have also reviewed the Final EIS and the amended Forest Plan. All site-specific projects will be subject to additional environmental analysis, which will tier to the Final EIS for the amended Forest Plan.

The amendment I am approving modifies four of the six components of the Forest Plan that are required by law and regulations governing forest planning. In addition to the required components, I am also approving a Timber Sale Program Adaptive Management Strategy, which is an additional step in implementing adaptive management and correcting the deficiencies identified by the Ninth Circuit court. As part of this decision, I also direct the Forest Supervisor to strengthen the cooperative efforts with the State of Alaska on implementation and monitoring, including efforts to improve timber sale economics, by developing cost-sharing and other agreements with the State of Alaska. This direction is described in detail in the section of this ROD dealing with implementation.

Decision Components Required by NFMA

Goals and Objectives

Multiple-use goals and objectives for the Tongass are described in Chapter 2 of the Plan. These goals and objectives guide the overall management for the Forest, establish the desired conditions for implementing the Plan, and satisfy the requirements of 36 CFR 219.11(b). Achievement of these goals and objectives will ensure the sustainability of the Tongass National Forest, and the ecological, social, and economic values derived from the Forest. These goals and objectives describe the mosaic of land and resource conditions desired for the forest in the future. Full attainment of these goals and objectives can be influenced by a number of factors, such as congressional budget allocations, changed circumstances or new information relative to land management.

The amended Plan includes several changes to the goals and objectives adopted in 1997. A new goal has been added to maintain viable plant communities and populations and a mixture of habitats capable of supporting the full range of naturally occurring flora. It also includes a new goal to consult with Tribes to protect and maintain sacred sites across the Forest. New objectives are included for each of these goals. A new objective was added to reduce the introduction, spread, and impact of invasive species. Two new objectives related to timber management were also added. One addresses “economic timber” in the timber sale program; the other deals with flexibility and stability in the sale program. In addition to the new goals and objectives, several others were modified. More emphasis was given to ecosystem services values. The goal for karst was re-written to focus on maintaining natural processes and productivity while allowing other land uses as appropriate. Several goals and objectives were updated to clarify management intent.

Management Prescriptions

Chapters 3 and 4 of the amended Plan set forth the management prescriptions and forest-wide standards and guidelines that describe how land managers will operate on the Tongass. These chapters provide the expectations and limits on how and where activities will be conducted. The management prescriptions in Chapter 3 include 16 Land Use Designations, each with its own goals and objectives, and specific standards and guidelines designed to ensure achievement of them. Management prescriptions for the Wilderness and National Monument Wilderness LUDs have been combined to reduce duplication, while retaining separate goals and objectives for National Monument Wilderness. Several other management prescriptions have been changed slightly to update and clarify them. Many of the forest-wide standards and guidelines (Chapter 4) were also edited to update their terminology, clarify them, and improve the consistency of application. New standards and guidelines were developed to address invasive species and plants. Another new standard was added that requires old-growth forest structure (i.e., live trees, dead trees, and clumps of trees) to be retained after timber harvest in areas that have had considerable past harvest, as a replacement for standards in the 1997 Forest Plan related to goshawk foraging and marten habitat.

The 19 LUDs are commonly organized into four groups with similar management direction and environmental effects. The first two groups are commonly referred to as "non-development LUDs, and the latter two groups as "development LUDs." The main changes from the 1997 Forest Plan in the allocation of land on the Tongass to the various LUDs include:

1. Updated acreage figures for all LUDs as a result of refinements to the geographic information system and better inventory information regarding scenery.
2. The addition of approximately 90,000 acres[2] to the network of small Old-Growth Habitat reserves, as discussed in the section of this ROD dealing with protecting wildlife habitat and biodiversity. Some of these additional acres were previously allocated to development LUDs, others to non-development LUDs.
3. Expansion of Geologic Special Interest Areas to protect nearly 47,000 acres of newly identified karst lands that are most vulnerable to disturbance from development.
4. Reallocation of about 97,000 acres on the Juneau Icefield from Remote Recreation to Semi-remote Recreation, which would allow minor enclaves to be established above the snow accumulation zone.
5. Reallocation of about 43,000 acres on Chichagof Island at the head of Tenakee Inlet from Timber Production, Modified Landscape, and Old-Growth Habitat to Semi-remote Recreation to address the high sensitivity of this area to development and timber economics.
6. Reallocation of about 18,000 acres on Kupreanof Island east of Kake from Timber Production to Semi-remote Recreation to address public concerns and timber economics.
7. Reallocation of development LUDs near Bostwick Inlet on Gravina Island to Semi-remote Recreation in response to public concerns, as described in greater detail in the section of this ROD dealing with minimizing effects on roadless areas. These are changes that I am making through this decision to Alternative 6 as displayed in the Final EIS.
8. Allocations among the development LUDs were adjusted to reflect improved inventory data regarding scenery. These are changes that I am making through this decision to Alternative 6 as displayed in the Final EIS.
9. An expansion of the Minerals LUD overlay by approximately 80,000 acres (from 170,514 to 249,570 acres) to include portions of the Hyder area and areas on Prince of Wales Island associated with the Niblack, Ruby Tuesday, and Khayyam minerals prospects.

The amended Forest Plan's allocation of all National Forest System lands on the Tongass to the various LUDs is shown in Table 1 below.

Activities consistent with management prescriptions are guided by the application of standards and guidelines, which govern resource management activities and are key to successful implementation of the Forest Plan. Some of these standards and guidelines apply to all lands, others to specific management prescriptions. These standards and guidelines take precedence over annual targets or projected outputs; no project or program will be funded for which the applicable standards and guidelines cannot be carried out.

The primary LUDs that allow timber management, Timber Production, Modified Landscape, and Scenic Viewshed, total approximately 3.4 million acres, or 20 percent of the Tongass National Forest. Three of these LUDs, Timber Production, Modified Landscape, and Scenic Viewshed, account for all of the scheduled timber harvest under the Forest Plan. Scenic and Recreational River LUDs also allow timber management if the adjacent LUD allows timber harvest and the scenery guidelines are met; however, very little harvest has occurred in these LUDs over the last 10 years. Accordingly, I expect little if any timber harvest in these LUDs over the next 10 to 15 years.

[2] This includes approximately 50,000 acres added by previous amendments to the 1997 Forest Plan.

Table 1
Land Use Designations for the Amended Forest Plan

Land Use Designation	Total Acres Allocated to Each LUD[1]	Total Acres Allocated to Each LUD without Overlays[2]
Wilderness LUD Group		
Wilderness	2,637,292	2,637,292
Wilderness National Monument	3,111,792	3,111,792
Nonwilderness National Monument	166,942	166,942
Total for Wilderness LUD Group		**5,916,026**
Natural Setting LUD Group		
LUD II	721,002	721,002
Remote Recreation	2,033,665	2,033,665
Semi-Remote Recreation[3]	3,023,152	3,023,152
Old-Growth Habitat	1,221,173	1,221,173
Enacted Municipal Watershed	45,226	45,226
Research Natural Area	58,788	26,093
Special Interest Area	342,137	221,176
Wild River	192,463	62,799
Scenic River	27,133	27,133
Recreational River	27,387	27,387
Total for Natural Setting LUD Group		**7,408,806**
Development LUD Group		
Experimental Forest[4]	31,405	31,405
Scenic Viewshed	307,402	307,402
Modified Landscape	728,679	728,679
Timber Production	2,381,486	2,381,486
Total for Development LUD Group		**3,448,972**
Overlay LUD Group[5]		
Minerals	249,570	0
Transportation and Utility Systems	--	0
TOTAL NATIONAL FOREST SYSTEM LAND		**16,773,804**

1 This column includes the total acreage allocated to each LUD. However, in some cases, more than one LUD can be applied to the same area (such as a Special Interest Area within Wilderness); therefore, totaling the acres of this column will exceed the total National Forest acreage.

2 This column counts each acre of the Tongass only once. It includes the total areas allocated to each LUD, except for five LUDs that sometimes overlay other LUDs. The Research Natural Area, Special Interest Area, and Wild River LUDs sometimes overlay Wilderness, Wilderness National Monument, or LUD II; when this occurs the acreage is included under these other LUDs (so as not to double count). Also, the Minerals and Transportation and Utility System LUDs always function as overlays and do not have acreage in this column.

3 The acreage figure for this LUD includes 6,544 acres currently allocated to Experimental Forest, but proposed to be converted to Semi-Remote Recreation.

4 The acreage figure for this LUD includes 20,853 acres currently allocated to Scenic Viewshed, but proposed to be converted to Experimental Forest.

5 The two LUDs in this group are always overlay LUDs. Areas allocated to these LUDs are managed according to the underlying LUD until such time that mineral or transportation/utility development is approved, if at all. The Minerals overlay LUD has an area (249,570 acres) associated with it; no acreages are calculated for the Transportation and Utility System LUD because it is defined as a series of corridors of undefined width and imprecise locations.

Land Suitable for Timber Production

The amended Forest Plan also updates the classification of lands suitable for timber production and determines where on those lands timber harvesting could be allowed, in accordance with NFMA regulations, 36 CFR 219.14(a), and Section 102 of the Tongass Timber Reform Act (TTRA). Appendix A of the Forest Plan details the criteria and process used to determine the forest lands suitable for timber production. These are the lands capable of producing commercial volumes of timber on a sustained-yield basis, and are not in areas legislatively withdrawn from timber harvest. They are the only lands where regularly scheduled timber harvest may occur.

This process uses a computer model that takes into consideration a number of characteristics of land across the entire Tongass National Forest. Changes were made to reflect updated geographic information system data; the results of a new logging systems and transportation analysis; and a new, lower estimate of the Model Implementation Reduction Factor.[3] As a result of these updates, the total estimated suitable land area decreased from 781,000 acres under the 1997 Forest Plan (as amended) to 773,000 under the 2008 Amendment. In addition, new modeling was conducted to identify the maximum acreage of lands from the suitable land base that would need to be scheduled for harvest over the next 100 years or so, in order to produce timber each decade at the maximum level permitted under the Allowable Sale Quantity. As a result of these updates, the total amount of scheduled suitable land decreased from 687,000 acres under the 1997 Forest Plan (as amended) to 663,000 acres under the 2008 Amendment.

Commercial timber sales can occur on lands that are not identified as suitable for timber production, but only if needed to accomplish other management objectives. Examples include commercial thinning of dense young-growth forest stands to improve wildlife habitat, and salvage sales of trees damaged or killed by insects or disease, or blown down by wind storms. Such sales are infrequent on the Tongass, are not part of the scheduled timber program, and thus do not count toward the Allowable Sale Quantity.

Allowable Sale Quantity

The Allowable Sale Quantity (ASQ) is the maximum amount of timber that can be sold in the first decade following this decision. It has not been changed; the ASQ for timber for the amended Forest Plan is established at 2.67 billion board feet per decade, which is equivalent to an annual average of 267 million board feet (MMBF). This is an upper decadal limit on the amount of timber that may be offered for sale from suitable timberland on the Tongass National Forest as part of the regularly scheduled timber sale program. As mentioned above, the ASQ is unchanged from that established for the 1997 Forest Plan. However, the timber program will be implemented in three phases under the Timber Sale Program Adaptive Management Strategy, as explained in detail later in this section and in other sections of this ROD.

Annual offering levels depend on several factors. For the Tongass National Forest to offer timber sales at levels near the maximum allowed under the amended Plan, Congress would need to consistently appropriate sufficient funding, the Forest Service would need to increase the number of timber sales prepared and offered, and the timber industry would need to take advantage of additional marketing opportunities, make new capital investments, purchase sales offered, and harvest timber at rates higher than current levels.

As was true under the 1997 Plan, the ASQ consists of two separate Non-Interchangeable Components (NICs) called NIC I, which is 2.38 billion board feet of timber per decade, and NIC II, which is 0.29 billion board feet per decade. The NIC I component includes land that can be harvested with normal logging systems and is typically more economic to harvest. The NIC II component includes land that has high logging costs due to isolation or special equipment

[3] The Model Implementation Reduction Factor reduces the amount of land identified by the model as suitable for timber production to account for unforeseen factors that arise during implementation of the Plan. The Factor was reduced from approximately 32 percent in the 1997 Forest Plan to approximately 23 percent in the amended Forest Plan, as a result of updates to the geographic information system and other data.

requirements. These NIC components are estimates that do not reflect all of the factors that may influence actual sale levels. They are designed to prevent the disproportionate harvest of the most economical portions of the Forest over the long term. Thus, the separate limits on each component are binding on a decadal basis. The components are non-interchangeable because lower sale levels in one component may not be compensated for by higher sale levels in the other. About 89 percent of the ASQ comes from NIC I land and about 11 percent comes from NIC II.

Monitoring and Evaluation

The monitoring plan, required by NFMA regulations, 36 CFR section 219.12 (k), is contained in Chapter 6 of the amended Forest Plan. It represents an essential quality control mechanism and facilitates learning from Plan implementation. The monitoring plan provides for three types of monitoring: (1) implementation monitoring to determine if the standards and guidelines are being followed; (2) effectiveness monitoring to determine if standards and guidelines are achieving the desired results; and (3) validation monitoring to determine if the underlying assumptions are valid.

Monitoring and evaluation play a central role in adaptive management. Some monitoring and evaluation activities are conducted to ensure appropriate implementation of standards and guidelines. Other activities are conducted to deal with uncertainties regarding effects of land management activities. This includes gathering additional information to reduce these uncertainties by determining whether the effects of various standards and guidelines are consistent with predictions, and also to validate key assumptions underlying various standards and guidelines and projected outcomes of management. Information gained through monitoring and evaluation will be used to adjust management direction in the future where warranted. Accordingly, monitoring and evaluation will be a high priority under the amended Forest Plan. The monitoring plan contained in the amended Forest Plan specifies the questions to be answered through monitoring. Several modifications were made to refine the critical monitoring questions, including more emphasis relative to emerging climate change issues. Information on sampling methods and other detailed information about how the questions might be answered has been removed, because these provisions tend to be frequently updated to respond to new science and information. Details of the monitoring program such as data gathering protocols will continue to be developed in consultation with the State of Alaska and other interested Federal agencies.

The Forest Service will conduct an evaluation of the Forest Plan in 5 years, as provided by the NFMA planning regulations (36 CFR 219.10(g)). That review will include an evaluation of the Plan's old-growth conservation strategy, which is designed to conserve biodiversity and prevent the need to list species under the Endangered Species Act. The evaluation will be conducted in collaboration with appropriate Federal and State agencies. Any needed changes in the Plan's direction will be incorporated through the amendment or revision process, just as this amendment was prepared, in part, in response to information obtained under the monitoring and evaluation program established under the 1997 Forest Plan.

Recommendations on Special Management Areas

As described in Chapter 1 of the Final EIS, the purpose and need of the 2008 Forest Plan Amendment is to respond to the 2005 decision by the U.S. Court of Appeals for the Ninth Circuit, and to update the Plan in response to the 5-year evaluation completed in 2005. Accordingly, changes to wilderness areas, wild and scenic rivers, and research natural areas are outside the scope of the Amendment. During this amendment process, however, I reviewed the decision I made in 2003 not to recommend that any new wilderness areas be designated, or any changes to existing wilderness areas be made. I made that decision because I found no compelling need for additional wilderness on the Tongass at that time. I believe the 2003 decision should remain in effect. Consequently, this decision does not include any additional wilderness recommendations. Potential wilderness recommendations can be considered again as part of the next revision.

Similarly, I am making no changes to the recommendations made by the Regional Forester in 1997 that segments of over 30 rivers be included in the National Wild and Scenic Rivers System.[4] These recommendations require action by the Chief of the Forest Service and the Secretary of Agriculture before being considered by the President for transmittal to Congress. No changes are being made to the network of research natural areas currently designated on the Tongass.

Although the scope of this Amendment did not include proposals to add new wilderness areas, wild and scenic rivers, or research natural areas, or to expand existing units of these systems, there is one change to a special management area that I am recommending. In response to a request from the Pacific Northwest Research Station, I join the Director of the Station in recommending to the Chief of the Forest Service that the designation of Young Bay on Admiralty Island as an experimental forest be terminated and that a new experimental forest in the Cowee Creek and Davies Creek watersheds on the mainland north of Juneau be established. Admiralty Island is not accessible by road, which is needed to fully achieve the objectives of an experimental forest. The proposed new experimental forest is accessible from the Juneau road system. Unless and until the Chief approves these recommendations, Young Bay will be managed as an experimental forest, and the Cowee Creek-Davies Creek area will be managed under the Scenic Viewshed and Old-Growth Habitat LUDs. Upon approval by the Chief and execution of any necessary public land orders, Young Bay will be managed under the Semi-Remote Recreation LUD, which includes the termination of the existing mineral withdrawal, and the Cowee Creek-Davies Creek area will be managed as an experimental forest. While only the Chief can make the decision on these recommendations, the potential environmental effects of that decision—other than issues related to mineral withdrawals--are described in the Final EIS for this Forest Plan Amendment. Upon approval by the Chief, we would make a technical correction to the Plan to reflect that approval.[5]

Changes Adopted in this ROD to Alternative 6

As mentioned briefly above, I have decided to make four changes to Alternative 6 as displayed in the Final EIS. The following changes have been incorporated into the amended Forest Plan:

- Development LUDs in the vicinity of Bostwick Inlet on Gravina Island have been changed to Semi-remote Recreation.
- Allocations of development LUDs have been changed (e.g., from Scenic Viewshed to Modified Landscape) to reflect updated scenery inventory information.
- The standard and guideline included in Alternative 6 that would allow timber harvest within goshawk nest buffers if nests are unoccupied for two years has been changed. The amended Forest Plan will continue to protect all known nests; only buffers around "probable nests" may be subject to timber harvest, and only if two years of monitoring indicates no evidence that goshawks are present or actually nesting. This change is explained further in the section of this ROD dealing with protecting fish and wildlife habitat and biodiversity.
- The standard and guideline in Alternative 6 that requires project-level analysis of ways to reduce excessive human-caused wolf mortality has been changed to require such analyses to evaluate the effects of human access to the project area via all roads, not just roads open to vehicular traffic as included in Alternative 6. This change is explained further in the section of this ROD dealing with protecting fish and wildlife habitat and biodiversity.

[4] The 1997 ROD recommended that portions of 32 rivers, lakes, and streams be added to the National Wild and Scenic Rivers System. In 1998, the Acting Forest Supervisor determined that the 1997 recommendation for Niblack Lakes and Streams was based on incorrect information related to the area's productivity of anadromous fish, and adopted a non-significant amendment rescinding the recommendation that the Niblack Lakes and Streams system be designated as a component of the National Wild and Scenic Rivers System. I conclude the remaining 31 recommendations should remain in effect.

[5] If the Forest Service chooses to pursue withdrawing the new Experimental Forest from the mining and mineral leasing laws, additional NEPA analysis and public involvement will occur before making that decision.

Timber Sale Program Adaptive Management Strategy

I am keenly aware that my decision to approve an amendment that retains the same ASQ as in the 1997 Forest Plan will be controversial. Some people requested a higher ASQ be adopted, to ensure an opportunity for the timber sector to expand into a fully integrated and competitive industry.[6] Others asked for a lower level, to prevent unnecessary development of roadless areas perceived by some as most environmentally sensitive. Multiple use management requires that such competing demands be balanced in a sustainable manner. I believe my decision accomplishes this difficult task. A detailed explanation for my decision, including why I believe it responds to these concerns and how it remedies the inadequacies identified by the court, is provided below in the "Rationale for the Decision" section of this ROD. To further balance the competing demands and respond to requests for additional protection of roadless areas, I am also approving the Timber Sale Program Adaptive Management Strategy. As mentioned above, the decision to approve this Strategy is in addition to the decision components that are required by NFMA and its implementing regulations.

Under the Timber Sale Program Adaptive Management Strategy, actual operation of the timber sale program will be implemented in three phases, as determined by actual timber harvest levels. In Phase 1, the timber program will be restricted to a portion of the suitable land base that excludes moderate and higher value roadless areas[7]. The map of the Strategy is included on the CD of the Final EIS, and is also available on the internet at *www.fs.fed.us/r10/tongass/*. This Phase 1 portion includes approximately 537,000 suitable acres, or 69 percent of the total suitable land base. Should the actual level of timber harvest reach 100 MMBF for two consecutive fiscal years, the Tongass could then plan for timber projects in the Phase 2 portion of the approved suitable land base, resulting in a program that operates on 680,000 acres of suitable lands, including some moderate value roadless areas. Should timber harvest reach 150 MMBF for two consecutive fiscal years, the Tongass could then plan for timber projects in Phase 3, which includes the entire suitable land base. A more detailed explanation of the Timber Sale Program Adaptive Management Strategy and my reasons for adopting it are provided in the Implementation section of this ROD.

As mentioned previously, the Timber Sale Program Adaptive Management Strategy is an additional step being taken in response to concerns that an overestimate of timber demand will lead to timber harvest in areas perceived by many as more environmentally sensitive--such as higher value roadless areas--that would not have to be developed if the Plan were based on a lower estimate of timber demand. It is very difficult to estimate long-term timber demand with a high degree of precision and confidence when local, regional, and global market conditions are constantly changing. Therefore, the Timber Sale Program Adaptive Management Strategy—in conjunction with the amended Forest Plan--addresses the Ninth Circuit court's finding that, if the 1997 Tongass Forest Plan Revision EIS had provided decision makers and the public with the correct market demand forecast, an alternative may have been selected with less environmental impact and in less environmentally sensitive areas.

The Forest Service has a statutory obligation to seek to meet market demand for timber from the Tongass National Forest, both the annual demand and demand for each planning cycle of 10-15 years, subject to other applicable law and to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources.[8] I am confident that the amended Forest Plan continues to meet these other resource goals, including recreation and the maintenance of biological diversity, as described in the Rationale for the Decision section of this ROD. I am also concerned that the current timber industry in Southeast Alaska is not sustainable at the current harvest levels, or with uncertain future timber harvest levels. Accordingly, it is prudent to keep options open so that

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[6] For the purposes of this ROD, an integrated timber industry is one with local milling and processing facilities for each kind of log that comes from harvest operations on the Tongass National Forest. Competition is created between processors for similar supply needs.

[7] The term "roadless area" is a generic term that is sometimes used to refer to all areas without roads. For the purpose of this ROD, it is used to refer to inventoried roadless areas, as discussed in detail in the section of this ROD titled "Rationale for the Decision."

[8] See the market demand portion of the Rationale for the Decision section for a detailed discussion of this issue.

the timber industry in Southeast Alaska can evolve in response to long-term market developments, including a significant expansion if demand for timber rises substantially in the future. As long as other competing demands are being met, it is important to avoid constraining the lands available for timber harvest so much that it is impossible for the timber industry to expand in response to future market developments. At the same time, however, it is not necessary to schedule timber harvest in higher value roadless areas, unless timber harvest levels rise sufficiently to warrant such an expansion into these sensitive areas.

Adaptive management principles suggest we respond to uncertainty by adopting a flexible management system that balances the short- and long-term social, economic, and environmental risks and adjusts promptly if conditions change. The Timber Sale Program Adaptive Management Strategy, along with all the other conservation measures in the amended Forest Plan, is just such a system. Together, the amended Forest Plan and Adaptive Management Strategy do not guarantee an expansion of the timber industry; nor do they prohibit development in all roadless areas. Rather, they keep options open for expansion of the industry (within the ASQ approved in this Plan), while protecting areas that are perceived as more environmentally sensitive as much as possible for as long as possible. My confidence in this Strategy is further strengthened by the expected increase in young-growth[9] management over the next few planning cycles; and the increasing public interest in this conversion, which will ultimately reduce the need for old-growth timber resources and the associated need for development in roadless areas.

This is discussed in greater detail in the section of this ROD describing the rationale for the decision.

Alternatives Considered

Numerous EISs have been published as part of the development of the 1997 Forest Plan; together these EISs have considered dozens of alternatives. A Draft EIS was published in 1990, a Supplement to the Draft EIS in 1991, a Revised Supplement to the Draft EIS in 1996, a Final EIS in 1997, a Draft Supplemental EIS (addressing only whether additional wilderness should be proposed) in 2002, and a Final Supplemental EIS regarding additional wilderness in 2003. As displayed in Table 2 below, these EISs considered in detail 39 different alternatives, many of which appeared in more than one EIS. Further information on the evolution of the alternatives considered is provided below in the discussion of alternatives not analyzed in detail. In addition, Chapter 2 of the Final EIS for this Amendment provides a detailed description of the evolution of the alternatives considered.

[9] The term “young growth” refers to areas where trees have been removed by timber harvest, fire, insects, disease, or windstorms, and then grown back.

Table 2
Statistics for 39 Tongass Forest Plan Alternatives Considered in Detail; 1990 – 2003

Alternative No. and Source	ASQ [1] (MMBF annual)	Suitable lands (Acres X 1,000)	Non-Development LUDs (Acres X 1,000)	Development LUDs (Acres X 1,000)
1 1997	0	0	16,700	200
1 1996	0	74	16,700	200
6 2003	92	344	15,700	1,200
8 2003	96	351	15,700	1,200
5 1997	122	786	12,100	4,800
4 1997	130	845	11,700	5,200
5 1996	139	1,400	12,100	4,800
4 1996	145	1,507	11,700	5,200
7 2003	174	521	14,300	2,600
5 2003	209	589	13,800	3,100
A 1990	217	536	13,600	3,300
3 2003	236	620	13,500	3,400
3 1997	256	795	12,700	4,200
1 2003	259	664	13,200	3,700
2 2003	259	664	13,200	3,700
4 2003	259	664	13,200	3,700
11 1997	267	676	13,200	3,700
3 1996	278	1,188	12,600	4,300
10 1997	300	924	12,700	4,200
6 1997	309	1,024	12,100	4,800
E 1990	336	717	11,600	5,300
A 1991	355	1,173	13,700	3,200
6 1996	362	1,400	12,100	4,800
8 1996	364	1,389	10,500	6,400
B 1991	413	1,360	13,000	3,900
B 1990	425	1,101	12,900	4,000
2 1997	463	1,180	11,700	5,200
F 1990	467	1,111	11,000	5,900
G 1990	468	1,112	11,000	5,900
2 1996	489	1,526	11,700	5,200
P 1991	502	1,649	11,700	5,200
9 1996	513	1,869	10,800	6,100
C 1990	540	1,200	10,500	6,400
C 1991	541	1,732	11,200	5,700
9 1997	549	1,390	10,800	6,100
D 1991	568	1,818	11,400	5,500
7 1997	640	1,575	9,100	7,800
D 1990	660	1,575	9,100	7,800
7 1996	689	2,044	9,100	7,800

Notes:
Sources: 1990 Draft EIS, 1991 Supplement to the Draft EIS, 1996 Revised Supplement to the Draft EIS, 1997 Final EIS, and 2003 Supplemental EIS)
[1] All ASQ figures in this table are shown as total volume, including net sawlog plus utility. The 1990 Draft EIS and the 1991 Supplement to the Draft EIS display ASQ figures as net sawlog only. Therefore, figures in this table for alternatives displayed in those documents do not match the figures originally published.

Development of Alternatives Included in the Draft EIS

As noted in the Final EIS, one of the fundamental objectives that guided the development of alternatives for the Draft EIS on the 2008 Forest Plan Amendment was to exclude roadless areas from the development LUDs (the Land Use Designations that allow timber harvest and road construction) as much as possible in each alternative. Because the Tongass has so little developed land, this is possible only at very low levels of timber harvest. Therefore, planners assessed each inventoried roadless area using the Wilderness Attribute Rating System, the only nationally established methodology for evaluating the quality of roadless areas, as well as their fish and wildlife values, recreation and subsistence values, and other multiple use values. They also gave extra consideration to 18 areas of special interest identified by the Under Secretary of Agriculture in the ROD he issued in 1999, and to 23 areas that would have been designated as wilderness under a bill passed by the House of Representatives in 1989. The development of alternatives was guided by these considerations and, at each stage, as an alternative with a higher level of timber harvest was being developed, the minimum amount of roadless acres were added to the development LUDs, starting with lower value roadless areas. In this way, at each level of timber harvest associated with each of the alternatives, development is allowed in roadless areas only to the extent necessary to achieve the multiple use objectives of the alternative, including timber production; each alternative excludes the higher value roadless areas from the development LUDs as much as possible. Alternatives were modified in response to public comments received on the Draft EIS, as explained in the section of this document dealing with minimizing effects on roadless areas.

In deciding which of the previously evaluated alternatives to analyze in this EIS, consideration was also given to alternatives that had been reviewed by the wildlife risk assessment panels that were formed during the development of the 1997 Forest Plan. This objective was accomplished for four of the seven alternatives. Given that the risk assessment panels showed a high correlation between development acres and the risk they assigned to an alternative, coupled with the fact that the harvest levels of all alternatives considered in detail in the 2008 Final EIS were bracketed by alternatives evaluated by the risk assessment panels, viability risk levels could be readily assigned to all alternatives. See Appendix D of the Final EIS for details on the application of the risk assessment panels to the alternatives considered in the 2008 Final EIS.

Alternatives Considered in Detail, Including the No-Action Alternative

Alternative 1

Compared to the 1997 Forest Plan, Alternative 1 would give much greater emphasis to maintaining roadless areas, associated fish and wildlife values, and recreation, tourism, and subsistence opportunities in undeveloped areas. In response to public comments on the Draft EIS, this alternative was modified to preclude timber harvest in all roadless areas. Development LUDs on Kuiu Island, Baranof Island, much of Chichagof Island, the Yakutat area, and essentially all of the mainland also were changed to non-development LUDs in response to comments on the Draft EIS. Consequently, no scheduled timber harvest or road construction would be allowed on these areas under Alternative 1. The standards and guidelines of the 1997 Forest Plan dealing with foraging habitat for the northern goshawk and with high value habitat for the American marten would be replaced with a new legacy standard and guideline. A total of 839,000 acres of the Tongass would be in development LUDs, 15.9 million acres would be in non-development LUDs, and 144,000 acres, including 86,000 acres of old growth, would be in the suitable land base. This alternative would have an average annual ASQ of 49 MMBF.

Alternative 2

Compared to the 1997 Forest Plan, Alternative 2 would give additional emphasis to maintaining roadless areas, associated fish and wildlife values, and recreation, tourism, and subsistence opportunities in undeveloped areas, but not as much as Alternative 1. Timber harvest would be allowed in areas where roads have already been constructed, and in roadless areas with lower wilderness attribute ratings (primarily those adjacent to developed areas). The vast majority of current roadless areas would remain in a natural condition. The goshawk foraging habitat and high value marten habitat standards and guidelines of the 1997 Forest Plan would be replaced with a new legacy standard and guideline. A total of 1.9 million acres of the Tongass would be in development

LUDs, 14.8 million acres would be in non-development LUDs, and 394,000 acres, including 215,000 acres of old growth, would be in the suitable land base. This alternative would have an average annual ASQ of 151 MMBF, and closely matches the recommendations provided by The Nature Conservancy for the protection of intact watersheds.

Alternative 3

Compared to the 1997 Forest Plan, Alternative 3 would give some additional emphasis to maintaining roadless areas, associated fish and wildlife values, and recreation, tourism, and subsistence opportunities in undeveloped areas. Timber harvest would be allowed in areas where roads have already been constructed, and in many roadless areas within the suitable land base, which excludes higher value roadless areas identified in previous planning or congressional wilderness proposals. The vast majority of current roadless areas Forest wide would remain in a natural condition. The goshawk foraging habitat and high value marten habitat standards and guidelines of the 1997 Forest Plan would be replaced with a new legacy standard and guideline. A total of 2.8 million acres of the Tongass would be in development LUDs, 14 million acres would be in non-development LUDs, and 514,000 acres, including 313,000 acres of old growth, would be in the suitable land base. This alternative would have an average annual ASQ of 204 MMBF.

Alternative 4

Compared to the 1997 Forest Plan, Alternative 4 would give greater emphasis to timber production and associated economic stability of Southeast Alaska communities. Timber harvest would be allowed in a more extensive area than under the 1997 Forest Plan. While the majority of current roadless areas would remain in a natural condition, roadless areas outside of wilderness that contain substantial productive old growth would be subject to timber harvest and road construction. Alternative 4 would use a conservation strategy with a smaller number of reserves than the 1997 Forest Plan strategy; the old-growth reserve system would be applied within four biogeographic provinces (North Central Prince of Wales Island, Kupreanof/Mitkof Islands, Dall Island, and Northeast Chichagof Island) plus several individual reserves outside of these provinces. In addition, a minimum of 33 percent of productive forest land would be retained in an old-growth condition in each Value Comparison Unit.[10] The goshawk foraging habitat, high value marten habitat standard and guideline and the proposed legacy standard and guideline would not be included in the Forest Plan under Alternative 4. The goshawk nesting standard and guideline would also not be included. A total of 4.7 million acres of the Tongass would be in development LUDs, 12.0 million acres would be in non-development LUDs, and 892,000 acres, including 656,000 acres of old growth, would be in the suitable land base. This alternative would have an average annual ASQ of 312 MMBF in the first decade (and 360 MMBF in subsequent decades).

Alternative 5

This is the No Action alternative. It represents a continuation of the 1997 Forest Plan, as previously amended, and would result in a mix of National Forest uses and activities. Timber harvest would be allowed in an area more extensive than under Alternative 3, but less extensive than under Alternative 4. The vast majority of current roadless areas Forest wide would remain in a natural condition. A total of 3.6 million acres of the Tongass would be in development LUDs, 13.2 million acres would be in non-development LUDs, and 687,000[11] acres, including 463,000 acres of old growth, would be in the suitable land base. This alternative would have an average annual ASQ of 267 MMBF.

[10] Value Comparison Units are approximately 950 distinct geographic areas delineated on the Tongass to provide a common set of areas for resource inventories and analysis. They generally follow watershed boundaries.

[11] This figure does not match that provided in the 1997 Final EIS due to updated inventory information, land adjustments, and previous Forest Plan amendments.

Alternative 6

This is the alternative identified as the Proposed Action in the Draft EIS. It is very similar to Alternative 5 (No Action) in terms of LUD allocations; however, it includes refinements to the boundaries of small old-growth reserves, new Geologic Special Interest Areas, a new Experimental Forest proposal, the conversion of a large area of Remote Recreation LUD north of Juneau to Semi-Remote Recreation, the conversion of development LUD areas on Chichagof and Kupreanof Islands to Semi-remote Recreation, and other minor LUD refinements. Timber harvest would be allowed in an area more extensive than under Alternative 3, but slightly less extensive than under Alternative 5. The vast majority of current roadless areas Forest wide would remain in a natural condition. The goshawk foraging habitat and high value marten habitat standards and guidelines of the 1997 Forest Plan would be replaced with a new legacy standard and guideline. A total of 3.5 million acres of the Tongass would be in development LUDs, 13.3 million acres would be in non-development LUDs, and 663,000 acres, including 445,000 acres of old growth, would be in the suitable land base. This alternative would have an average annual ASQ of 267 MMBF.

Alternative 7

Compared to the 1997 Forest Plan, Alternative 7 would give much greater emphasis to timber management. Timber harvest would be allowed in a more extensive area than under the 1997 Forest Plan. While the majority of current roadless areas would remain in a natural condition, most roadless areas outside of wilderness that contain substantial productive old growth would be subject to timber harvest and road construction. The Beach and Estuary Fringe buffer would be reduced from 1,000 to 500 feet and buffers on Class III streams would not be required. The Old-Growth Habitat LUD and its management prescription would not be used. The standards and guidelines for goshawk foraging habitat, high value marten habitat, and legacy would not be included in the Forest Plan under Alternative 7. The goshawk nesting standard and guideline would also not be included. A total of 5.0 million acres of the Tongass would be in development LUDs, 11.7 million acres would be in non-development LUDs, and 1,070,000 acres, including 807,000 acres of old growth, would be in the suitable land base. This alternative would have an average annual ASQ of 421 MMBF. Alternative 7 was incorporated in the NEPA analysis at the request of the Southeast Conference.

Alternatives Considered but not Analyzed in Detail

As mentioned above, the Forest Plan revision process started in 1987 and resulted in the development of numerous environmental documents, which cumulatively described dozens of alternatives. Each of these alternatives was considered for detailed study and comparison in the Draft EIS for the 2008 Forest Plan Amendment, in their original form or in a modified form. Altogether, 49 alternatives were considered for detailed study prior to the selection of the EIS alternatives; 39 based on past alternatives (which formed the basis for Alternatives 1, 3, 4, 5, and 7), and 10 new ones (which formed the basis for Alternatives 2 and 6). These alternatives were considered in light of the key issues and the purpose and need. They ranged in ASQ, the maximum amount of timber that can be sold on an average annual basis, from 0 to almost 700 MMBF per year. Development LUD acres in these alternatives ranged from a few hundred acres to almost 8 million acres, and suitable forest lands ranged from 0 to over 2 million acres. Chapter 2 of the Final EIS contains a more thorough discussion of the alternatives not analyzed in detail.

The Environmentally Preferable Alternative

The Council on Environmental Quality (CEQ) regulations for implementing NEPA require that the Record of Decision specify “the alternative or alternatives which were considered to be environmentally preferable” (40 CFR 1505.2(b)). This alternative has generally been interpreted to be the alternative that will promote the national environmental policy as expressed in NEPA’s Section 101 (CEQ’s “Forty Most-Asked Questions”, 46 *Federal Register*, 18026, March 23, 1981). Ordinarily, this means the alternative that causes the least adverse effect to the biological and physical environment. Alternative 1 of the Final EIS is the environmentally preferable alternative.

Rationale for the Decision

Summary

I reached my decision to select Alternative 6 with the modifications described in this ROD, and to approve the Tongass Timber Sale Program Adaptive Management Strategy, after a comprehensive review and careful consideration of the relevant ecological, economic, and social potential effects of the Final EIS alternatives. During my consideration of the Final EIS and in reaching my decision, I have been guided by a wide variety of factors. Among the most important of these are how best to respond to problems identified by the Ninth Circuit Court of Appeals in their 2005 decision, many of which were identified as key issues in the EIS, and other considerations including those related to national policy.

The following explanation of why I selected Alternative 6 from among the seven alternatives analyzed in the Final EIS addresses each of these factors in great detail. Another key factor in my decision is compliance of the Forest Plan with applicable laws, regulations, and executive orders, as described in detail in a separate section of this ROD. Here, I want to provide a short summary of my thinking.

When I contemplate all of the information about legal requirements, effects analyses, risk assessments, and all the other factors relevant to this decision, it still comes down to sustainability of the multiple uses and resources of the Forest: How can we best balance the competing demands on the Tongass National Forest, when there is uncertainty about those demands and the effects of trying to meet them? Specifically, how can we best balance:

- Potential risks to fish and wildlife from building roads and harvesting timber with the risks of local mills shutting down if their need for that timber cannot be met?
- Potential adverse effects on recreational use of the Tongass with the level of timber harvest allowed?
- The advantages of an integrated timber industry with the potential resource effects of allowing a sufficient level of timber harvest to enable new processing facilities to be built?

Finally, how do we ensure that higher value roadless areas perceived as most environmentally sensitive are being protected from development as much as possible at whatever rate timber is harvested and roads are constructed?

The most logical approach to me is to deal with fish and wildlife issues first, then with recreation issues, timber demand, issues related to an integrated industry, and protecting roadless areas in that order. This does not reflect any relative value of the issues or the resources, only what I see as the logical order of dealing with them.

Fish and Wildlife Habitat and Biodiversity. The management of habitat to maintain the long-term viability of all Tongass fish and wildlife species as well as to sustain subsistence, recreational, and commercial uses of these resources is a key factor in my decision. This decision relies heavily on the sound scientific foundation developed in the 1997 Tongass Forest Plan, especially the fish and riparian standards and guidelines and the comprehensive wildlife conservation strategy prepared through an interagency collaborative process. All key components of this conservation strategy have been incorporated in the amended Forest Plan. The conservation strategy ensures the maintenance of viable populations of all vertebrate species on the Tongass by means of a comprehensive approach based on principles of conservation biology. Implementation of this strategy also recognizes the State of Alaska's responsibility to provide for sustainable fish and wildlife resources and the human uses of these resources. The old-growth habitat strategy included in the amended Forest Plan is fully responsive to our obligations to manage habitat to maintain viable populations within a multiple-use context. This strategy has been developed through careful analysis and integration of the best scientific information available on this subject, and will minimize fragmentation of old-growth habitat on the Forest.

The strategy includes two major components. First is the system of large, medium and small old-growth reserves well distributed throughout the Tongass. This system of reserves is made up of areas allocated to the Old-Growth Habitat LUD, plus lands in all the rest of the non-development LUDs, which essentially maintain the integrity of the old-growth system. This component provides adequate habitat for old-growth dependent or associated species, and provide for connectivity between reserves in order to prevent genetic isolation of populations. The reserve system protects 72 percent of the existing productive old-growth habitat on the Tongass. The second major element of the wildlife conservation strategy is a series of standards and guidelines applicable to those portions of the Tongass open to consideration for potential timber harvest. The standards and guidelines regulate how development will occur on those areas open to potential development. Standards and guidelines incorporate a species-by-species approach that addresses issues that are more localized or not accounted for in the broader, ecosystem context approach that was incorporated into the old-growth reserve system. These standards and guidelines protect an additional 19 percent of the existing productive old-growth habitat on the Tongass. Between the reserve system and the standards and guidelines that apply to the development LUDs, the amended Forest Plan will protect 91 percent of the existing productive old-growth habitat on the Tongass.

The purpose of both components of the strategy is to ensure the viability of old-growth dependent or associated species. The 1997 ROD concluded that the strategy provided assurance, subject to an acceptable level of risk inherent in projecting management effects, that even if timber were harvested and roads were constructed consistently for a period of 100 years at the Plan’s maximum allowable levels, viable populations of all vertebrate species on the Tongass would remain at the end of that period. Largely because of scientific uncertainty, the conservation strategy (and any other conservation strategy) involves some degree of risk. Therefore, the 1997 Plan did not represent a “no risk” conservation strategy. It represented a balance of wildlife conservation measures that considered the best available scientific information and reflected an acceptable level of risk for continued species viability, based on conservative assumptions.

In the spring of 2006, experts in the field of conservation biology and Tongass-related species came together with agency representatives in a workshop to assess new information from conservation science and species research; discuss the implications of that new information for the underlying assumptions of the conservation strategy; and determine whether there was a need to modify or replace the existing strategy. On the basis of the information presented at the workshop, the Forest Service concluded that the conservation strategy remains valid and appropriate for the long-term management of the Tongass National Forest. Many ideas were discussed at the workshop. The Forest Service considered all of these ideas, and incorporated some of them into the analysis associated with this Forest Plan Amendment. The status and outcome of all topics considered during the workshop can be found in the document titled: Interagency Conservation Strategy Review: An Assessment of New Information Since 1997.

As described in greater detail in a later section of this ROD, the Final EIS describes the potential effects of the Forest Plan on the probability of sustaining viable populations of wildlife species on the Tongass. As I review that information, I am struck by several key points. First, there are no terrestrial species on the Tongass listed as threatened or endangered under the Endangered Species Act. Second, the analysis in the Final EIS indicates no species will trend toward listing with implementation of the Forest Plan. The conclusion of that analysis is that the amended Forest Plan will provide an amount and distribution of habitat adequate to maintain viable populations of vertebrate species in the planning area and will maintain the diversity of plant and animal communities. In addition, the amended Forest Plan has a high likelihood of sustaining populations Forest-wide for the continued subsistence, recreational, and commercial uses of fish and wildlife species.

Recreation and Tourism. As discussed in detail in the section below on this subject, the analysis in the Final EIS suggests that relatively minor changes in the mix of recreational opportunity settings may occur over the next 150 years under the amended Forest Plan. Changes to settings are related to projected levels of future development. The magnitude and rate of these changes will be influenced by the level at which timber harvest and associated road construction occurs. Even if such development occurs at the maximum level allowed under the amended Forest Plan, some of these changes—an increase in opportunities for road-based recreation—will be desirable to some people, and undesirable to others. This may result in users being displaced to other areas where the setting and use patterns are more in line with their expectations and needs. The Tongass National Forest is overwhelmingly pristine and unroaded, and will remain that way under the amended Forest Plan. Therefore, I conclude there will be no significant reduction in recreation and tourism opportunities as a result from implementation of the Forest Plan over the next 10 to 15 years, and some opportunities may be enhanced.

Timber Demand. Based on my confidence in the assurance of maintaining fish and wildlife viability and recreational opportunities, the next question is how to deal with uncertainty related to timber demand. Once again, I recognize that I am making a decision for 10 to 15 years, while considering potential effects over a longer time horizon. In this case, however, if the decision is inadequate to meet the needs of the timber industry over the next 10-15 years, the industry simply will not be around for corrections to be made during the next Plan revision. State and private forest lands in Southeast Alaska are not able to provide an adequate supply to meet the minimum level needed for current mills to remain in operation. There are also questions about whether the industry will expand in the future if a supply of timber is available. Such an expansion would allow the industry to become more efficient and enhance its competitive position, improving its sustainability. While approving a Plan with an ASQ high enough to allow such an expansion will not make it happen; adopting an ASQ that meets only current needs will certainly prohibit it. Therefore, once viability concerns are met, it makes sense to approve a Plan with an ASQ high enough to allow current mills to increase their production to efficient operating levels and provide some room for new processing facilities, which will help maintain a vibrant and diverse economy in Southeast Alaska. As explained in detail in the section of this ROD dealing with market demand, the amended Forest Plan accomplishes that result.

Need for an Integrated Forest Products Industry in Southeast Alaska. Beyond the question of what the market demand for timber is likely to be over the next 10 to 15 years, I also considered what supply would be needed to provide an opportunity to reestablish an integrated forest products industry in Southeast Alaska. As explained in detail in the section of this ROD on this subject, the existing timber industry in the region has been at a competitive disadvantage in world markets since the closure of the pulp mills in the 1990s. Reestablishing an integrated industry, including processing facilities for all types of material harvested on the Tongass, would require a reliable supply of economic timber from the Forest. Providing an opportunity for additional processing facilities to be established is an important step to ensuring the economic sustainability of the industry. An integrated industry would make commercial thinning more economically feasible, allowing more restoration work in watersheds where past practices have led to degraded ecological conditions. If local processing facilities can be established for utility[12] logs, they would no longer be left in the woods. Accordingly, establishment of an integrated industry would further the goals of ecological, as well as economic, sustainability. I selected Alternative 6, which has an ASQ substantially above recent harvest levels, in part to provide such opportunities—and to ensure they are not foreclosed.

Minimizing Effects on Roadless Areas. Having met requirements dealing with viability, recreation, and timber demand, and having provided opportunities for the development of an integrated timber industry, we turn finally to minimizing effects on roadless areas. Paramount among these concerns is how to ensure that development occurs first on the lower value roadless areas, since the ASQ of the Forest Plan is considerably above recent harvest levels, while protecting the higher value roadless areas and those perceived as more environmentally sensitive as much as possible. The amended Forest Plan and Adaptive Management Strategy limit timber harvest to lower value roadless areas unless harvest levels rise sufficiently to warrant allowing timber harvest in moderate value and higher value roadless areas.

[12] Utility logs are those with so much rot or otherwise of such poor quality that they cannot be sawn into lumber. They are relatively common in old-growth forests, comprising approximately 15 percent of the volume of timber cut on the Tongass. For safety and logistical reasons, such trees within a timber harvest unit must be purchased and cut down, even though the purchaser may have no use for them. In recent years, they have often been cut down and left in the woods.

Conclusion. For the reasons described above, I conclude that my decision to approve the amended Forest Plan and the Timber Sale Program Adaptive Management Strategy meets all legal requirements, and best balances the many competing demands on the Tongass National Forest. The conservation strategy included in the amended Forest Plan ensures that healthy populations of wildlife will remain across the Tongass; the Adaptive Management Strategy protects higher value roadless areas; the LUD allocations and standards and guidelines minimize effects on recreation and tourism; and the ASQ associated with the LUD allocations and management direction provides opportunities for the timber industry to expand sufficiently to become more integrated and competitive in world markets. In short, my decision ensures the sustainability of the multiple uses of the Tongass and of the outstanding natural resources of the Forest that we all treasure.

I recognize that there is enormous value in maintaining the Tongass for the suite of ecosystem services it provides to the world. More detail on the difficulty of monetizing these values is discussed below, yet there is no doubt they exist, and I have given them full consideration. People come to Alaska to catch salmon; to see bears; to see bears catching salmon; to enjoy the tranquility of an old-growth forest – forests with and without roads. People come here to boat on pristine coastal waters; to see whales and other marine mammals. Hunters come here to pursue deer and bears on these mountainous islands; some of them by car, and others preferring a more rugged and isolated experience in our many roadless areas. I believe all of these visitors, like many Alaska residents, treasure the abundant populations of fish and wildlife species dependent on the Tongass and its old-growth forests. This nature-based tourism is a valuable industry for Southeast Alaska. These rainforests are also critical to another important Southeast Alaska industry, commercial fishing. Well protected streams and their clean, cool waters are critical for large and lucrative salmon runs, on which both humans and animals thrive year after year. Trees are another valuable, renewable resource the Tongass has to offer. Trees are valuable in many forms--standing on the ground; downed, dead and decomposing on the forest floor; and sitting on a log truck headed for a local saw mill. The latter is a form that can provide for an important and sustainable industry that contributes to a diverse economy, without detracting from the other values I recognize as important to the public. Simply put, on a forest as vast as the Tongass, which is blessed with an abundance of these renewable resources, I believe it is important to maintain opportunities for all uses to occur, and at a scale which is both beneficial to local communities and respectful of broader national interests. Managed in a sustainable and environmentally sensitive manner, I believe the Forest Service can provide the raw materials of the Tongass to support a healthy wood products industry, a growing tourism industry, and a robust fishing industry in perpetuity. I am confident that the amended Forest Plan I am approving today can achieve that result.

The remaining portions of this section explain in detail the rationale for my decision, starting with an elaboration of the considerations described above, including how they relate to problems identified by the Ninth Circuit Court of Appeals in its 2005 opinion, and to the key issues identified in the Final EIS.

Protecting Fish and Wildlife Habitat and Biodiversity

Background

NFMA requires the Secretary of Agriculture to specify "guidelines for land management plans developed to achieve the goals of the Program which … provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives…" (16 U.S.C. 1604(g)(3)(B)). In accord with this diversity provision, the Secretary promulgated a regulation that provides in part: "Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area." (36 CFR 219.19.)

The scientific community and courts recognize that NFMA does not create a concrete, precise standard for diversity. The Committee of Scientists that provided scientific advice to the Forest Service on the drafting of NFMA regulations stated that "it is impossible to write specific regulations to ‘provide for’ diversity” and “there remains a great deal of room for honest debate on the translation of policy into management planning requirements and into management programs” (44 Fed. Reg. 26,600-01 & 26,608).

In this planning context, absolute certainty is not possible. This has led to a planning process which involves risk projections regarding the distribution of species over the next 100 years. Numerous factors, which vary according to the characteristics of the ecosystem examined, are considered in evaluating risk. Some common factors include the life history of the species, the current amount and distribution of habitat, the amount and distribution of species’ ranges within the planning area, and other reasonably foreseeable protective measures. In as biologically diverse and expansive an area as the Tongass, much of this type of information is evolving. Moreover, even absent any human-induced effects, the likelihood that habitat will continue to support species’ persistence can vary among species. For example, the continued persistence of local rare endemic species whose entire range may comprise only a few acres is intrinsically insecure. Thus, compliance with the regulation is a matter of assessing risk, which is not subject to precise numerical interpretation and cannot be fixed at any one single threshold. Because long-term risk varies among species, even when using the best scientific projections available, it is also necessary to follow-up with rigorous monitoring of select key species and their habitats to ensure that populations remain healthy, particularly in areas of the Forest with higher levels of timber harvest. These monitoring expectations and commitments are described in Chapter 6 of the Forest Plan, titled “Monitoring and Evaluation.”

In determining compliance with the NFMA fish and wildlife resource regulation, I have considered existing and reasonably foreseeable conservation measures. In addition to the Plan’s land allocations (which protect 78 percent of the Forest in non-development LUDs) and standards and guidelines, other possible measures include activities undertaken pursuant to internal policy directives (e.g., the Forest Service’s sensitive species program) and steps taken during project planning. The one issue that remains uncertain and could, in the future, alter assumptions made in the Final EIS is the effects of climate change. Consequently, it is important for the Tongass to stay abreast of the evolving scientific information related to the effects of climate change and how this may affect fish and wildlife populations. However, the state of current knowledge and the uncertainty about the specific effects of climate change leads me to conclude that the best course of action today is continued management of the Tongass for resiliency in the face of uncertain but anticipated change. This will be done primarily through the maintenance of the conservation strategy, coupled with a robust monitoring plan that will allow for management intervention if and when effects of climate change are more certain. I have determined that the combination of providing for an amount and distribution of habitat adequate to maintain viable populations of vertebrate species in the planning area and increased emphasis on monitoring climate-related changes is a reasonable solution.

Summary

The Final EIS describes the potential effects of the Forest Plan on the probability of sustaining viable populations of wildlife species on the Tongass. The conclusion of that analysis is that the Forest Plan will provide an amount and distribution of habitat adequate to maintain viable populations of vertebrate species in the planning area and will maintain the diversity of plant and animal communities. That conclusion is based in large part on viability risk assessments prepared by panels of experts for the 1997 Plan. Based on these assessments and all the other analyses, the 1997 Forest Plan EIS estimated that there was a moderate to very high probability of maintaining sufficient habitat to maintain viable populations of wildlife species on the Tongass under the 1997 Plan. The risks associated with the 1997 Plan were related to the scientific uncertainty of projecting long-term effects of management actions. I believe those probability estimates are very conservative for the following reasons:

- The viability risk assessments assumed continuous timber harvest at the maximum level allowed under the Plan (the ASQ level of 267 MMBF annually) for 100 consecutive years, with no change in applicable standards and guidelines during that entire period. In essence, they did not assess the risks associated with a 10- to 15-year decision, but with a 100-year decision.

- Risks that viable populations would not be maintained are generally low, would only arise several decades into the future, and then only if timber were continuously harvested at or near the maximum ASQ level.
- Timber has not been harvested on the Tongass at or near the maximum ASQ level throughout a single planning cycle, let alone several. The first Tongass Forest Plan was adopted in 1979, and was in effect through May of 1997. It had an annual average ASQ of 549 MMBF of total volume.[13] Total volume harvested from 1980 through 1996 averaged 327 MMBF annually, only 60 percent of the ASQ. Since adoption of the 1997 Forest Plan, total volume harvested has averaged 84 MMBF annually, only 32 percent of the annual average ASQ of 267 MMBF. I do not expect timber to be harvested at a continuous rate of 267 MMBF over the next planning cycle of 15 years, let alone 100 years.
- If timber harvest rises to 267 MMBF annually over the next 10-15 years, or even beyond that level in the future, the planning process ensures that any issues that may emerge regarding sustaining viable populations of wildlife species on the Tongass will be addressed. Plans must be revisited through a public process every 10-15 years. Each time, the latest scientific information is examined to determine what changes may be needed. The Forest Service and other State and Federal agencies will continue to monitor implementation of the Forest Plan and its results. If a viability-related problem were to develop, it would not go unnoticed—it would be addressed.
- Standards currently in effect are far more protective than those of 20 or 40 years ago. It is highly likely that standards will continue to become more effective over the next several decades through adaptive management as the scientific understanding of how to minimize the adverse environmental effects of human activities continues to improve.

I want to be clear that I believe the analysis displayed in the Final EIS of potential effects on wildlife is valid. Land management decisions must consider very long-term potential effects to ensure they are sustainable. To estimate such potential effects, assumptions must be made about what management direction will apply in the future. It would be impossible to predict what changes in policy might be made over the next 100 years. Yet I am not making a 100-year decision today; I am making a 10- to 15-year decision. Experience tells us that standards do become more effective over time, and timber is not harvested at maximum allowable levels for long, if ever. While the members of the viability assessment panels may have concluded there is no scientific basis upon which to make different assumptions, the ones made are very unlikely to occur, and render the viability analyses something close to a "worst case scenario." Consequently, while I am mindful of the fact that there are some long-term viability risks associated with implementing the Forest Plan over the next 10 to 15 years, I believe those risks are very small. For example, Chapter 3 of the Final EIS indicates that 92 percent of the productive old-growth forest that ever existed on the Tongass remains today. Over the next 15 years, even if timber is harvested at the maximum rate allowed under the amended Forest Plan over that entire period, less than 3 additional percent would be harvested and 89 percent of the original productive old-growth forest (97 percent of the existing productive old growth forest) would remain. I believe the risks associated with this level of activity are completely acceptable. Moreover, I am confident that any problems that may surface in the future will be addressed through the public planning process. Accordingly, I am as certain as I can be that this decision ensures the maintenance of viable wildlife populations as required by NFMA. A more detailed discussion of issues related to viability is provided below.

The Old-Growth Habitat Reserves

The amended Forest Plan strengthens the protection of old-growth habitat in two ways. First, it improves the network of small old-growth reserves through work completed by an interagency team.

[13] The ASQ of the 1979 Plan was expressed as 450 MMBF, which counted sawlog only. The 549 MMBF figure includes utility volume as well, as displayed in the 1997 Final EIS for the Tongass Forest Plan Revision.

Biologists from the State of Alaska, U.S. Fish and Wildlife Service (FWS), and the Forest Service reviewed nearly 300 small old-growth reserves identified in the 1997 Forest Plan and recommended reconfigurations for many of them. My decision acts on those recommendations. The amended Forest Plan includes an updated set of old-growth reserves that is approximately 90,000 acres larger than the old-growth reserve system contained in the 1997 Plan. Some 13 old-growth reserves require more analysis at the project level before any changes are made, as described in Appendix K of the Forest Plan. My decision enhances the network of small old-growth reserves by incorporating habitat protections identified through the interagency review; for example, the need to protect narrow habitat corridors known as “pinch points” that connect larger patches of habitat. At the same time, the changes in the small old-growth reserves will reduce operational conflicts, such as problems encountered when gaining access to suitable timber lands.

The second enhancement in old-growth protection is a substantial increase in the amount of land allocated to other non-development LUDs. By increasing these allocations by 69,000 acres, the amended Forest Plan is expected to be more beneficial with respect to wildlife habitat than the 1997 Plan.

The Tongass now has an estimated 4,951,000 acres of productive old-growth forest. Changes in this amendment will increase the portion of productive old growth in non-development LUDs from 71 percent under the 1997 Forest Plan to 72 percent. Another 19 percent of productive old-growth forest will be protected by the standards and guidelines that apply to the development LUDs. Overall, the amended Forest Plan protects 91 percent of the existing productive old growth on the Tongass National Forest. Not all of that is of equal value in terms of wildlife habitat quality. Many believe that high-volume old growth is higher quality habitat. An even smaller subset of the old-growth forest—the large-tree old growth--is also often perceived as higher quality wildlife habitat. The large-tree category is characterized by stands that have a coarse canopy texture and typically contain the largest trees and the highest timber volumes. The amended Forest Plan protects over 90 percent of the existing high-volume old growth on the Tongass National Forest, and 89 percent of the existing large-tree old growth. Appendix D of the Final EIS discusses these considerations in more detail, as does the Biodiversity section of Chapter 3 of the Final EIS. Based on my review of these analyses, I am confident that the amended Forest Plan ensures that high quality wildlife habitat will remain abundant on the Tongass National Forest.

Standards and Guidelines That Apply in Development LUDs

Another component of the old-growth conservation strategy, management standards and guidelines, applies to lands not contained within the system of old-growth reserves. Rather, these standards and guidelines apply to those lands with LUD allocations that provide for the scheduled harvest of timber—the development LUDs. While these LUDs comprise 21 percent of the Forest, only about 4 percent of the Forest would actually be scheduled for potential harvest over the next 100+ years. Within the development LUDs, some standards and guidelines aim to ensure protection of important old-growth habitats and connectivity. Key examples are the 1,000-foot buffers along beaches and estuaries and the streamside buffers protecting riparian zones. Other standards and guidelines preclude or significantly limit logging in areas with high-hazard soils, steep slopes, karst terrain, visually sensitive travel routes and use areas, and timber stands technically not feasible to harvest. All of these key standards and guidelines are maintained in this decision because they protect important resources and serve vital connectivity functions within the network of old-growth reserves.

Some changes to wildlife standards and guidelines are being adopted in this decision. The purpose is to maintain the high level of protections afforded in the 1997 Plan, while also allowing additional flexibility during on-the-ground implementation. The minor changes serve to clarify standards and guidelines that were being either misinterpreted or inconsistently applied. The adoption of a Forest-wide legacy standard and guideline as a replacement of the 1997 goshawk foraging and marten habitat standards and guidelines is a major change. The new standard and guideline applies in watersheds where the level of past or anticipated timber harvest is high. By requiring the retention of forest structural components such as patches of large trees, down logs, and snags (dead trees) after timber harvest in more biogeographic provinces, the legacy standard and guideline will provide beneficial effects to more species in more areas across the Tongass than the standards and guidelines of the 1997 Forest Plan.

The Queen Charlotte Goshawk

Conservation organizations petitioned the FWS to list the Queen Charlotte goshawk subspecies of the northern goshawk (*Accipiter gentilis laingi)* as endangered in May 1994. The FWS has repeatedly determined that listing is not warranted, largely on the basis of protections provided by the conservation strategy in the 1997 Tongass Forest Plan. The most recent status update and finding was published in November 2007. The FWS found that the best available information does not support the listing of the Alaska population segment as threatened or endangered at this time. However, the FWS also concluded that Vancouver Island is a significant portion of the Queen Charlotte goshawk's range and that listing the subspecies in British Columbia is warranted.

I am mindful that the FWS made its non-warranted determination for Alaska goshawks largely on the basis of protections in the 1997 Forest Plan. This is reflected in my decision to maintain the key components of the conservation strategy in the amended Forest Plan, so as to continue providing a high level of protection for the goshawk. However, the decision does include three changes that affect goshawk habitat. These are: 1) adjustments to the network of small old-growth reserves and increases in other non-development LUDs, as described in the preceding section; 2) changes to the goshawk nest buffer standard and guideline; and (3) adoption of a new Forest-wide legacy standard and guideline that replaces the goshawk foraging standard and guideline contained in the 1997 Plan.

The 1997 Tongass Forest Plan EIS estimated that Alternative 11, as displayed in that EIS, had a high likelihood of maintaining viable populations of goshawks well-distributed across the Tongass, even if timber were harvested and roads constructed for 100 years at the maximum levels allowed by Alternative 11. This estimate did not take into account several goshawk-specific measures that were added in the final decision after the assessment was conducted. These measures were added to Alternative 11--the Selected Alternative--to further reduce risk to the goshawk, in recognition that the species had been considered for listing under the Endangered Species Act. One such measure was prescribed for goshawk habitat on Prince of Wales Island, where productive old-growth has been fragmented by past management actions such at timber harvest and road construction. This goshawk foraging standard and guideline, applicable within the most-fragmented watersheds on Prince of Wales Island, sought to retain habitat structure for goshawk nesting, foraging, and dispersal between old-growth reserves.

The Final EIS for the 2008 Forest Plan Amendment considered the cumulative changes in the conservation strategy in describing the potential effects on goshawks. Changes that enhance the old-growth reserve system, as described in the previous section, figure importantly in this analysis. These enhancements include a net addition of acres to the old-growth reserve network; improvements in the configuration of small reserves recommended by the interagency team; and the additions to other non-development LUDs that are part of this decision. The enhanced reserve network in the amended Forest Plan, coupled with the 1,000-foot wide beach buffers and other features that provide habitat connectivity, should provide a similar if not stronger foundation for maintaining goshawk populations across the Tongass. Overall, at least 91 percent of the existing productive old growth (83 percent of all old growth that ever existed on the Tongass) would remain on the Tongass, even if timber were harvested at the maximum level allowed by the Forest Plan for 100 consecutive years. In addition, over this same time period, a significant acreage of young growth that is protected from future harvest (equal to about 5 percent of the original amount of old growth) will be reaching mature forest stages and will also have value as goshawk habitat. For these reasons, I conclude that an abundant supply of habitat suitable for goshawk nesting and foraging will persist across the Tongass.

Because the protection of known goshawk nests is paramount, I am modifying Alternative 6 as displayed in the Final EIS to ensure that confirmed nests will continue to be protected by a 100-acre buffer of old-growth habitat, as required by the 1997 Forest Plan. The amended Forest Plan does, however, make a change to the 1997 Plan to allow some management flexibility in stands where goshawks have been observed but no direct or indirect evidence of a confirmed nest is documented.

Such stands are defined as “probable nest stands.” Under the amended Forest Plan, activities may be allowed within the 100 acres surrounding probable nest stands, but only if—after 2 years of monitoring—there is no additional evidence of goshawk use. A requirement to survey for goshawks prior to timber harvest remains in effect, as does a commitment to monitoring. Therefore, I anticipate that management situations enabled by this change would be rare, and that goshawk populations would not be affected.

As another change relating to goshawks, I am adopting a Forest-wide legacy standard and guideline in lieu of the goshawk foraging standard and guideline contained in the 1997 Plan. This change stems from the desire for a more comprehensive (versus single-species) approach to retaining old-growth structural components in areas of timber harvest, and for more consistency in application across the Forest. The legacy standard and guideline applies to higher risk VCUs across the Forest, whereas the 1997 Plan’s goshawk foraging standard applied just to higher risk VCUs on Prince of Wales Island. Therefore, the beneficial effects of retaining old-growth structure, for example in retaining connectivity and habitat conditions for prey, will apply to goshawks throughout their range on the Tongass National Forest. My decision to adopt this change also responds to operational and economic considerations associated with timber harvest, which is another important objective in this plan. This standard and guideline will be monitored to ensure it functions as expected.

The benefits to wildlife of leaving large trees, snags, and downed logs after timber harvest is well documented in the scientific literature, including studies on goshawk and their primary prey species. However, there is no scientific basis to guide managers as to how much structural material should be retained, and in what configurations, to specifically benefit goshawks and their prey in southeast Alaska. I am basing my decision on research that suggests that retaining clumps of trees is more beneficial than retaining single trees. Clumps receive more use by wildlife and are more windfirm than scattered residual trees. Applying the legacy standard and guideline in required VCUs is expected to achieve the beneficial effects of residual habitat structure that were intended by goshawk standards and guidelines in the 1997 Plan. Additionally, clumped configurations provide an increased measure of operability from a timber harvest standpoint.

An additional feature of the legacy standard and guideline is that it is scaled to take into account the cumulative effects from past and planned forest harvesting. The legacy standard and guideline need not apply in low and moderate risk watersheds, where cumulative effects are low, because protection is afforded by other measures such as non-development LUDs, old-growth reserves, and standards and guidelines designed primarily to address other resource concerns. In high-risk watersheds, where cumulative effects are greater, the legacy standard and guideline provides additional protections, above those other measures. As was intended by the original goshawk standards, the new approach will retain important forest structure where it is most needed, in the higher-risk VCUs. The legacy standard and guideline applies to 49 VCUs across the Forest, including 31 on Prince of Wales Island. This compares to 22 VCUs under the 1997 Plan, under which the goshawk foraging standard applied only to that Island.

I believe that the potential effects to goshawks described in the Final EIS for the 2008 Tongass Forest Plan Amendment are fully consistent with the November 2007 status finding by the FWS. I also believe that the amended Forest Plan provides as much protection for goshawks as was provided by the 1997 Plan. That Plan was estimated to provide a high likelihood of maintaining viable populations of goshawks, even before the goshawk foraging standard and guideline was added to further reduce risk. Moreover, in my view the estimate of viability risk is based on extremely conservative assumptions. This level of risk to goshawk viability would result from this Plan only under the following conditions: timber is harvested annually for 100 years at levels near the maximum allowed, and any needed corrections identified through monitoring and evaluation are not acted on. I believe that such conditions are highly unlikely. During the time the 1979 Forest Plan was in effect, annual harvest levels averaged 60 percent of the maximum level allowed. Since the 1997 Plan was implemented, annual harvest levels have been about one-third of the maximum allowed, and young-growth stands have developed suitable habitat conditions for goshawks faster than predicted. Under the amended Forest Plan, timber may continue to be harvested at rates less than the maximum allowed. A more detailed explanation of the potential effects of the amended Forest Plan is provided in Chapter 3 and Appendix D of the Final EIS.

Alexander Archipelago Wolf

In this decision the Forest Service maintains its commitment to the conservation of the Alexander Archipelago wolf. We will continue to work closely with the Alaska Department of Fish and Game and the FWS on issues related to wolf conservation in Southeast Alaska. Details on how the amended Forest Plan will provide a high likelihood of maintaining viable wolf populations in Southeast Alaska are provided in Appendix D and Chapter 3 of the Final EIS.

This decision does adopt some minor changes to wolf standards and guidelines to improve their effectiveness with respect to near-term and long-term wolf viability concerns described in the 1997 Forest Plan EIS. These changes relate to density thresholds of deer, a primary prey species of wolves; and to potentially unsustainable human-induced mortality.

Long-term maintenance of a deer herd, capable of providing sustainable wolf populations, is an important management objective in the Tongass Forest Plan. The 1997 Plan included a standard and guideline setting a deer population objective, where possible, sufficient to maintain sustainable wolf populations. The amended Forest Plan updates this standard and guideline to reflect new information from wolf research in Southeast Alaska. Additional information is provided in Chapter 3 and Appendix D of the Final EIS.

Another concern in some areas is the potentially unsustainable level of hunting and trapping of wolves, when both legal and illegal harvest is considered. The 1997 Forest Plan EIS acknowledged that open road access contributes to excessive mortality by facilitating access for hunters and trappers. Landscapes with open-road densities of 0.7 to 1.0 mile of road per square mile were identified as places where human-induced mortality may pose risks to wolf conservation. The amended Forest Plan requires participation in cooperative interagency monitoring and analysis to identify areas where wolf mortality is excessive, determine whether the mortality is unsustainable, and identify the probable causes of the excessive mortality.

More recent information indicates that wolf mortality is related not only to roads open to motorized access, but to all roads, because hunters and trappers use all roads to access wolf habitat, by vehicle or on foot. Consequently, this decision amends the pertinent standard and guideline contained in Alternative 6 as displayed in the Final EIS in areas where road access and associated human caused mortality has been determined to be the significant contributing factor to unsustainable wolf mortality. The standard and guideline has been modified to ensure that a range of options to reduce mortality risk will be considered in these areas, and to specify that total road densities of 0.7 to 1.0 mile per square mile or less may be necessary. The wolf standard also requires that both access management on National Forest System lands, and harvest regulations for hunting and trapping, be considered in relation to wolf management objectives.

Chapter 3 and Appendix D of the Final EIS contain details on these plan components relating to wolf viability. I am confident that these measures will ensure adequate protection to sustain viable populations of the Alexander Archipelago wolf. The Forest Service will continue to work closely with the State of Alaska to gather and apply new information to help resolve any future concerns about wolf management.

Endemic Mammals

This decision continues to give special management consideration to animal taxa that are known or suspected of being endemic to Southeast Alaska. Efforts have increased since 1997 to document the distribution of endemic mammals on the Tongass. Forest Service partnerships with other agencies and universities have significantly increased our knowledge of many species. However, gaps remain in the knowledge base, and there is continued concern about risks to species that may be endemic to islands within the Alexander Archipelago.

This decision brings forward from the 1997 Plan the conservation measures for habitat connectivity (described in previous sections), as well as the standards and guidelines for landscape connectivity and endemic terrestrial mammals. This decision also adopts minor changes to these standards and guidelines. For example, it clarifies that the original intent of the landscape connectivity standard was to provide connectivity between large and medium old-growth reserves. As described in an earlier section, enhancements in the network of small old-growth reserves provide protections to important habitat "pinch points," and give additional consideration to connectivity at the watershed scale. The endemic terrestrial mammal standard was modified to allow the use of existing inventory data on endemic mammal distribution when analyzing effects of proposed management projects. Surveys would still be necessary where existing information is not adequate to assess project-level effects.

American Marten

The 1997 Forest Plan EIS estimated that Alternative 11 as displayed in that EIS had a moderate likelihood of maintaining viable populations of American marten across the Tongass for 100 years, even if timber were harvested and roads constructed at the maximum levels allowed by Alternative 11 for that entire period. This moderate likelihood estimate did not take account of additional conservation measures that were added in the subsequent ROD. Alternative 11 was selected in the 1997 ROD, and modified to further reduce risk to marten viability. Several protective measures for marten habitat were added, including a standard and guideline relating to timber harvest practices. The intent of the 1997 marten standard and guideline was to reduce risk in five biogeographic provinces. Marten were judged to be vulnerable in these provinces because large areas of young conifer growth lack the residual old-growth forest structure that is known to be an important marten habitat feature. The standard and guideline aimed to avoid the creation of additional, significant gaps in marten habitat that would limit marten movement and population interactions. It required the retention of downed logs, snags, and green trees to reduce adverse effects of timber harvest on marten habitat, based on research findings that show higher marten use in partially logged areas than in clearcut areas that lack large-wood structure.

Healthy marten populations persist on the Tongass. Recent information suggests that marten populations are stable or increasing across most of the Tongass. Areas on the Tongass with the highest levels of prior timber harvest continue to have stable or increasing marten populations; for example, on Chichagof Island and Prince of Wales Island. Trapping regulations have not changed significantly on the Tongass, indicating the marten supply remains stable. In an earlier section I expressed my view that the viability panel assessments were highly conservative, reflecting a "worst-case scenario." While I am mindful that there are some long-term viability risks associated with the amended Forest Plan, I believe those risks are very small and would only occur if timber were harvested at or near the maximum rate allowed under the Plan throughout the 100-year time horizon.

Recent marten studies in Southeast Alaska confirm the scientific basis for the finding in 1997 that an old-growth reserve system represents a model of marten conservation, especially when supplemented by additional measures to protect habitat in areas where timber harvest is allowed. Studies show that marten home ranges include some areas where timber harvest and roads have reduced the old-growth cover. These and other studies indicate that the quality and quantity of available prey are very important factors influencing marten abundance and distribution.

Reflecting these findings, the amended Forest Plan incorporates three changes that affect marten habitat. First, it adopts the enhancements to the network of small old-growth reserves and the increases in other non-development LUDs that I have already described. Second, it incorporates the Forest-wide legacy standard and guideline as a replacement for the marten standard and guideline. And third, it clarifies when to consider road density management for marten.

As previously mentioned, research supports the network of old-growth reserves as the critical foundation for marten conservation on the Tongass National Forest. Enhancements in the network of small reserves, coupled with the 1,000-foot wide beach buffers and other measures for habitat connectivity, also favor the outlook for marten conservation.

I have already described the change to the legacy standard and guideline in the section on the Queen Charlotte goshawk. Adoption of the legacy standard and guideline will retain important forest structure where it is most needed, in the higher-risk VCUs throughout the Forest. The residual structure is expected to serve as suitable foraging and dispersal habitat for marten in the short term, reducing adverse effects of timber harvest on marten habitat.

Marten encounter a mosaic of habitat conditions in Tongass landscapes, including natural patterns of fragmentation associated with muskegs, windthrown stands, and other openings. While marten spend most of their time in mature and old-growth forests, studies have documented marten movements through a variety of habitats including non-commercial forest and clearcuts with established conifer cover. When applied in a typical timber sale layout, the legacy standard and guideline should produce a mix of openings and clumped residual trees. When the riparian buffers and various other standards and guidelines are factored in, most timber sale units will show a significant presence of residual-tree patches. I anticipate that the patchy character of harvest units, embedded within managed watersheds in which old growth is retained for a variety of reasons including operational constraints and beach and riparian buffers, will provide habitat conditions adequate to sustain marten prey populations. Forest Plan monitoring will check to ensure that old-growth structure is retained within units as directed by the legacy standard and guideline. Adjustments can be made through adaptive management if monitoring determines that habitat objectives are not being met.

The 1997 Plan contained a Forest-wide marten standard and guideline relating to road density. This standard is clarified in the amended Forest Plan, as follows. Road access is to be considered as an issue for marten management only when there is evidence that mortality is exceeding sustainable levels and that human access on roads is the most significant factor causing this trend. The intent of the standard does not change; rather, the change makes it clearer as to when the standard should be implemented. Other minor edits do not change the intent of the standard, but offer clarifications to support more consistent implementation. The Forest Service will continue to work closely with the State of Alaska to gather new information about marten mortality so that future concerns may be addressed in a timely and collaborative manner.

The mosaic of marten habitat that will be protected under the amended Forest Plan is similar to the marten habitat protection analyzed by the 1997 risk assessment panels, except that the network of old-growth reserves has been enlarged. Connectivity between reserves will be provided by riparian and beach fringe buffers, based on studies that report preferential marten use of riparian zones. The development LUDs will retain significant old-growth habitat. An average of 68 percent of the existing productive old growth (54 percent of what existed before commercial timber harvest began) will remain unharvested in the development LUDs, even if timber is harvested annually at the maximum allowable level for 100 years. Forest wide, 91 percent of existing productive old growth would remain after a century of maximum-rate harvest (83 percent of what existed before commercial timber harvest began). The percent of old growth remaining will vary by biogeographic province; however, VCUs within the highest-risk provinces will have additional protections afforded by the legacy standard and guideline. In addition to these habitat measures, road access will be managed to reduce marten mortality where this factor constitutes a significant risk. Collectively, the various elements of the Tongass marten strategy are expected to increase the likelihood of maintaining viable marten populations throughout the Forest. While habitat gaps may occur, the likelihood that these would cause significant isolation among marten populations is low. The anticipated transition to second-growth harvest, combined with thinning conducted for wildlife in young-growth stands, should improve the conservation picture for marten and their prey in future decades.

I believe that the potential effects to marten described in the Final EIS for the 2008 Tongass Forest Plan Amendment are well within the range of effects predicted in 1997. The 1997 Tongass Forest Plan EIS estimated there would be a moderate likelihood that marten populations would remain viable throughout the Tongass, before marten and landscape connectivity standards and guidelines were added in the 1997 ROD to further reduce risk. The amended Forest Plan also reduces risks to marten viability through increased protective measures for marten above and beyond what the viability panels assessed. These additional measures include increased old growth acres retained in both old growth reserves and other non-developments LUDs; retention of the marten road density and landscape connectivity standards and guidelines; and the addition of the legacy standard and guideline. Furthermore, the level of risk to marten viability described in the 1997 EIS would be realized only under a certain set of conditions, as follows. Timber harvest occurs at or near the maximum limits every year for the next 100 years, and any needed corrections identified through monitoring and evaluation are not acted upon. I believe these are extremely conservative assumptions. Annual timber harvest levels under the 1979 Forest Plan averaged 60 percent of the maximum level allowed. Under the 1997 Plan, annual harvest levels have fallen to 32 percent of the maximum allowed. Timber may continue to be harvested at levels below the maximum allowed under the amended Forest Plan.

For all these reasons, I am confident that the direction implemented by this decision will provide for viable populations of marten across the Tongass.

Management Indicator Species

Both the 1997 Forest Plan and the 2008 Tongass Forest Plan Amendment were prepared under the 1982 NFMA planning regulations, which required the identification of management indicator species in forest plans. This requirement was based on an assumption that the responses of selected species to land management activities could indicate the likely responses of other species with similar habitat requirements. The 1997 Tongass Plan identified 13 terrestrial and 4 aquatic management indicator species. All the terrestrial management indicator species are associated with the coastal spruce and hemlock forests that represent 98 percent of total productive old-growth on the Tongass. The 1997 Plan also specified what monitoring information should be gathered annually and evaluated after 5 years to see whether population trends could be detected, and how those trends might relate to management of the Tongass National Forest. The requirements for monitoring population trends and management relationships are contained in the applicable NFMA planning regulations. The amended Forest Plan retains all 17 management indicator species.

Fish Habitat

The Tongass National Forest contains outstanding fish habitat and aquatic resources. These resources support major subsistence, recreational, and commercial fisheries, as well as traditional and cultural values. Abundant rainfall, streams with glacial origins, and watersheds with high stream densities provide an unusual number and diversity of freshwater fish habitats. These abundant aquatic systems of the Tongass provide spawning and rearing habitats for the majority of fish produced in Southeast Alaska. Maintenance of this habitat, and associated high-quality water, is of great interest to several State and Federal natural resource agencies, as well as user groups, Native organizations, and individuals.

Many of the standards and guidelines in the 1997 Forest Plan were based, to a large extent, on the recommendations of the Anadromous Fisheries Habitat Assessment (AFHA). AFHA is considered the most comprehensive scientific review available for the Tongass. The 1997 ROD noted that the standards and guidelines and other direction included in the 1997 Forest Plan meet or exceed all of the recommendations by AFHA.

In general, the effects of implementing the amended Forest Plan on fish resources are expected to be at or below those predicted for the selected alternative in the 1997 Tongass Forest Plan Final EIS. I believe that the 1997 Forest Plan's direction regarding protection of fish habitat will continue to maintain high-quality fish resources on the Tongass; therefore, no changes were made.

Conclusion

Our understanding of the biological diversity of the complex old-growth ecosystem of the Tongass National Forest, including its composition, function and structure, is continually growing. Given the complexities involved, management decisions necessarily will involve some degree of uncertainty. This uncertainty can be mitigated to a large degree by developing an adaptive management approach based on a strong partnership with the State of Alaska and other Federal agencies to actively monitor ecosystem functions, fish and wildlife habitat, and populations. Based on my review of the record, including the Final EIS and Appendix D, I find that the old-growth strategy and specific species management prescriptions represent a balance of fish and wildlife habitat conservation measures which consider the best available scientific information. Accordingly, I find that the amended Forest Plan will provide fish and wildlife habitat to maintain viable populations of vertebrate species in the planning area and maintain the diversity of plants and animals, within an acceptable level of risk inherent in projecting management effects. Furthermore, the amended Forest Plan has a high likelihood of sustaining populations Forest-wide for the continued subsistence, recreational, and commercial uses of fish and wildlife species.

Recreation and Tourism

The potential effects of the proposed Forest Plan alternatives on recreation and tourism are evaluated in the Recreation and Tourism section of the Draft and Final EIS documents. As stated in a number of locations in that section, recreation and tourism in Southeast Alaska and on the Tongass are influenced by a number of factors that are largely independent of forest management decisions. While it is difficult to predict future recreation and tourism demand with precision, the number of visitors to Southeast Alaska, particularly cruise ship visitors, is generally expected to remain at current levels or continue to increase. Southeast Alaska residents also place a high value on the quality and availability of outdoor recreation opportunities on the Tongass. Although there is limited information that quantifies resident and non-resident recreation use, I know that residents and visitors alike seek a wide spectrum of recreation activities – some people enjoy activities requiring vast and remote areas in a natural setting, while others prefer developed facilities, utilities, and easy access. From a management perspective, the requirements of these activities are often at odds with one another and sometimes with other Forest management activities, including timber harvest and associated road construction and road management.

The potential effects on the supply of recreation opportunity settings are easier to predict, because they are affected by land management decisions to the extent that different LUD classifications influence potential recreation opportunity spectrum (ROS) classes and, therefore, different types of recreation. As indicated in the Final EIS, the general trend across all alternatives is toward an increase in developed and/or motorized opportunities and a corresponding decrease in primitive recreation opportunities. In regard to the Selected Alternative, approximately 79 percent of the Forest would fall within the Primitive or Semi-Primitive ROS classes, compared with approximately 89 percent at present. Approximately 18 percent of the Forest would fall within the Roaded Modified ROS class, compared to 10 percent at present. These changes would occur gradually over the next 150 years, and would be lower in magnitude if future development does not occur at the maximum levels allowed by the Forest Plan.

It is important to note that recreational opportunities do not cease to exist as a result of management activities such as timber harvest and road construction. Rather, changes in the supply of recreation opportunities could result in changes in recreation demand and use patterns. Southeast Alaska residents and visitors seeking solitude and isolation in a natural setting may be displaced to other areas of the Forest where the setting and use patterns are more in line with their expectations. This effect is a result not only of projected timber harvest and road development, but also due to the increases in resident population and tourism that are expected to occur under all of the alternatives. Nearly three quarters of the Forest will remain untouched by development activities, even if such activities are conducted at the maximum rates allowed under the Plan for 100 years. As described in detail in Chapter 3 of the Final EIS and in the section of this ROD dealing with the protection of roadless areas, only one-quarter of the land in inventoried roadless areas is allocated to development LUDs, and only 3 percent is included in the suitable land base. Finally, development in higher value roadless areas will be deferred under the Timber Sale Program Adaptive Management Strategy unless the level of timber harvest rises to the point where such development is warranted. In this fashion, the amended Forest Plan, in conjunction with the Adaptive Management Strategy, protects the areas most commonly identified as most valuable for primitive recreation.

Those seeking more developed areas and easier access may find increased recreational opportunities as forest management activities in development LUDs increase road access and facilitate more developed recreation opportunities. Forest-wide standards and guidelines for recreation and tourism remain substantially unchanged under the amended Forest Plan, and will guide the development of new recreation facilities. The amended Forest Plan also protects the scenic quality of heavily traveled cruise ship corridors and recreation and tourism use areas.

The amended Forest Plan is consistent with national travel management policy by requiring each Ranger District to identify and designate those roads, trails and areas that are open to motor vehicle use. This will require extensive public involvement and coordination. Working with forest users, government officials, and tribal entities at the local level is the most effective way to make route designation decisions. The Forest Service will continue to work with the State of Alaska regarding access and travel management planning and implementation.

In summary, my decision provides for a mix of recreation opportunities, with a wide range of recreation settings and experiences available throughout the Forest. It balances the competing demands of providing sufficient timber for a sustainable forest products industry while also meeting the various and wide-ranging recreation demands and user needs of Southeast Alaska residents and visitors and the recreation and tourism industry.

Market Demand

Introduction: This was key issue 2 in the EIS for the 2008 Tongass Forest Plan Amendment. This section reviews the extensive work done to respond to the findings of the Ninth Circuit court regarding the error made in 1997 in interpreting projections of market demand for timber from the Tongass National Forest. It also describes how I considered other factors related to market demand.

I understand that estimating long-term market demand is inherently uncertain. This is the primary reason I am adopting the Tongass Timber Sale Program Adaptive Management Strategy, which restricts timber harvest and associated road construction activities to the lower quality roadless areas of the Tongass unless the level of timber harvested warrants allowing such activities to take place in higher quality roadless areas that are perceived by many as more environmentally sensitive.[14] Thus, the Strategy addresses the inherent uncertainty in estimating the long-term future demand for timber. By no means does this render the substantial work done to correct the errors found by the court unimportant. It does, however, minimize the harm from any potential errors in forecasting timber demand. I believe the Final EIS fully remedies the problems identified by the Ninth Circuit regarding the treatment of market demand in the 1997 Tongass Forest Plan EIS. I recognize, however, that there are differences of opinion on long-term forecasts of market demand. The Tongass Timber Sale Program Adaptive Management Strategy is the most reasonable way to address such differences of opinion and provide the flexibility required in the face of such uncertainty. In doing so, the Strategy makes the differences of opinion regarding market demand less relevant to the decision to adopt Alternative 6.

Background—Tongass Timber Reform Act: The debate concerning the market demand for timber from the Tongass National Forest, and how the timber program relates to market demand, has been ongoing for decades. Forest Service economists with the Pacific Northwest Research Station completed their first study of the issue in 1990. Later that year, Congress enacted TTRA, which in Section 101 amended Section 705(a) of the Alaska National Interest Lands Conservation Act to read as follows:

> Subject to appropriations, other applicable law, and the requirements of the National Forest Management Act of 1976 (Public Law 94-558), except as provided in subsection (d) of this section, the Secretary shall, to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle. 16 U.S.C. 539(d)(a).

Questions about how to interpret and apply this direction slowed the development of procedures to comply with it. In the ROD for the 1997 Forest Plan, the Regional Forester directed that procedures be developed "to ensure that annual timber sale offerings are consistent with market demand."

[14] See the section of this ROD on minimizing effects on roadless areas for a discussion of the terms "higher value" and "lower value" roadless areas.

Those procedures were completed in 2000, and have become known as the "Morse methodology" after their author. These procedures are based on the premise that:

- Forest product markets are volatile, especially in the short run.
- Timber purchasers in Southeast Alaska have few alternative suppliers of timber if they cannot obtain it from the Tongass National Forest. Oversupplying this market has relatively few adverse economic effects; undersupplying it can have much greater negative economic consequences.
- It takes years to prepare National Forest timber for sale, including completion of environmental impact statements.
- It is difficult to estimate demand for timber from the Tongass, even a year or two in advance.
- Industry must be able to respond to rapidly changing market conditions in order to remain competitive.

Accordingly, the Morse methodology establishes a system that seeks to build and maintain sufficient volume of timber under contract[15] to allow the industry to react promptly to market fluctuations. Industry actions such as annual harvest levels are monitored and timber program targets are developed by estimating the amount of timber needed to replace volume harvested from year to year. The Morse methodology is adaptive, because if harvest levels drop below expectations and other factors remain constant, future timber sale offerings would also be reduced to levels needed to maintain the target level of volume under contract. Conversely, if harvest levels rise unexpectedly, future timber sale targets would also increase sufficiently to ensure that the inventory of volume under contract is not exhausted. By dealing with uncertainty in a flexible, science-based fashion, the Morse methodology is an example of adaptive management. The Forest Service adopted the Morse methodology as the means by which the agency complies year-by-year with the annual demand portion of the TTRA "seek to meet" requirement. Similarly, the agency intended to comply with the requirement to seek to meet demand "for each planning cycle" through a series of annual applications of the Morse methodology.[16]

In its 2005 decision, the U.S. Court of Appeals for the Ninth Circuit opined on the interpretation of TTRA. The court determined TTRA "imposed additional planning requirements for the Tongass." Among the requirements, according to the appellate court, "Congress imposed a unique duty on the Forest Service to consider the 'market demand' for timber" in Section 101 of TTRA." Further, the court stated that the duty to consider, or assess, market demand "can be seen as a refinement of the general requirement under NFMA that the Forest Service consider timber harvest as one of the goals to be balanced with environmental preservation and recreational use."

The court also found that reason and logic support a linkage between the ASQ of the Forest Plan and market demand. According to the court, "[A] ceiling too low to satisfy demand could compromise one of NFMA's multiple-use goals (timber harvest) without justification in this record." However, the court specifically noted: "[W]e do not suggest that an ASQ can never be too low to satisfy market demand, or that the Forest Service must in fact *meet* demand (as opposed to *seek* to meet market demand)." Likewise, the court stated, "a ceiling higher than needed to satisfy demand, could compromise another of NFMA's multiple-use goals (environmental preservation) without justification in this record." However, the court expressly left open the possibility that the Forest Service could adopt an ASQ greater than even the highest market demand scenario in order to allow flexibility to respond to changes in market demand, so long as the record shows "how much greater the ASQ would need to be, or to what extent other alternatives might have been considered in detail, in relation to the actual market demand."

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15 Volume under contract is timber purchased but not yet harvested, the primary indicator of timber inventory available to the industry.

16 Adoption of the Forest Plan Amendment and the Timber Sale Program Adaptive Management Strategy do not require any changes in the Morse methodology for estimating annual timber sale offer levels. In particular, the Strategy limits the land area within which the Tongass timber program may operate, not the level of volume to be planned or offered for sale. The Morse methodology was updated, however, to incorporate new derived demand projections from a study described later in this section (Brackley et al).

The Role of the Forest Service's Pacific Northwest Research Station in Estimating Demand: As mentioned above, the first Pacific Northwest Research Station study of demand for timber from the Tongass was completed in 1990. As explained in Chapter 3 of the Final EIS for the 2008 Forest Plan Amendment, a second report with updated projections was issued in 1994, after one of Southeast Alaska's two pulp mills closed in 1993. When the last remaining pulp mill closed in 1997, the projections were updated again in the spring of 1997. It was these draft projections that were erroneously interpreted in the 1997 Final EIS and ROD for the Revised Tongass Forest Plan.

The Ninth Circuit court found that, because of the error in interpreting the 1997 market demand projections, the 1997 Final EIS failed to provide decision makers and the public with an accurate assessment of information relevant to evaluate the Tongass Plan. The court further found that, had the accurate market demand forecast and related potential employment and earnings information been used, an alternative may have been selected with less environmental impact and in less environmentally sensitive areas.

The Pacific Northwest Research Station prepared a new forecast of market demand for timber from the Tongass National Forest, *Timber Products Output and Timber Harvests in Alaska: Projections for 2005-25,* Allen M. Brackley, Thomas D. Rojas, and Richard W. Haynes, 2006 (Brackley et al.). This study projects the demand for timber from the Tongass,[17] derived from the demand in Pacific Rim markets for the end products manufactured from that timber. The Brackley et al. study revises projections made in the three previous reports, and reflects changes in Pacific Rim markets and the Alaska forest products sector over the last 10 years.

The study analyzes trends over a historical period of 40 years to forecast trends over 20 years in three key parameters:

1. The level of forest products imports in Pacific Rim nations. Based on other research regarding these markets, the Brackley et al. study projects that Pacific Rim imports of sawn wood products will increase over the next 20 years.
2. The share of those markets that will be supplied by North American forest products producers, which the study projects will remain constant.
3. The share of North American exports to the Pacific Rim that will come from Alaska. The analysis examines four alternative assumptions regarding future trends of the Alaskan share of North American exports to the Pacific Rim.

Each of these parameters influences demand for timber from Alaska. An increase in any one of them will increase demand in Alaska, if other influences remain constant. Likewise, a decrease in any of these parameters will decrease demand in Alaska, other things equal. Estimated trends in these three parameters result in projected demand for forest products from Southeast Alaska over two decades; other assumptions had to be made to convert these estimates into demand for timber from the Tongass National Forest. All of these assumptions are described in the study. Based on these assumptions, the study projects the market demand for timber from the Tongass National Forest under four different scenarios for the future of the Alaska wood products industry. As explained in Chapter 3 of the Final EIS, these scenarios are as follows:

Scenario 1—Limited Lumber Production. The goal of this scenario is to depict the situation the industry has faced over the last several years. It assumes no change in the Alaskan share of North American exports to the Pacific Rim, and no change in the North American share of Pacific Rim imports. Thus, the only increase in demand is a gradual rise resulting from growth over two decades in Pacific Rim imports, which are assumed to return to the levels of Japanese imports in 1997. It assumes there will continue to be very little market for two decades for low-grade sawlogs harvested from the Tongass, and no market for utility logs. The lack of a market for low-quality material (low-grade sawlogs and utility volume) raises the operating costs of Alaskan sawmills per unit of product,

[17] The report projects demand for timber from Alaskan national forests. Because the Chugach National Forest, the only other national forest in Alaska, has no commercial timber program, demand for national forest timber in Alaska equates to demand for timber from the Tongass.

making it more difficult for them to compete in global markets with their counterparts in the Pacific Northwest and Canada.

Scenario 2—Expanded Lumber Production. In this scenario, some form of demand stimulus is assumed, such that Alaskan producers' market share of North American exports to the Pacific Rim rises somewhat, returning to a level experienced in the last decade. Such a demand stimulus could come from an industry marketing program, capital investment to make existing sawmills in Alaska more efficient, a change in policy, or some other event that enhances the competitive position of Alaskan producers relative to their competitors in the continental United States, or a combination of such developments. Other assumptions under this scenario are the same as under Scenario 1.

Scenario 3—Medium Integrated Industry. In this scenario, events are assumed to occur that stimulate demand and develop a market for low-quality material, such that Alaskan producers' market share of North American exports to the Pacific Rim rises more quickly than under Scenario 2. Development of a market for low-quality material is referred to as an integrated industry, because all of the material resulting from timber harvest would be processed into marketable products. This is displayed as the construction of a medium-density fiberboard (MDF) plant, but the authors make it clear that an MDF plant is only one way a use for low-quality material could develop.

Scenario 4—High Integrated Industry. This scenario also assumes demand-stimulating events resulting in the development of a market for low-quality material. It also assumes that the Alaskan market share of North American exports to the Pacific Rim rise steadily over two decades.

The Brackley et al. study displays the alternative projections of derived demand for timber from the Tongass National Forest in Table 3 of the report. For the first two scenarios, which assume no market for low grade sawlogs and utility volume, the figures in that table includes sawtimber only. For the two integrated industry scenarios, the projections include total volume, including both sawlogs and utility. Utility volume must be cut down along with higher-quality timber even if there is no demand for it. It is the total volume of timber cut on the Tongass that is of most interest, in part because environmental effects result from total volume cut. In addition, any comparison of scenarios must be based on comparable figures. Accordingly, the table below (from Chapter 3 of the Final EIS) shows Brackley et al. projections for all four scenarios in terms of total volume:

Recent Developments: The Brackley et al. study was published in July 2006. In March 2007, I approved a new policy under which timber purchasers may ship to the lower 48 states unprocessed certain small-diameter and low-quality logs harvested from the Tongass, up to 50 percent of the volume harvested on each sale. This interstate shipments policy places purchasers of Tongass National Forest timber sales on a more level playing field with their counterparts in the Lower 48, where there is no restriction on interstate shipments of any timber harvested from National Forest System lands. This policy creates a market opportunity for low-quality material that the Brackley et al. study assumed would not be utilized under scenarios 1 and 2. While it is still early in the implementation of the new policy, we expect that full implementation of it over the next few years will make Alaska forest products producers more competitive with their counterparts in the Lower 48 States, because it creates a market for low grade and small diameter sawtimber and possibly for utility volume. That may allow Alaska producers to increase their share of domestic forest products markets, which would stimulate demand for timber from the Tongass without the construction of new processing facilities in Southeast Alaska, until adequate volume is available to do so.

Table 3
Volume of Tongass National Forest Timber that Must be Cut to Supply Derived Demand Reported in Brackley et al. (Million Board Feet)

	Projected National Forest Timber Harvest—Alaska (MMBF; includes Sawlog, Utility, and Shipments from Alaska)[1]			
Year	Scenario 1. Limited Lumber	Scenario 2. Expanded Lumber	Scenario 3. Medium Integrated	Scenario 4. High Integrated
2007	49.8	61.9	67	67
2008	49.8	66.4	139	139
2009	51.3	72.4	151	151
2010	52.8	78.5	166	166
2011	52.8	84.5	184	184
2012	54.3	90.5	204	286
2013	55.8	98.1	204	291
2014	57.3	105.6	204	295
2015	58.9	113.2	204	299
2016	58.9	122.2	204	303
2017	60.4	131.3	204	308
2018	61.9	140.3	204	313
2019	63.4	150.1	204	317
2020	64.9	163.0	204	325
2021	66.4	175.0	204	333
2022	67.9	187.1	204	342
2023	69.4	200.7	204	351
2024	70.9	215.8	204	360
2025	72.4	230.9	204	370

Notes:
[1] These figures include total volume that would need to be cut to meet the demand projected by Brackley et al.

The Pacific Northwest Research Station recently completed an addendum to the Brackley et al. study,[18] which responds to public comments on the 2006 study, and events since that study was completed. The conclusion of the Addendum states that:

> Given the Region 10 shipment policy, the restarting of the veneer mill, and the success of Alaska producers in niche or specially markets, our current appraisal is that demand for national forest timber in Alaska is on a trajectory more similar to the scenario 2 (expanded lumber production). The down side of this development is, however, that part of the harvest is moving to mills outside southeast Alaska that have the technology to produce high volumes from small material. In our projections we assumed that the new technology would move to southeast Alaska. Regardless, the changes have the potential to create higher returns to the mills in southeast Alaska. Challenges still remain with the utilization of utility logs due to a limited fiber market. Until such markets evolve, it is difficult to see the evolution of an integrated industry characteristic of scenarios 3 and 4.

Other Studies: As described in Chapter 3 of the Final EIS, the Forest Service has considered other reports and analyses related to demand. These include a study of installed mill capacity completed by the McDowell Group et al for the Southeast Conference in 2004; recent sales and harvest figures; and estimates of the minimum timber volume required by various processing facilities made by the Juneau Economic Development Council and a subcommittee of the Tongass Futures Roundtable. These indicators offer a wide range of estimates of market demand for timber from the Tongass National Forest. While I considered all of these indicators, I relied most heavily on the Brackley et al.

[18] Brackley, Allen M. and Haynes, Richard W. 2007. Timber Products Output and Timber Harvests in Alaska: An Addendum. Res. Note PNW-RN-XXX. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. XX p.

study, and the Addendum to that study, because they are the only peer-reviewed scientific analyses of market demand for Tongass timber, and because they are the only studies that estimate demand derived from demand for end products. As described in the section of this ROD on the need for an integrated forest products industry in Southeast Alaska, the studies by the McDowell Group and the Juneau Economic Development Council are most helpful in considering what the supply needs for such an industry would be.

Public Input. We received numerous comments from the public regarding timber supply and seeking to meet market demand. Some reviewers expressed the view that market demand for timber from the Tongass National Forest is 360 MMBF of economic timber volume, that recent harvest levels reflect solely supply constraints, and that selecting any alternative with an ASQ below 360 MMBF would unnecessarily constrain the growth of the timber industry, resulting in significant adverse consequences for the economy of Southeast Alaska.

I believe the most likely demand scenario to develop over the next 15 years is for annual market demand to reach 187 MMBF by 2022. The Brackley et al. study describes significant challenges for the industry in reaching Scenario 4, under which market demand is projected to reach 360 MMBF in 2024 and 370 MMBF in 2025. The Addendum to that study reiterates the challenges that make scenarios 3 and 4 unlikely to occur. Among these are a resolution of the supply constraints related to appeals and litigation, and an investment climate perceived as favorable. Other reviewers point out that timber operators in Alaska have considerably higher labor and transportation costs and face other competitive disadvantages relative to their counterparts in the Lower 48 States, which negatively affects the investment climate in the Alaska forest products sector. In addition, the studies most often cited to support the assertion that market demand for Tongass timber is 360 MMBF were based almost exclusively on mill capacity rather than derived demand for manufactured products. The Brackley et al. study is the only derived demand study. Accordingly, I view the other studies more as analyses of timber supply needed to operate current and potential future mills, rather than projections of market demand.

For all these reasons, I believe that the ASQ of the selected alternative will provide an opportunity for the growth of an integrated and competitive timber industry over the next 10 to 15 years. Moreover, if the timber industry grows more rapidly than anticipated in the next few years, such that demand exceeds the average annual ASQ of 267 MMBF, existing procedures are flexible enough to respond to this possibility. ASQ is a ceiling on the amount of timber that may be sold over a ten-year period. While it is most often expressed as an average annual figure, the ASQ of the amended Forest Plan is 2.67 billion board feet for the next decade. Thus, if less than the average annual figure of 267 MMBF is sold in the next five years, the difference could be added to the sale quantity for the remainder of the decade, up to the 10-year limit of 2.67 billion board feet.

If the demand for timber has been substantially underestimated, the forest planning process includes procedures for analyzing what is known as departure from the established ASQ ceiling, to determine whether harvesting above the ASQ level would better meet multiple-use objectives (see Forest Service Manual 1926.15 and Handbook 2409.13). These procedures include several criteria or conditions in which evaluation of departure from the ASQ would be warranted. Such consideration would be done through the normal forest planning process, which includes public involvement. One of the conditions listed is when implementation of the ASQ could have a substantial adverse impact in the economic area in which the forest is located. For example, if the level of timber harvest were to increase to the point where the cumulative amount of timber sold approached the ASQ, there may be insufficient additional sale volume to support an expansion of the industry, should an expansion such as a new processing facility be proposed. If this were regarded as too disruptive to the local economy, the Handbook allows for consideration through the forest planning and public involvement process of an alternative that departs from non-declining flow requirements. Preliminary analysis performed as part of this Amendment process has shown that a departure volume of at least 310 MMBF per year (3.1 billion board feet for 10 years) in the second decade is achievable without compromising sustained yield principles in future decades.

I am also aware of concerns that timber demand has been overestimated, and that adopting an alternative with an ASQ substantially higher than recent harvest levels could allow timber harvest and road construction in roadless areas perceived as more environmentally sensitive and therefore worthy of protection. The Timber Sale Program Adaptive Management Strategy is designed to address that concern by limiting harvest in Phase 1 to the lower quality roadless areas and deferring development activities in the higher quality roadless areas until such time as the actual harvest levels indicate a need to allow development in these areas. A more detailed description of how higher value roadless areas are protected at each phase of the Strategy is included in the next section of this ROD. The main point, however, is this: by adopting the Timber Sale Program Adaptive Management Strategy we have eliminated the potential harm to more environmentally sensitive areas from overestimating long-term market demand for timber. I am convinced that it is impossible to estimate the long-term market demand for Tongass timber with complete precision and accuracy. I am equally convinced that by adopting the Strategy, those difficulties no longer matter very much in choosing among alternatives. I feel secure in selecting Alternative 6, with an ASQ well above recent timber harvest levels, because the Timber Sale Program Adaptive Management Strategy will ensure that, at whatever level timber is harvested over the next 10-15 years, such harvest will be limited to the lowest value roadless areas possible.

Conclusion

In 1997, the Regional Forester concluded his analysis of demand issues as follows:

> Market demand is volatile; the projections done by the [Pacific Northwest Research] Station scientists have changed considerably each time they have been updated. Different economists will often make different projections of future demand because they often make different assumptions about the future (see Brooks and Haynes, June 1994, Timber Products Output and Timber Harvests in Alaska: Projections for 1992-1010, General Technical Report, PNW-GTR-334). Demand also will be influenced by whether or not businesses choose to invest in new wood-processing industries in Southeast Alaska over the next decade. Such decisions will be determined in part by investors' subjective evaluations of the certainty with which they can rely upon the Tongass as a reliable source of timber. 1997 ROD, page 25.

These statements are still applicable today.

As I review Table 3, I see annual market demand estimates that range from 50 to 139 MMBF in 2008; and from 68 to 342 MMBF in 2022. As discussed above, the Pacific Northwest Research Station economists who developed the demand projections believe the most likely outcome is Scenario 2. That suggests it is most reasonable to expect an annual demand of approximately 187 MMBF in 2022 unless the industry becomes fully integrated in the interim. It is this last figure that I found most instructive and useful for guiding my decision. As described in other sections of this ROD, I believe the selected alternative avoids conflicts with other goals, such as environmental preservation (especially wildlife viability) or recreation. The ability of the selected alternative to meet these other goals gives me the assurance I need to select Alternative 6, which allows the projected level of long-term demand to be met.

Need for an Integrated Industry

An integrated forest products industry is one that includes processing facilities and markets for all types of logs from timber harvest operations conducted in the area, and for byproducts such as chips that result from processing those logs into lumber or other products. Such integration substantially enhances the economic efficiency of a regional industry as a whole, and the competitive position of all producers relative to their counterparts in other areas. Southeast Alaska has not had an integrated industry since the closure of the region's pulp mills in the 1990s. Those mills processed utility logs, for which little or no local market has existed since those mills closed. Utility volume must still be cut down, primarily for safety reasons. The lack of a local facility to process utility volume means timber purchasers are required to cut and handle logs that they must often leave in the woods. Thus, some of the material harvested is not utilized; producers' operating costs are increased per unit of material they do process; and the industry's competitive position is diminished.

Consequently, the lack of an integrated industry increases the economic incentive to harvest high-volume timber stands disproportionately in order to make timber sales economic.

The lack of facilities in Southeast Alaska to process low-grade and small-diameter material also makes it more difficult to conduct commercial thinning of young-growth timber stands. Because funding for pre-commercial thinning projects has historically been insufficient to meet the need, commercial thinning is the most feasible way to improve wildlife habitat quality and restore other ecological values in areas previously harvested. Some of these areas have significant restoration needs because they were harvested decades ago under standards considerably less protective than they are today. The absence of processing facilities in Southeast Alaska for the small-diameter material from these stands makes such restoration more difficult to accomplish.

Further, an integrated industry could enhance the quality of life in Southeast Alaska by providing for a sector of sustainable, year-round, family-wage jobs in rural, resource-dependent communities. When added to existing industries such as recreation and nature tourism, commercial and recreational fishing, and government employment, an integrated wood products industry could contribute to a more stable social infrastructure. This includes schools, hospitals, libraries and various service industry amenities like hotels and restaurants that support a greater quality of life for Alaska residents.

Consequently, re-developing an integrated industry is an important part of the ecological, economic and social components of sustainability. Timber production has been one of the missions of the National Forests since enactment of the Organic Administration Act in 1897. If we are to sustain this industry in Southeast Alaska, we must provide opportunities for local processors to expand and integrate enough to compete more effectively in world markets. Integration would also enhance ecological sustainability by reducing the amount of material now left in the woods and facilitating the transition to an industry based more on young-growth stands. For all these reasons, I believe it is important to provide opportunities for the re-establishment of an integrated forest products industry in Southeast Alaska, capable of processing all types of timber products available from the Tongass.

Having determined that it is important to provide an opportunity for the timber industry to become more integrated, the question arises as to what supply from the Tongass National Forest would be needed to accomplish that objective. There are many sources of information on this subject, and I considered them all. The Brackley et al. study indicates that a partially integrated industry would generate a market demand for timber from the Tongass of 204 MMBF in 2022, and a fully integrated industry would demand 342 MMBF.

As mentioned in the market demand section of this ROD, a recent analysis prepared for the Southeast Conference—"Timber Markets Update and Analysis of an Integrated Southeast Alaska Forest Products Industry" (McDowell Group et al. 2004)—also studied the supply needed to support an integrated timber industry in Southeast Alaska. That study considered installed capacity of Southeast mills, projected a harvest volume that would allow the mills to operate at an efficient level assuming the existence of an integrated industry, and concluded that a minimum of 200 MMBF total harvest would be required annually from the Tongass National Forest. However, the most efficient use of timber from the Tongass would most likely include other processing facilities, such as a veneer mill. The industry would be most efficient with at least two of each type of manufacturing facility because this would foster competitive bidding for materials and labor. Depending upon the types of facilities, this could require an annual harvest of 350 MMBF or more from all sources of wood. On December 30, 2006, the McDowell Group responded to a request by Southeast Conference to clarify and update key findings from the 2004 report. They concluded the study done in 2004 was still valid, including the estimate that 350 MMBF or more would be required to support an integrated and competitive industry.

The report prepared by Juneau Economic Development Council and an effort by a Tongass Futures Roundtable Subcommittee also estimate the minimum timber volume required by various processing facilities based on their potential capacity. The estimated sawmill volume is approximately 66 percent of existing mill capacity (138 MMBF annually), based on the four largest existing sawmills in Southeast Alaska, with some allowance for smaller mills. The minimum estimated annual volume necessary to supply a veneer plant is 30 MMBF of sawlogs, with 80 to 100 MMBF of No. 3 sawlogs and utility logs required to support an MDF or bioenergy facility. Using these projections, a total of 248 MMBF to 268 MMBF is the minimum annual supply necessary to support an integrated industry.

The State of Alaska has also provided information related to the supply of timber needed from the Tongass to support the reestablishment of an integrated industry. In the comments provided by the State on the Draft EIS, the Governor recommends the Tongass provide a minimum of 168 MMBF of economic sawlog timber to support reestablishment of an integrated industry.[19] When the utility volume associated with this harvest level is accounted for, this equates to an economic (or NIC I) annual harvest of approximately 200 MMBF from the Tongass. The NIC I portion of the ASQ of the amended Forest Plan is 238 MMBF annually, which is sufficient to meet the needs identified by the State.

As I consider all of this information regarding the supply needs of an integrated industry, I conclude that the amended Forest Plan will provide an opportunity for such an industry to be reestablished in Southeast Alaska. Alternatives 1 and 2 of the Final EIS would foreclose that option; Alternative 3 could meet it only during periods of strong markets, when the NIC II volume becomes economically viable. However, potential investors in additional processing facilities must make their decisions based on long-term projections that include entire market cycles. Therefore, a reliable annual supply of at least 200 MMBF of economic timber would be needed from the Tongass to meet the objective of providing an opportunity for the reestablishment of an integrated industry. None of the alternatives with an ASQ lower than the amended Forest Plan's meet that criterion.

Minimizing Effects on Roadless Areas

This issue was described in the EIS for the 2008 Forest Plan Amendment as key issue 1. As with many other issues regarding management of the Tongass National Forest, protecting roadless areas is a topic with a long history and many complexities. Consequently, we begin this discussion with terminology, then the history, before describing how the Final EIS, the selected alternative, and the Timber Sale Program Adaptive Management Strategy respond to this issue.

Terminology. The following terms are used in this ROD in discussing roadless issues:

Roadless Area: The term "roadless area" is a generic term that is sometimes used to refer to all areas without roads. (The Final EIS uses the term this way, to include all such areas.) For the purpose of this ROD, however, it is used to refer only to inventoried roadless areas to simplify the discussion.

Inventoried Roadless Area: An undeveloped area typically exceeding 5,000 acres that meets the minimum criteria for wilderness consideration under the Wilderness Act.

History. The Wilderness Act of 1964 required the Secretary of Agriculture to inventory all roadless areas within the National Forest System to determine which of them should be designated as Wilderness. Generally speaking, roadless areas must be at least 5,000 acres, or adjacent to existing wilderness, to be eligible for such designation. The Forest Service has long recognized that not all roadless areas are of equal ecological, scenic, or recreational value. Accordingly, the agency developed the Wilderness Attribute Rating System as the process to rate roadless areas according to their natural integrity, scenic quality, opportunities for solitude, and primitive recreation opportunities. The NFMA implementing regulations later incorporated the inventory requirements into the forest planning process. Lands identified through these procedures are referred to as Inventoried Roadless Areas.

A comprehensive inventory of roadless areas on the Tongass that meet the Wilderness Act's minimum criteria was completed in 1996 as part of the development of the 1997 Forest Plan. This inventory identified about 9.4 million acres of roadless land on the Tongass in 110 inventoried

[19] "Economic timber" is defined as: A fair market value sale of timber wherein the average purchaser can meet all contractual obligations, harvest and transport the timber to the purchaser's site, and have a reasonable certainty of realizing a profit from the sale.

roadless areas. No inventory is completely accurate for long, however, for a variety of reasons. National Forest System lands are sometimes conveyed to non-federal parties, such as conveyances to Alaska Native corporations under the Alaska Native Claims Settlement Act. Non-federal lands within National Forest boundaries are sometimes acquired by the Forest Service, most often through exchange for other Federal lands. Roadless areas also become developed, primarily through timber harvest and road construction allowed under the Forest Plan. Finally, geographic information system data are updated periodically. Consequently, inventories conducted only a few years apart can yield different results.

Inventories of roadless areas on the Tongass illustrate these points. The Forest Service updated the 1996 inventory in 2000 as part of the development of the Roadless Area Conservation Rule (Roadless Rule), published in 2001. The 2000 inventory identified about 9.3 million acres. The inventory was updated again in 2003 as part of the development of the Supplemental EIS regarding potential wilderness recommendation; this inventory identified about 9.6 million acres of the Tongass as roadless areas. The Final EIS for the 2008 Forest Plan Amendment updates the 2003 inventory, and identifies 9,514,185 acres in 109 inventoried roadless areas on the Tongass. A map of these roadless areas is available on the CD containing the Final EIS, and on the internet through the Forest's website at *www.fs.fed.us/r10/tongass/*.

Treatment of the Roadless Issue in the Final EIS, Forest Plan, and Timber Sale Program Adaptive Management Strategy. As discussed in the section of this ROD on the alternatives considered, the protection of higher value roadless areas was a paramount consideration in the development of the alternatives analyzed in detail in the Draft EIS. The Forest Service rated each of the 109 inventoried roadless areas on the Tongass using the Wilderness Attribute Rating System. Special consideration was also given to areas proposed for wilderness during congressional consideration of TTRA, and to areas allocated to non-development LUDS by the Under Secretary of Agriculture in the 1999 ROD that was later vacated by the court. The results of that evaluation were used to exclude higher value roadless areas from development LUDs of each alternative as much as possible, so that timber harvest and road construction activities allowed under each alternative would avoid higher value roadless areas to the extent practical, given the balance of multiple use objectives of each alternative.

Refinement of the Alternatives: During the public comment period on the Draft EIS, many reviewers recommended that timber harvest and road construction be confined to the portions of the forest where roads have already been constructed, so that all currently roadless areas would remain undeveloped. Many respondents recommended specific roadless areas be protected from development. Some conservation organizations, such as The Nature Conservancy, developed their own rankings of watersheds on the Tongass and offered lists of areas that they recommend for protection from development. Nearly all of these are within roadless areas.

Following the public comment period on the Draft EIS, the Forest Service reviewed six different ranking systems and lists of areas recommended for protection that represent a wide variety of approaches to identifying higher value areas. These include:

1. The list of High Value Community Use Areas developed by the Alaska Department of Fish and Game.
2. The 18 Areas of Special Interest identified by the Under Secretary of Agriculture in the 1999 ROD.
3. Roadless areas identified by the U. S. Fish and Wildlife Service as having outstanding or important fish and wildlife values.
4. Watersheds identified by the Southeast Alaska Conservation Council as Tier 1 or Tier 2 watersheds.
5. A list of Conservation Priority Watersheds identified by The Nature Conservancy and the Audubon Society and provided in comments on the Draft EIS.
6. Roadless areas and their relative ranking based on the Wilderness Attribute Rating System.

While there is considerable commonality among these lists, there also are some significant differences. These differences demonstrate that there is no single definitive process or criterion by which to judge the value of individual roadless areas. Accordingly, the Forest Service took all of these rating systems and lists into account in developing the Final EIS and the Timber Sale Program Adaptive Management Strategy. The Forest Service also considered logistical considerations, such as the proximity of roadless areas to developed lands, to account for social and economic values as well as biological values in the consideration of roadless values. During this analysis, the Forest Service identified three general categories of roadless areas, based largely on how frequently they are included in the above ranking systems:

- *Lower Value Roadless:* These lands are relatively small areas, and usually located within or near developed landscapes. They often lack the resource features and values found in larger and more isolated roadless areas. Because of their smaller size and proximity to developed landscapes, they often are less manageable as a roadless area by themselves, and can often be accessed by logical extensions of existing road systems. These areas usually appear on no more than 1 or 2 of the ranking lists described above. For example, the 16,000-acre East Zarembo Roadless Area on Zarembo Island is long and irregular in shape, is substantially affected by surrounding developments, and does not have high ecological or social values when compared to larger and more isolated roadless areas.
- *Moderate Value Roadless:* These areas are generally larger and often include portions with higher ecological or social values. Examples include high value watersheds, high scenic resources, or high recreational values. These areas usually appear on 3 or 4 of the ranking lists described above. The southern end of the South Kupreanof Roadless Area is a good example, in which the southwestern corner associated with Rocky Pass has very high scenic values while most of the remainder has lower values.
- *Higher Value Roadless:* These areas are often larger and usually have very high ecological and social values. These areas usually appear on 5 or 6 of the ranking lists described above. The 190,000 acre Cleveland Roadless Area is a good example.

As described in Chapters 2 and 3 of the Final EIS, the alternatives respond to public concerns regarding protection of roadless areas in a progressive fashion. Alternative 1 would allow no scheduled timber harvest or road construction in any roadless area. As alternatives progress to higher levels of allowable timber harvest and road construction, more roadless areas are allocated to the development LUDs, starting with lower and some moderate value roadless areas in Alternative 2, then incorporating mostly lower and moderate value roadless areas in Alternative 3, and more higher value roadless areas in alternatives 4 through 7.

Further Protection of Higher Value Inventoried Roadless Areas through the Timber Sale Program Adaptive Management Strategy: Based on my review of this information and the analyses presented in the Final EIS, I believe the selected alternative minimizes the adverse environmental effects on roadless areas while still seeking to meet market demand for timber from the Tongass. Just over 3 quarters of inventoried roadless acres are included in the 13.3 million acres of non-development LUDs. The Forest Plan allocates 24 percent of the inventoried roadless acres to development LUDs. Due to the additional protection offered by the standards and guidelines that apply to these LUDs, only 3 percent of the land in inventoried roadless areas would be included in the suitable land base. Finally, even if timber were harvested and roads constructed at the maximum rates allowed under the Forest Plan for 100 years, at least 80 percent of the Tongass would still remain in an undeveloped condition without roads.

I know some will still be concerned, however, that since the ASQ of the Forest Plan is considerably higher than recent harvest levels, some higher value roadless areas may still be unnecessarily harmed by including them in the development LUDs before the projected increase in long-term demand actually materializes. The Timber Sale Program Adaptive Management Strategy that I am adopting today was designed specifically to remedy these concerns. A discussion of how the Strategy was developed follows below.

After the public comment period on the Draft EIS, the Forest Service reviewed each of the roadless Value Comparison Units (VCUs, areas of land delineated for planning purposes) in the development LUDs of Alternative 6. Each of these VCUs that contains suitable lands was compared to each of the six lists of higher value roadless areas described above, to develop a comprehensive sense of the ecological, recreational, and social value of each of these VCUs. As previously mentioned, logistical challenges related to timber economics were also considered. Through this process, each VCU was assigned to one of the three phases of the Timber Sale Program Adaptive Management Strategy. Phase 1 of the Strategy is similar to Alternative 2, in that the scheduled timber sale program would be confined to areas already developed and to lower value roadless areas. Phase 2 of the Strategy, which would be implemented only if the level of timber harvest reached 100 MMBF annually for two consecutive years, is similar to Alternative 3, in that the scheduled timber sale program would be allowed to operate in some moderate value roadless areas. Phases 1 and 2 are also comparable to Alternatives 2 and 3, respectively, regarding the maximum sustainable level of timber harvest that could be supported from the amount of suitable land they include.

Only in Phase 3, which would only be implemented if timber harvest levels reach 150 MMBF for two consecutive years, would the scheduled timber harvest program be allowed to operate in higher value roadless areas. In this fashion, the Timber Sale Program Adaptive Management Strategy offers an extra level of protection for higher value roadless areas, and a more robust response to concerns related to allowing such areas to be affected by development activities prematurely.

I want to reiterate that there is no single definitive process or criterion by which to judge the value of individual roadless areas. That is why the Forest Service took into consideration the ratings of other organizations to help us design a strategy that seeks to avoid areas most often listed as high value.

Treatment of Areas of Special Interest to the Public under the Forest Plan and Adaptive Management Strategy: As described above, several conservation organizations and numerous individuals have provided input recommending protection for specific areas. The areas mentioned most frequently are listed below, with a description of how each area is treated under the selected alternative and the Adaptive Management Strategy. The map of the areas included in each phase of the Timber Sale Program Adaptive Management Strategy can be found on the on the compact disc of the Final EIS and is also available on the internet at *www.fs.fed.us/r10/tongass/*.

Port Houghton – Public comments on this area requested protection for the southern portion of the Windham - Port Houghton Roadless Area, all of the Fanshaw Roadless Area, and the western tip of the Spires Roadless Area in the South Arm of Faragut Bay, especially Port Houghton, the salt chuck at the head of the North Arm of Port Houghton, Sanborn Canal, and Faragut Bay. The majority of these areas remain in non-development LUDs under the amended Forest Plan. While some areas within the Windham – Port Houghton and the Fanshaw Roadless Areas are allocated to development LUDs, they are included in the Phases 2 and 3 of the Timber Sale Program Adaptive Management Strategy, with VCUs 790 and 840 in Phase 3. This means that until the actual level of timber harvest on the Tongass reaches 100 MMBF for two consecutive fiscal years in Phase 1, then 150 MMBF for two consecutive years in Phase 2, no timber sales could be planned for these areas.

Thomas Bay part of Spires Roadless Area –The development LUDs in the southern tip of the Spires Roadless Area and other lands near the southern portion of Thomas Bay are mostly roaded and are included in Phase 1 of the Strategy. The development LUDs (VCUs 4830 and 4840) near the northern part of Thomas Bay are mostly undeveloped and are included in Phase 2.

Kake Community Use Area and Kuiu Island – Kuiu Island and the surrounding smaller islands are important to the residents of Kake, especially the coastal areas near Kake. Areas most often associated with higher values include the Keku Islands, Kadake Bay and Creek, Port Camden, Rocky Pass, and the East Kuiu Roadless Area on the south and east side of Kuiu Island.

The Keku Islands and the lands adjacent and near Kadake Bay are in non-development LUDs. Lands adjacent to the Keku Islands in VCU 3990 have been placed in Phase 2 of the implementation strategy. This means that until the actual level of timber harvest on the Tongass reaches at least 100 MMBF for two consecutive fiscal years, no timber sales could be planned for these areas.

The adjustments to small old-growth reserves in this area also resulted in a continuous block of non-development LUDs from Kadake Bay to Saginaw Bay. Additionally, about 23 miles of Kadake Creek and other major tributary streams that flow into Kadake Bay were recommended in 1997 for designation as a Recreational River, and that recommendation is not being changed. Recreational River LUDs generally provide recreation opportunities in a pleasing, though modified, free-flowing river setting, while allowing timber harvest, transportation and other developments.

Port Camden has development LUDs on both sides of the bay, with the west side having past timber management activities and the east side mostly undeveloped. In response to public comments, the west side of Port Camden in VCU 4200 is in Phase 2 of the implementation strategy. The east side of Port Camden in VCU 4200 is placed in Phase 3, so no timber sale could be planned for this area unless timber harvest levels reach 150 MMBF for two consecutive fiscal years in the future.

Rocky Pass is nearly entirely in non-development LUDs, including the east side of the peninsula between Rocky Pass and Port Camden. The East Kuiu Roadless Area located to the south of the developed areas on the east side of the Island is placed in Phase 3.

The remaining development LUDs on northern Kuiu Island are included in Phase 1 of the Strategy, primarily because the area is mostly developed with good infrastructure and timber volumes, all of which are important for the current timber industry. I believe the overall mix of land use designations for Kuiu Island, when combined with the deferral of many parts of the development LUDs on Kuiu to Phases 2 and 3 of the Adaptive Management Strategy, provides a good balance of the commodity and noncommodity values and uses for Kuiu Island.

Upper Tenakee Inlet – In the 1997 Forest Plan, the non-development LUDs along the shoreline areas, including several inlets and bays, often resulted in blocked access or significantly increased costs of access to the development LUDs in the uplands. In reviewing the small old-growth reserves in upper Tenakee Inlet, biologists, logging engineers and managers took a hard look at this area to see if a better balance of protecting the high scenic and habitat values associated with the area while also addressing the high development costs could be made. In response, VCUs 2240 and 2250 in the upper end of the Inlet were converted to the Semi Remote Recreation LUD to address the scenic values and to strengthen the biodiversity connection, or pinch-point, with the northeastern lobe of Chichagof Island as well as the Neka Bay area. Both development and non-development LUDs along the west side of the Inlet were consolidated and the development LUDs in VCUs 2260, 2290, and 2320 are scheduled for Phase 3 of the Strategy. VCU 2310 is scheduled for Phase 2 because it is easily accessible by extending the current road system from VCU 2300.

Ushk Bay/Poison Cove – This area of very high public interest is located in the Hoonah Sound Roadless Area. Issues in this area relate to Native Allotment claims, subsistence, timber sale economics, the proximity of the area to Sitka, high cultural and traditional use values, scenic, and other uses. If development projects are proposed in the area, the amended Plan provides reasonable options and flexibility to address the high values and potentially competing uses of the area. In recognition of this area's complexity and high values, it is included in the Phase 3 of the Strategy, which means that no timber sale can be planned until actual harvest levels on the Tongass reach 150 MMBF for two consecutive fiscal years.

West Duncan Canal – The lands all along the west side of Duncan Canal are in non-development LUDs in recognition of the high recreation and scenic resources associated with the area. This width of non-development LUDs ranges from about 1 mile in width to several miles inland, such as up the Castle River drainage. The inland portions of the northern part of the area where development is allowed are included in Phase 1 of the Strategy because they are easily accessible from currently roaded areas in the interior of the island by extending existing road systems. Development LUDs associated with the southern part of the Canal in VCU 4350 are deferred until Phase 3. Most of the remaining land in development LUDs on the southern portion of the Island is in Phase 2, because these areas would be easily accessible by extending the existing road system in the interior of the Island to the north. The amended Forest Plan provides a well-balanced mix of LUDs that fully recognize the many values associated with the lands along the west side of Duncan Canal while allowing some timber harvest if and when it is needed.

Honker Divide – Honker Divide is a key part of the old-growth conservation strategy for the northern half of Prince of Wales Island, with over 200,000 acres in non-development LUDs. The strategy includes connections of old-growth habitat in non-development LUDs from the Karta Wilderness through Honker Divide and the Sarkar Lakes area and through the Calder Holbrook LUD II area to the northern tip of Prince of Wales Island. To further support the protection of this connective area, I am including the eastern portions of VCU 5750 and 5780 in Phase 2 of the implementation strategy. VCU 5740 is also deferred to Phase 2, which means no timber harvest may be planned until the actual harvest levels on the Tongass reach 100 MMBF for two consecutive fiscal years.

***Gravina and Bostwick Inlet* –** Bostwick Inlet is located on the south and east end of Gravina Island near Ketchikan. Many residents of the nearby communities of Ketchikan, Saxman, and Metlakatla use this area for recreation and subsistence purposes. Much of the land in the area surrounding Bostwick Inlet were previously allocated to development LUDs and no changes were proposed in the 2007 draft amended Forest Plan.

Many reviewers of the Draft EIS recommended no timber harvest be allowed on Gravina Island. In their comments on the Draft EIS, the Ketchikan Indian Community (KIC) expressed serious concerns with timber harvest activities previously proposed on Gravina Island, and referred to ongoing collaborative efforts to resolve those concerns. KIC recommended changing the LUDs in the Bostwick area from development to non-development. Consequently, I am modifying Alternative 6 as displayed in the Final EIS to change the LUD allocations in the Bostwick Inlet area to a combination of non-development LUDs. I am also deferring timber harvest in the development LUD to the west and south of Bostwick inlet to Phase 3 of the Timber Sale Program Adaptive Management Strategy. Only if the timber industry expands to levels of harvest sufficient to implement this last phase could timber sale planning be done for this area.

Cleveland Peninsula – The Cleveland Roadless Area has been the center of land use debates for some years. Recreation use of Cleveland Peninsula is high, especially on the eastern side of the peninsula north of Ketchikan. Some mineral exploration is ongoing on the northern side of the peninsula. The Forest Plan allocates the entire southwestern portion, roughly one-half of the area, to non-development LUDs. The remainder of the peninsula is allocated to a mix of development and non-development LUDs that recognize the old-growth habitat, scenic, and timber values of the area. I believe the mix of LUDs and associated standards and guidelines in place with the Forest Plan are appropriate to address the high values associated with Cleveland Peninsula. It is not the appropriate time to change the mix of LUDs here, primarily because of the amount of suitable and available timber included in the development LUDs. However, virtually all of the development LUD areas on Cleveland Peninsula are included in Phase 3 of the Strategy, except for VCU 7210 where the Emerald Bay project was previously proposed, which will be in Phase 2. No further timber sale planning in this area may be done until the actual harvest levels on the Tongass reach 100 MMBF for two consecutive fiscal years.

***Salmon Bay Lake* –** Most of the Salmon Bay Lake area on northern Prince of Wales Island is in a congressionally designated LUD II area. Relatively small portions of the watershed outside of the LUD II area are in development LUDs, especially in VCUs 5340 and 5341. These portions are included in Phase 2 of the Strategy, which means that no timber harvest may be planned until the actual harvest level on the Tongass reaches 100 MMBF for two consecutive fiscal years.

***Basket Bay and Kook Lake* –** This area was identified by The Nature Conservancy, the U.S. Fish and Wildlife Service, and others as having very high fish and wildlife values. The area to the north of Kook Lake in VCU 2390 is developed while the area to the south in the remainder of VCUs 2390 and 2400 is not. The development LUD portion of the southern area is included in Phase 2 of the Strategy.

***Sitka Community Use Area* –** The development LUDs in the immediate area surrounding Sitka have been heavily developed during past timber management activities. Many residents of Sitka have expressed a desire for a greatly reduced level of future timber harvest or none at all. Therefore the majority of the development LUDs have been placed in Phase 2 of the Strategy, which means that no timber harvest may be planned until the actual harvest level on the Tongass reaches 100 MMBF for two consecutive years.

Kruzof Island – The developed portion of northern Kruzof Island has become popular for recreation users from Sitka, especially taking advantage of the roaded access of the area. The Nature Conservancy and Audubon Alaska assessment efforts also recognized this area for its multiple use values and recommended the area have an integrated management emphasis. All of the Timber Production LUD in this area has been changed to Modified Landscape, which better reflects the recreation and scenic values of the area while also providing opportunities for smaller timber sales in the future. The area is also included in Phase 1 of the Strategy.

Problems Identified by the Ninth Circuit Court of Appeals

As described on page one of this ROD, the Ninth Circuit Court of Appeals identified several inadequacies with the 1997 ROD and Final EIS for the Forest Plan. Remedying those problems is the primary purpose and need for the 2008 Amendment. The section of this ROD regarding market demand explains how the Forest Service has corrected the errors made in 1997 by developing new projections of market demand. Having corrected those previous errors related to market demand, the court's supposition about choosing an alternative with less environmental effects and in less sensitive areas does not apply to this decision. Nonetheless, the discussions above on roadless areas and the Timber Sale Program Adaptive Management Strategy explain how the Forest Service has taken extra steps to ensure that potential adverse effects on areas perceived as environmentally sensitive have been minimized. The discussion below explains why I believe that Alternative 6, coupled with the Tongass Timber Sale Program Adaptive Management Strategy, best responds to the remaining problems identified by the court, those dealing with the range of alternatives considered in the Final EIS, and the cumulative effects of disproportionate harvest of high-volume timber on non-federal land.

Range of Alternatives

The Court of Appeals for the Ninth Circuit found two deficiencies related to the alternatives considered in the 1997 Final EIS for the Revised Tongass Forest Plan. The Forest Service had not considered alternatives that set the ASQ equal to the correct demand scenarios. In addition, each of the 10 alternatives considered in the EIS allocated some roadless areas to LUDs that allow development; the EIS omitted an alternative that allocated less undeveloped land to the development LUDs.

Setting ASQ of the Alternatives Equal to Projected Demand of the Scenarios. In the 1997 Final EIS, one alternative had no scheduled timber program, so the ASQ for that alternative was zero. With that exception, the ASQ of all alternatives considered in 1997 exceeded demand projections under the low and middle market scenarios of the 1997 demand study. For the 2008 Forest Plan Amendment, I considered all the demand projections of the Brackley et al. study, as displayed in Table 3, which I consider to be the best available science related to market demand projections. As previously discussed in the market demand section of this ROD, I found the projections for 2022 most helpful in guiding my decision to approve the amended Forest Plan, since that is the end of the NFMA planning cycle of 10-15 years, and three of the four demand scenarios estimate that demand will grow every year throughout the 20-year period of the study. Table 4 below compares the demand projections for 2022 with the ASQ for the second decade of each alternative considered in detail in the Final EIS.

Table 4
Projected Demand[1] in 2022 Under each Brackley et al. Scenario Compared to Second-decade Average Annual ASQ for each Final EIS Alternative

Projected 2022 demand[a] (MMBF).	Second-decade ASQ for each alternative (MMBF).
Scenario 1 – 68	Alternative 1 – 49
Scenario 2 – 187	Alternative 2 – 152
Scenario 3 – 204	Alternative 3 – 203
Scenario 4 -- 342	Alternative 4 – 360
	Alternative 5 – 267
	Alternative 6 – 267
	Alternative 7 – 421

Note:
[1] These figures include total volume (sawlog and utility) that would need to be harvested to meet the demand projected by Brackley et al.

Alternatives 1-4 were designed to correspond with scenarios 1-4, respectively. Alternative 1 was designed to reflect scenario 1, with modifications to better match recent annual harvest levels (approximately 50 MMBF) and to avoid harvesting in roadless areas and areas on Kuiu Island. Because of these modifications, the Alternative 1 ASQ is actually 19 MMBF (28 percent) below the projected demand of Scenario 1. The ASQ of Alternative 2 is 25 MMBF (19 percent) below the projected demand of Scenario 2. The purpose of Alternative 2 is to display an alternative that restricts development activities to lower value roadless areas. Alternative 3 differs from Scenario 3 by only 1 MMBF. The ASQ of Alternative 4 is 18 MMBF (5 percent) above the projected demand of Scenario 4. These figures do not match exactly, partly because the second decade ASQ extends 20 years from the decision, while the projected demand represents an annual figure 15 years out.

Alternatives Allocating all Roadless Areas to Non-Development LUDs. As mentioned at the beginning of this section, the Ninth Circuit found the 1997 Tongass Forest Plan Revision Final EIS deficient because all of the alternatives considered in detail allocated some roadless areas to LUDs that allow development; the 1997 Final EIS did not include an alternative that allocated less undeveloped land to the development LUDs.

To remedy this deficiency, the Final EIS for the 2008 Tongass Forest Plan Amendment considers Alternative 1, which allocates no roadless areas to the LUDs that allow development, as shown in Chapter 2 of the EIS. In the interest of clarity, I point out that some activities that might be considered “development” may sometimes be allowed in many of the non-development LUDs. The most significant of these is the construction of a State highway or utility system connection between communities in Southeast Alaska, or between the region and the continental road system and power grid. Such development could be allowed in many “non-development” LUDs, including areas that are currently roadless. Such development is expected to be quite rare, and would require additional project-level NEPA analysis and decision-making before actual construction could begin.

The Forest Service received several comments from the public concerning the range of alternatives considered in the Draft EIS. The most frequent concern expressed was that the Draft EIS did not include an alternative with an ASQ lower than 50 MMBF. Several reviewers recommended such an alternative be included in the Final EIS, because they believe that timber harvest levels are likely to fall below that level.

As discussed in the section of this ROD on alternatives considered, and in Chapter 2 of the Final EIS, all alternatives displayed in all the EISs developed for the 1997 Forest Plan were reviewed for consideration in detail in the Draft and Final EIS for the 2008 Tongass Forest Plan Amendment. As displayed in Table 2 of this ROD, Alternative 1 of the 1996 Revised Supplement to the Draft EIS for the Revised Tongass Forest Plan was analyzed in detail in that EIS, and had an ASQ of zero. This alternative was also considered in detail in the 1997 Final EIS. This alternative was not considered in detail in the Draft or Final EIS for the 2008 Forest Plan Amendment for several reasons:

- The previous consideration in the 1996 and 1997 EISs was deemed adequate.
- The concern being addressed by alternatives with a low ASQ—avoiding development in roadless areas—is addressed by Alternative 1 of the 2008 Final EIS, because this alternative avoids timber harvest in roadless areas.
- Information from a variety of sources (e.g., mill capacity utilization reports and communications from operators) gave rise to concerns that the current timber industry in Southeast Alaska could not survive if an alternative were selected with an ASQ equal to or lower than current harvest levels.

Cumulative Effects of Disproportionate High-Volume Logging

The Court of Appeals for the Ninth Circuit found several deficiencies in the 1997 Final EIS for the Tongass Plan related to the cumulative effects of disproportionate high-volume logging (a practice sometimes called "highgrading") on non-federal land.[20] Specifically, the court found that the 1997 EIS failed adequately to consider such cumulative effects because the EIS did not include: (1) a catalog of past projects; (2) a discussion of how those projects (and differences between the projects) have harmed the environment; (3) a discussion of the connection between individual non-federal high-volume harvests and the prior environmental harm from those harvests; and (4) an assessment of the potential impacts of reasonably foreseeable continued highgrading in the future.

The court also found that a cumulative effects analysis in a new programmatic EIS is necessary for the Forest Service and the public to make a rational evaluation of the proposed action balancing the competing goals of timber harvest, environmental preservation, and recreational use in the Tongass.

Catalog of Past Projects on Non-Federal land. Because information about specific projects on non-federal land was unavailable in 1997, the cumulative effects analyses in the 1997 EIS assumed that all non-national forest land within the boundaries of the Tongass National Forest had no habitat value and therefore would not contribute to wildlife viability on the Tongass. In other words, non-federal land was analyzed as if it contained no vegetation whatsoever. In response to the court's concern regarding the lack of a catalog, the Forest Service worked with the State of Alaska and Sealaska Corporation, the regional Native corporation for Southeast Alaska, to develop a comprehensive catalog of each timber harvest project conducted on State land and Alaska Native corporation lands.

Appendix E of the Final EIS provides a catalog of past harvest by breaking down all past harvest in Southeast Alaska according to landowner category within each of 23 biogeographic provinces and identifying the acreage and decade(s) of harvest for each. In addition, the appendix summarizes the data provided by the State of Alaska regarding past harvest activities in Southeast Alaska permitted under the Alaska Forest Resources and Practices Act.

While Appendix E of the Final EIS complies with the court's direction to develop a catalog of past projects on non-federal land, this is only a small part of the analysis contained in the Final EIS of the potential cumulative effects of the disproportionate harvest of high-volume timber on non-federal land. For example, better mapping of current stand conditions on all land ownerships in Southeast Alaska has improved the analysis of effects of past timber harvest throughout the region. In addition, because complete information on stand types associated with early harvests was not documented or available, a method of estimating the proportion of different types in past harvests was developed and applied to all past harvest areas. The methodologies used to quantify the amounts and types of past harvest and project future harvests on both federal and non-federal lands are described in Appendix B of the Final EIS.

[20] While this ROD uses the term "highgrading" as it is used in the Ninth Circuit Court's opinion, it is a silvicultural term correctly defined as selective removal of the biggest and highest value trees from a stand. Over time, this can reduce the overall genetic quality of the stand.

The Biodiversity section of the Final EIS uses the Appendix E information along with geographic information system analyses and other information to describe in detail the total amount of past old-growth harvest on National Forest System (NFS) lands and non-NFS lands, and the amount within each of 23 biogeographic provinces that make up Southeast Alaska. In addition to the total amount of productive old-growth harvest, the amount of high-volume and large-tree old-growth harvest, the amount of harvest on karst terrain, and other descriptors are provided and discussed. In addition, projections are made in order to quantify future harvest levels for each of these categories and the effects of cumulative harvests are evaluated.

These analyses show that 92 percent of the original old growth still exists on NFS lands. When non-NFS lands are also considered, this percentage drops to 87 percent for all of Southeast Alaska. Similarly, 87 percent of the original high-volume old growth and 80 percent of the original large-tree old growth still exists on NFS lands, but 70 and 68 percent of these categories exist for all of Southeast Alaska, respectively.

Even if timber were harvested for 100 years at the maximum rate allowed under the amended Forest Plan, 83 percent of the original productive old growth, 79 percent of the original high-volume old growth, and 72 percent of the original large-tree old growth on NFS lands would still remain. If non-NFS lands are also considered, these percentages would decline to 76 percent, 70 percent, and 57 percent.

High-volume productive old growth currently makes up approximately 41 percent and large-tree old growth makes up 11 percent of the productive old growth on the Tongass. These two categories make up the same percentages within the reserves of the conservation strategy. Overall, and once standards and guidelines such as riparian and beach protection are applied, about 90 percent of the existing high-volume old-growth and 89 percent of the existing large-tree old growth would be protected under the amended Plan. This is a conservative estimate, based on the assumption that maximum harvest levels allowed under the ASQ are implemented over many decades.

As discussed in previous sections of this ROD, however, the duration of this decision is 10 to 15 years, not 100 years. The analyses described above also show that, if timber were harvested at the maximum level allowed by the amended Forest Plan for 15 years, 89 percent of the original productive old-growth forest would remain on the Tongass (97 percent of the existing old growth); as would 84 percent of the original high-volume old growth (97 percent of the existing high-volume old growth) and 77 percent of the original large-tree old growth (96 percent of the existing large-tree old growth).

This high level of protection for high-volume old growth is in part a direct result of the design criteria for the makeup of the reserves, which is just one way in which the 1997 Forest Plan was responsive to the disproportionate harvest levels of the past, including harvests on non-NFS lands. For example, Appendix K to the Forest Plan (1997 and 2008 Amendment), which establishes criteria for old-growth reserves, has specific target levels for high-volume old growth. Additionally, the adjustments to the small old-growth reserves and the expansion of other non-development LUDs included in this decision add about 149,000 acres to the reserve system relative to the 1997 Forest Plan, as amended. These acreages include 45,000 additional acres of productive old growth, 27,000 acres of which are high-volume old growth (59 percent), and 11,000 acres of which are large-tree old growth (25 percent).

Therefore, past timber harvest, including past disproportionate harvest of high-volume stands, has been considered in the design of old-growth reserves and in the development of the conservation strategy. Effects analyses for all resources were based on the environmentally conservative assumption that all scheduled suitable lands would be harvested at some point over the next 100-150 years. Because most of the Tongass lands suitable for timber harvest are undeveloped, it is reasonable to schedule higher-volume stands, higher in proportion to their existence, for the purpose of offsetting high infrastructure development costs. Once the infrastructure is in place, lesser volume stands can be accessed at a higher rate because the cost of access is less. Doing otherwise creates deficit timber sale projects needing supplemental funding to offset infrastructure costs. Appropriation legislation for the last several years has not allowed the offering of deficit timber sale projects nor provided funding levels necessary to offset initial entry costs.

Comparison of Alternatives

Wildlife Viability

Long-term viability for wildlife species has been extensively studied and analyzed, and is discussed in detail in the Final EIS (Chapter 3, Biodiversity and Wildlife sections and Appendix D). Panels of experts were formed to assess viability risks to key species that could result from each alternative considered in the 1997 Forest Plan Revision EIS. These ratings were transferred to the alternatives in the 2007 Draft EIS, based on the four alternatives that are similar between the two documents and similarities in the amount of timber harvest allowed. Based on this analysis, the alternatives fall roughly into three groups.

Compared to the other alternatives considered in detail, Alternatives 1, 2 and 3 provide the highest degree of assurance that the habitat needed for viable, well-distributed wildlife populations would be maintained, and that subsistence, recreational, and commercial uses of wildlife resources would be sustained. This is due largely to more non-development LUDs and refinements to small old-growth reserve boundaries that protect more high quality old-growth habitat, as compared to Alternative 5 (the 1997 Forest Plan).

Alternatives 4 and 7 provide the least assurance that the habitat needed for long-term viability of all wildlife species would be maintained because more acres are in development LUDs and there would be poorer distribution of high quality old-growth reserves in Alternative 4, and none in Alternative 7. The U.S. Fish and Wildlife Service, in their comments on the Draft EIS, expressed concerns that these alternatives would fail to ensure viable, well-distributed populations and recommended these alternatives be eliminated from further consideration.

Alternatives 5 and 6 provide a moderate to very high degree of assurance that, even if development occurs at maximum allowable levels for 100 years, there would still be sufficient habitat to support long-term viability of wildlife species because there would be a good to very good distribution of high quality old-growth reserves over the long term. Alternative 6 includes improvements to the small old-growth reserve system that Alternative 5 does not have, and includes more total acreage in reserves than Alternative 5. Alternative 6 as displayed in the Final EIS would apply the revised version of the goshawk nest standards and guidelines and the new forest-wide legacy standard and guideline. I want a Forest Plan that, in conjunction with all the other multiple-use goals and objectives, has a relatively low level of risk—or conversely, gives me good assurance that the habitat needed to sustain viable populations of wildlife would be maintained over the long term. As explained in greater detail in the section of this ROD regarding wildlife habitat and biodiversity, Alternative 6—with the changes specified in this ROD--provides this assurance and retains the major components of the original conservation strategy. Alternatives 4 and 7 may not provide adequate assurance of meeting viability requirements.

Socioeconomic Considerations

As was true in 1997, maintaining options for a variety of social and economic uses of the Tongass is another key factor in my decision. These social and economic uses range from continuing a timber harvest program that provides a sustainable supply of timber and other timber products to providing for subsistence opportunities and unspoiled settings for recreation and tourism. It is partly a matter of finding a balance, within a multiple-use context, of the many public uses and demands on forest resources, and partly not foreclosing options for the future to respond to changes in public needs, economic conditions, or new technologies as such changes develop.

Alternatives 1 and 2 would not allow sufficient timber volume to meet the projected market demand under the scenario considered most likely to occur over the next 15 years, nor would they allow the development of an integrated timber industry. (See the market demand section of this ROD for a discussion of the scenarios depicted in the most recent study of demand for timber from the Tongass.)

Only Alternatives 4 and 7 could provide sufficient timber volume to meet the high integrated industry scenario, but with more trade-offs for wildlife habitat (described above), recreation opportunities and scenic quality, due to allocating 28 percent and 30 percent of the Tongass to moderate and intensive development LUDs, respectively.

Alternatives 3, 4, 5, 6, and 7 could all provide sufficient timber volume to meet the medium integrated scenario, although Alternative 3 could not provide sufficient economic volume. While Alternative 3 allocates 18 percent of the Tongass to moderate and intensive development LUDs, less than the 22 percent in Alternative 5 and 21 percent in Alternative 6, it does not provide enough opportunity for growth of an integrated timber industry over the next 10 to 15 years, which limits the potential socioeconomic development of many rural communities within the Tongass National Forest. Recreation opportunities and scenic quality are very similar between Alternatives 5 and 6. Alternative 6 changes the wildlife habitat standards and guidelines to reduce their economic impact, which leads me to conclude Alternative 6 best balances competing values and uses of the Tongass National Forest.

Present net value calculated for each alternative represents one efficiency measure for those costs and benefits that can be assigned monetary values, in this case timber, recreation and tourism and program management costs. Alternative 1 is estimated to have the highest present net value and Alternatives 4 and 7 the lowest, largely due to the high costs of operating timber programs in Alaska. The estimate of present net value for Alternative 6 is in the middle of the range of all the present net values for the seven alternatives considered. Given the failure of present net value to consider qualitative factors critical to accurately predicting net public benefits, and the ability of Alternative 6 to balance many competing values and uses of the Tongass National Forest, I find that Alternative 6 currently provides the best strategy for maximizing net public benefits.

Roadless Areas

Alternative 1 does not allocate any inventoried roadless acres to development LUDs, and has the fewest acres suitable for timber harvest. Alternatives 4 and 7 are at the other end of the spectrum, with the greatest amounts of the existing roadless areas allocated to moderate and intensive development LUDs and suitable for timber harvest.

Alternatives 2, 3, 6, and 5 show gradual increases in the acreage of existing roadless areas allocated to moderate and intensive development LUDs, with Alternative 6 slightly less than Alternative 5. With the Timber Sale Program Adaptive Management Strategy, I am confident that the highest value roadless areas within the suitable land base will be protected until needed to meet demonstrated growth and integration in the timber industry. Alternative 6 best provides the flexibility and balance to meet the competing demands for growth and for the protection of roadless character, recreation, and other socioeconomic values associated with roadless areas.

Other Resources

Alternatives 1, 2, 3, 5 and 6 are better than alternatives 4 and 7 in maintaining scenic quality and undisturbed settings, factors important to the continued expansion of the recreation and tourism industries, and to most Southeast Alaska communities.

The abundance and distribution of the majority of subsistence resources (fish and marine invertebrates) would not be affected by any alternative. The analysis continues to suggest that deer habitat capabilities in the areas of the Tongass with heavier timber harvest may not be adequate to sustain current and future deer harvest levels under any alternative, and that increased competition for deer harvest may cause a significant possibility of a significant restriction in the future.

This possibility of future restrictions resulting from changes in abundance and distribution of deer and increased competition would be lower for Alternatives 1, 2 and 3 and higher for Alternatives 4 and 7 compared with Alternative 5 (the 1997 Forest Plan, as amended). Alternative 6 is the same as Alternative 5 because similar amounts of acres are proposed for timber harvest.

Compared to Alternative 5, all other alternatives expand the Mineral LUD overlay by approximately 80,000 acres. None of the alternatives includes any changes to the management of mineral activities. No land ownership adjustments are proposed under any alternative and all alternatives, except Alternative 5, include recommending the Experimental Forest at Young Bay be replaced by a larger, more accessible Experimental Forest at Cowee and Davies Creek and that the Geologic Special Interest Areas be expanded by about 47,000 acres.

Alternative 1, the "environmentally preferable" alternative, would result in the least adverse effects to the physical and biological environment. With timber harvest scheduled only along the existing road system and no development in roadless areas, it has the least effects of the alternatives considered. Accordingly, in comparison with other alternatives, it tends always to rate highest when levels of resource protection are a consideration. Conversely, when considering timber-related employment and community dependence on such employment; infrastructure development and new road access; or rural development in a multiple-use context, Alternative 1 generally ranks lowest. Therefore, I conclude that it does not provide an acceptable balance between the competing multiple use demands for environmental protection and human uses of the natural resources of the Tongass National Forest. For the same reasons, it also does not meet the objectives of ecological, economic, and social sustainability.

Conclusion

Given the many social and economic trade-offs inherent in national forest management, I find that Alternative 6 best balances the many interrelated environmental, social, and economic issues that arise when managing for multiple uses.

Other Considerations

In addition to responding to the decision by the Ninth Circuit Court of Appeals and the key issues described above, my decision is based on consideration of several other topics, including invasive species, management of young-growth forest stands, climate change, ecosystem services, transportation and utility corridors, cooperation with the State of Alaska, public input, areas of special interest, and the use of the best available science.

Invasive Species

The 1997 Forest Plan did not include the term *invasive species*. Nationally and regionally, the Forest Service is giving high priority to eliminating or preventing adverse impacts caused by invasive species. The amended Forest Plan includes new objectives and standards and guidelines that will enable the Tongass National Forest to carry out these relatively new national and regional priorities on the Tongass. As is true in other program areas, the extent to which these objectives can be met is dependent in large part on factors out of the control of the Forest Service, such as congressional funding allocations.

Management of Young-Growth Forest Stands

The management of young-growth forest stands is becoming more important as young trees located in previously harvested areas mature, and as interest grows in transitioning the timber industry in Southeast Alaska from one based on the harvest of old-growth forest stands to one based on the harvest of young growth. Young-growth forest stands are those that grow after the trees in an area have been removed by timber harvest activities or a natural disturbance event such as a landslide or windstorm. A substantial amount of new information has become available regarding the management of young-growth forests since the 1997 Forest Plan was adopted. For example, forbs and shrub populations are more extensive in thinned young-growth stands than was assumed in previous forest planning efforts. This information is relevant for the analysis of the effects of timber harvest on species like the Sitka black-tailed deer that feed on forbs and shrubs. Management practices of young-growth forest stands, such as thinning, can substantially improve the forage for deer, and also promote better growth of the remaining trees for future timber harvest. Precommercial thinning involves cutting most of the small trees that naturally grow back in areas where the old-growth trees have been removed, usually about 15 to 25 years after the initial removal. When thinning is done at this stage, the young-growth trees removed are so small that that they usually have no commercial value, so it must be paid for by appropriated funds. Similarly, thinning of young-growth stands that are 50 to 70 years old can yield commercially marketable trees—hence the name "commercial thinning"--while also improving forage for wildlife and higher timber yields in the future. Many organizations have encouraged the Forest Service to transition the timber program on the Tongass from one based on the harvest of old-growth forest to one that harvests young-growth stands. Such a transition would enhance the protection of old-growth forest habitat.

For all of these reasons, I support the transition of the Tongass timber program to one based more on the harvest of young-growth stands. The amended Forest Plan has been carefully reviewed to ensure that it contains no provisions that might impede such a transition. Young growth could potentially comprise a substantial portion of the Tongass timber program in as little as three decades, with initial young-growth operations beginning in earnest by the end of the current planning cycle. The ultimate success of this effort, however, will depend on several factors, including investments by the timber industry in milling equipment designed for smaller young-growth trees, integration of the industry to effectively process all products harvested from the Forest, and funding decisions made by Congress.

Climate Change

Interest in climate change, and knowledge of this issue, have grown enormously over the last decade. The two broad questions relevant to the decision on the 2008 Forest Plan Amendment are the extent to which climate change might affect the natural resources of the Tongass National Forest and the uses of those resources, and the extent to which management of the Tongass could affect climate change.

As discussed in Chapter 3 of the Final EIS, the effects of climate change on the natural resources of the Tongass are highly uncertain, especially over the long run, and likely to be small, especially over the next 10 to 15 years. While there is general agreement among scientists that the climate is warming, there is considerable uncertainty concerning the exact effects of climate change on the forests of Southeast Alaska and how best to deal with possible changes to the many resources on the Tongass. There is a risk that climate change may result in increased blowdown, increased tree mortality from insects and disease, increased fire frequency and severity, adverse effects on air quality, changes to vegetation, streams, fish and wildlife habitat, and subsistence and recreational uses of the National Forest. However, there is considerable uncertainty concerning specific predictions of how the climate may change, and even more uncertainty regarding the effects of climate change on the resources of the Tongass National Forest.

Consequently, it is important for the Tongass to stay abreast of the evolving scientific information related to the effects of climate change. However, the state of current knowledge and the uncertainty about specific effects of climate change leads me to conclude that the best course of action today is continued management of the Tongass for resiliency in the face of uncertain but anticipated change. This will be done primarily by management of the Tongass as a mostly intact ecosystem with a robust monitoring plan that will allow for adaptive management intervention if and when effects of climate change are more certain.

The same is true regarding effects on climate change of the alternatives analyzed in the Final EIS. For example, as described in the Climate and Air section of Chapter 3, the science regarding the effects of timber harvest on carbon sequestration is uncertain. Some studies suggest that timber harvest may increase the release of carbon to the atmosphere, which would tend to increase greenhouse gasses and global warming. Others indicate that timber harvest may increase the amount of carbon sequestered from the atmosphere. In either case, the effects are likely to be small, especially compared to other routine human activities. Accordingly, information on climate change is not essential to a reasoned choice among the alternatives displayed in the Final EIS.

For these reasons, the issue of climate change has played a limited, but important role in this decision in the context of monitoring. The Forest Service will continue to monitor potential effects of climate change through existing monitoring programs and through the Monitoring and Evaluation Plan. Existing monitoring programs include our Regional forest health program that monitors forest health changes related to insects, disease, pathogens and windthrow across Region 10, and the long-term forest inventory system. In addition, the Forest Plan's monitoring and evaluation provisions have been updated to address the effects of all change, including climate change I believe these efforts will detect any significant effects of climate change on the Tongass. If such changes are detected, they will be addressed through existing planning procedures to determine whether changes in management of the Forest are warranted.

Ecosystem Services

Ecosystem services are those services and benefits provided by healthy ecosystems. They can be broadly defined to include consumptive uses, such as logging, fishing, and hunting, as well as other benefits associated with forests such as watershed services, soil stabilization and erosion control, improved air quality, climate regulation, carbon sequestration, and biological diversity. Ecosystem services are a topic of growing interest within the Forest Service, its partners and stakeholder groups.

Some members of the public have expressed concerns that ecosystem service values are not adequately considered in decision-making processes because they are not valued on a par with goods and services that are traded in commercial markets. The Final EIS discusses different attempts to measure the value of ecosystem services. While ecosystem services values on the Tongass are undoubtedly high, there is uncertainty about the accuracy of these estimates. It is also difficult to determine how the alternatives differ in the level of ecosystem services provided. The fact that the Final EIS does not assign a monetary value to ecosystem services does not lessen their importance in the decision-making process. In fact, a large proportion of the Final EIS is devoted to assessing impacts to the forest resources that cannot be readily expressed in monetary terms. This decision takes these values into consideration. As previously mentioned, the undeveloped nature of the Tongass National Forest, and the ecosystem services provided by the Forest, will be adequately protected by the Forest Plan. Even if timber harvest and road construction were conducted at maximum allowable levels under the Forest Plan for 100 years, at least 80 percent of the Tongass would still be in a roadless, undeveloped condition.

This Forest Plan Amendment also supports ongoing initiatives in Southeast Alaska to develop ecosystem services markets such as the Fuels for Schools program, thinning of young growth for wildlife habitat improvement, and implementation of practices and technologies to reduce the carbon 'footprint' of Forest Service operations.

Transportation and Utility System Corridors

The Transportation and Utility System (TUS) LUD was originally developed as part of the 1997 Plan to:

- Acknowledge the potential need for major highways or utility systems connecting communities in Southeast Alaska with each other, and connecting the region to the continental highway system and power grid.
- Identify likely locations for such connections.
- Facilitate construction of them.

The Forest Plan does not, however, approve any of these projects. As with any other proposed site-specific activity, construction of a TUS requires further project-level NEPA analysis and decision-making. During that process, all reasonable alternative routes must be considered, even those that may not be foreseeable at the programmatic, Forest Plan stage. Consequently, the objectives of the TUS LUD can be met without trying to identify on the LUD map every reasonable alternative route for every potential highway or utility system.

During the development of the EIS for the 2008 Forest Plan Amendment, State agencies and members of the public expressed concerns that not all potential TUS corridors were on the Forest Plan LUD map. Specifically, the Alaska Department of Transportation and Public Facilities (ADOT&PF) advised that several potential TUS routes identified in the Department's Southeast Alaska Transportation Plan were not included in the Draft EIS map. In response to these concerns, the Forest Service added a potential utility route for the community of Pelican to the LUD map in the Final EIS, and made other minor changes. In addition, the Plan's management direction for the TUS LUD has been clarified to improve its implementation, and to note that not all reasonable alternative routes for all potential TUS connections are—or can be--identified on the map. The Forest Service also will retain the information provided by ADOT&PF regarding alternative TUS routes in the planning record, to ensure this information will be available for any future land management decisions.

Cooperation with the State of Alaska

The Forest Service and the State of Alaska signed a Memorandum of Understanding (MOU) (January 28, 2006) to include the State as a cooperating agency in the development of the 2008 Forest Plan Amendment. Under this MOU, the State has participated extensively throughout the planning process for the 2008 Forest Plan. This cooperative effort has been essential in clarifying and resolving many land management issues. Future cooperation is addressed under the implementation section of this ROD.

Public Input

As explained in Chapter 1 of the Final EIS, the 2008 Tongass Forest Plan Amendment is based in part on public input gathered over the course of many years during previous planning efforts, including the development of the 1997 Forest Plan, the 2003 Supplemental EIS, the National Roadless Rule and project-level NEPA analyses. Additional public input for the 2008 Amendment to the Tongass Forest Plan began in January 2006 when the Forest created a website specific to the amendment (*www.tongass-fpadjust.net*) and requested input on the amendment process. The Notice of Intent to prepare the EIS continued the process of gathering public input when it was published in the *Federal Register* in March 2006. Appendix A of the Final EIS summarizes the public input process that led to the development of the significant issues.

The Draft EIS was released for public comment in January, 2007. Twenty-five public meetings were held. These meetings included 23 meetings in communities located throughout Southeast Alaska, a meeting in Anchorage, and an electronic public meeting held on the internet. These meetings included both an open house and a hearing. A total of 204 people provided formal testimony at these hearings.

The 90-day public comment period was scheduled to end in mid-April but was extended an additional 18 days because of bad weather in Southeast Alaska and to give people more time to comment on the changes made to small old-growth reserves. Approximately 84,500 comments were received during the 108-day public comment period. Approximately 98 percent of the responses were form letters. Comments were received from all 50 states and 89 other countries. This reflects the importance of the Tongass at the national and international level.

All comments were carefully reviewed, coded, and consolidated into logical comment summaries. Responses were developed to each comment summary and revisions made to the analysis or Forest Plan as appropriate. These comment summaries and responses can be found in Appendix H of the Final EIS.

Review of the public comments resulted in Alternative 1 being modified between the Draft and Final EIS, with all roadless areas and other high interest areas, such as Kuiu Island, being removed from the suitable timber land base. The results of the public involvement and comment process led to a number of other improvements, clarifications and updates between the Draft and Final EIS.

Tribal governments and Alaska Native corporations were also consulted throughout the planning process. They participated in the hearings described above and their comments are included in the summaries developed for Appendix H.

There have been numerous collaborative meetings and discussions held between groups with an interest in the Tongass. The Tongass Futures Roundtable, a group of 35 diverse stakeholders, organized many of these discussions with the intent of finding common ground on Tongass issues. These discussions continue and I am encouraged by the willingness of participants to work towards solutions that will benefit all of Southeast Alaska.

Finally, during the course of the development of the 2008 Forest Plan Amendment, the Forest Service has had thousands of informal contacts with people interested in the Amendment. The Forest Service approach has been thoroughly open and transparent. I am proud of the extent to which the Forest Service has involved the public in this process.

The Use of Science in the Planning Process

This Forest Plan Amendment builds upon the work previously done to revise and amend the Forest Plan. The management direction in the 1997 Tongass Forest Plan was the result of significant collaborative efforts throughout Southeast Alaska, the State, and across the nation. The 1997 Plan was developed collaboratively with other Federal and State natural resource management agencies, including the National Marine Fisheries Service, the Alaska Department of Fish and Game, the U.S. Fish and Wildlife Service, the Environmental Protection Agency, and the Forest Service Pacific Northwest Research Station. Representatives of the last three agencies were full members of the 1997 Tongass Forest Plan Revision interdisciplinary planning team. The process for developing the 1997 Forest Plan included peer reviews of the conservation strategy and review by panels of wildlife experts to ensure the Plan would be scientifically credible and resource sustainable.

The conservation strategy was the subject of a technical interagency workshop held in April 2006, which was designed to review and evaluate the conservation strategy in light of new science developed since the 1997 Plan. The workshop brought together scientists from a variety of organizations, including the Forest Service, the State of Alaska, other agencies, universities, and others, along with Tongass land managers, to report on and discuss current research relative to the conservation strategy, as well as experiences over the past 10 years relative to its implementation. The new science discussed at the workshop was fully considered throughout the planning process and in the modifications to the Plan.

The development of the EIS and the amended Forest Plan has been based on consideration of the best available science throughout the planning process. This has occurred by comprehensively reviewing available scientific research and other information relevant to the resource areas addressed. In addition, the specific modeling and analysis methods used were documented in Appendix B of the Final EIS or within other appendices or individual resource sections. Scientific sources relied on were cited, responsible opposing views were discussed, incomplete and unavailable information was acknowledged, and scientific uncertainty and risk was addressed in relevant portions of the Final EIS.

The amended Forest Plan provides for the sustainability of the resources of the Tongass National Forest, while directing the coordination and management of multiple uses of national forest land resources in cooperation with the State of Alaska, such as outdoor recreation, timber, mining, wildlife, fish, watershed, and wilderness. Recognizing that conditions on the Tongass National Forest do not remain static, that new information is constantly surfacing, and that considerable scientific uncertainty is associated with many conclusions regarding resource effects, the amended Forest Plan embraces an adaptive management approach. The Timber Sale Adaptive Management Strategy is a good example of this approach.

The Tongass National Forest worked closely with the Pacific Northwest Research Station to ensure consideration of the best available science throughout the process of amending the Tongass Forest Plan. The Station provided various science products to the Tongass Planning Team. Station scientists conducted four advisory science consultations on the topics of timber demand analysis, ecosystem services, and the use of deer models. Several Station scientists participated in the 2006 conservation strategy review workshop to examine new science information relating to the conservation strategy, and to identify additional information needs for the Tongass Plan Amendment. The Station produced a revised timber demand analysis which was published in July of 2006 (Brackley et al 2006). The Tongass Planning Team utilized the information from the new report, science consultations and the conservation strategy workshop in developing the Draft EIS.

Following the release of the Draft EIS, the Pacific Northwest Research Station conducted six science reviews to determine if relevant science information was considered and reasonably interpreted with consequences, uncertainties and risks appropriately identified. Informal science reviews were conducted on timber demand analysis, vegetation mapping, young-growth management, carbon sequestration and climate change, and ecosystem services. A more formal review was conducted on the elements of the conservation strategy dealing with the Queen Charlotte goshawk, American marten, Sitka black-tail deer, northern flying squirrel and endemic mammals. Station scientists were asked by the Alaska Forest Association (AFA) to describe more fully the timber demand study. In response, the scientists met with AFA and held a workshop to explain their methodology. As additional follow up, Station scientists also crafted the addendum to the Brackley et al. study of timber demand to provide additional details and clarification.

The Pacific Northwest Research Station provided input to Appendix D of the Final EIS, which deals with the science background, description of changes, assumptions and rationale for the old-growth conservation strategy, wildlife standards and guidelines, and wildlife viability components of the Forest Plan. The Station also provided input to Appendix G of the Final EIS, which describes how the Station’s market demand projections are used in timber sale planning. The Tongass Planning Team considered all the information from the science reviews, the timber demand addendum, and comments on Appendix D in compiling the Final EIS and ROD. A reconciliation table was developed to document how the science review input was considered in development of the Final EIS. The planners also met directly with Station representatives in July of 2007 to discuss the reconciliation of comments and seek additional feedback. The administrative record includes all science advisory consultation and science review comments provided by the Station, as well as the reconciliation demonstrating how the comments and information were used to inform the Final EIS and ROD.

Based on the level of rigor employed in reviewing available science and in incorporating and documenting this information throughout the planning process, in addition to the involvement of the Pacific Northwest Research Station at every step of the planning process, I am confident that the Final EIS and this ROD thoroughly consider and use the best available science.

Potential Land Adjustments

Appendix C of the Final EIS has been updated regarding new developments relating to potential land adjustments that could affect the implementation of the Forest Plan. Conceptual proposals from the Trust Land Office, representing the Alaska Mental Health Trust Authority, and Shee Atika Corporation are discussed in Appendix C. Additionally, proposed legislation introduced since the Draft EIS was published warrants some discussion here.

Two bills have been introduced in the U.S. House of Representatives that may affect lands within the Tongass National Forest, H.R. 3350, the Alaska Native Veterans Land Allotment Act and H.R. 3560, the Southeast Alaska Native Land Entitlement Finalization Act. Although a hearing was held by the House Natural Resources Committee in November, 2007 regarding these proposed bills, at this time no additional hearings or committee assignments have been identified and it is not clear whether these proposals will move further through the legislative process. Based on their current status, addressing the effects of these proposals relative to this Forest Plan decision is premature given the speculative nature of the prospects for legislative enactment. If at a later date one or both of these proposals become law, an analysis of the effects will be necessary to determine if a revision or amendment of the Forest Plan is warranted.

Land adjustments have been and will continue to be important considerations as the new Forest Plan is implemented. To continue to meet the conservation strategy and timber management goals and objectives of this Forest Plan decision, major discretionary land adjustment proposals will be considered if the proposed exchange of lands maintains the conservation strategy, ensures public access for subsistence uses, and at least a portion of the timber volume from the lands conveyed from the Tongass National Forest contributes to the timber manufacturing industry in Southeast Alaska.

National Policy Considerations

The Forest Plan reflects several aspects of national policy. Among the most important of these is the Forest Service Strategic Plan, developed under the Government Performance and Results Act of 1993.

In July 2007, the Forest Service completed a Strategic Plan for Fiscal Years 2007-2012, which provides direction to guide the entire agency in delivering its mission. Forest Service programs and budgets are aligned with the goals and objectives in this Strategic Plan which supplements the USDA Strategic Plan for Fiscal Years 2005-2010. Managing the Nation's forests and grasslands requires the complex integration of several levels of planning and cooperation with State and local planning efforts. These levels are defined below.

- *Strategic planning* takes place at the highest level and identifies strategic priorities for the agency that are implemented over a period of time through annual agency budgets. The strategic priorities are based on national assessments of natural resources and are responsive to social and political trends.
- *Business planning* by national programs, regions, research stations, and the Northeastern Area translates the broad strategic direction into the regionally specific work that contributes to the agency's mission.
- *Unit planning* (e.g., land and resource management plans for national forests and grasslands) provides an inventory of resources and their present conditions on a particular management unit. This inventory, coupled with the desired future condition for the resources, is the basis for annual work planning and budgeting.
- *Annual work planning* identifies the projects that all units propose for funding within a fiscal year. This level of planning involves the final application of strategic direction into a unit's annual budget to move its resources toward its desired future condition.

In addition, monitoring is essential to track resource conditions and human activities over time to effectively manage the Nation's forests and grasslands.

This amendment to the Tongass Forest Plan fulfills the unit planning level described above, and implementation will occur through the annual work planning level. In addition, the monitoring plan has been refined as the essential quality control mechanism that facilitates learning from Plan implementation.

I find the amended Tongass Forest Plan to be not only consistent, but strongly supportive of the goals in the agency-wide Forest Service Strategic Plan, as follows:

1. This decision continues to provide a balance between land stewardship services and meeting public demands for various uses of the Tongass National Forest. The updates and refinements in the Forest Plan multiple-use goals and objectives and management prescriptions include direction for rare plants, sacred sites, invasive species, and young growth management that will continue to restore, sustain and enhance the Forest's ecosystems and related services.
2. By keeping the ASQ at a level able to meet the possible future demands of an integrated industry, the amended Forest Plan helps maintain or create processing capacity and infrastructure in local communities. With the Timber Sale Program Adaptive Management

Strategy, I am confident that higher value roadless areas will remain intact unless timber harvest levels increase beyond 150 MMBF long enough to implement Phase 3 of the Strategy.

3. While open space is not the same issue in Southeast Alaska as it is in other parts of the country, partnerships with the State, Tribes, Native Corporations, and local communities will continue to contribute to responsible land management across all lands.
4. Continued use of the recreation opportunity spectrum to help identify and quantify different types of recreation settings on the Tongass National Forest will assure a mix of the highest quality outdoor opportunities and experiences. The sense of vastness, wildness and solitude will remain, with over three-quarters of the Tongass in natural or undeveloped LUDs, and opportunities for other users' desires to have developed and easy access will remain or may be increased in the moderate and intensive development LUDs.
5. Maintaining basic management capabilities relates to daily operations and accountability on the Forest, including continuing to cooperate with other Federal, State, Tribes, Native Corporations, local governments and private-sector partners. The objectives in the amended Forest Plan continue to emphasize opportunities for rural community and technical assistance.
6. While engaging Urban America may not seem directly applicable to Southeast Alaska, the Tongass leadership will continue to engage partners and educators in development and use of conservation education materials during implementation of the Forest Plan. One of the recreation and tourism objectives continues to emphasize projects that facilitate community use or community connections, and another forest plan standard and guideline is to identify opportunities and priorities for interpretation of heritage resources for public education and recreation. Direction in the amended Forest Plan continues to encourage traditional American values such as conservation ethic, appreciation of nature, national and community pride, and national and community well-being, including the stability of lifestyle and character.
7. To provide science-based applications, the amended Forest Plan continues the goal to seek out and promote research opportunities consistent with identified information needs described in Appendix B. Objectives for the nonwilderness national monument LUD continue to be to inventory, research, protect and interpret National Monument resources and make resource and research information about National Monuments available to other forest units where it may be beneficial.

Means to Avoid Environmental Harm

Mitigation Measures Adopted

Extensive measures to avoid or minimize environmental harm were adopted in the 1997 Forest Plan. Based on 10 years of experience in implementing and monitoring these measures, many of them have been updated in the 2008 Forest Plan Amendment, as previously discussed. These measures include forest-wide standards and guidelines, and additional standards and guidelines for each land use designation. At a minimum, these standards and guidelines meet all requirements of applicable laws, regulations, and State standards. Mitigation measures are an integral part of the standards and guidelines. Singularly and collectively, they avoid, rectify, reduce, or eliminate potential adverse environmental impacts of forest management activities. Some more significant mitigation measures are the beach fringe and riparian buffer zones, and the network of old-growth reserves. Based on the analysis in the Final EIS, including the response to comments contained in Appendix H, I conclude that all practicable means to avoid or minimize environmental harm from the amended Forest Plan have been adopted.

Mitigation Measures Not Adopted

The State of Alaska recommended changes to a standard regarding protection of important brown bear foraging sites adjacent to salmon streams. Since 1997, this standard has required project-level planning teams to consult with the State to determine where such foraging sites exist, and where buffers of approximately 500 feet from the stream should be adopted, within which no timber harvest is allowed. The State recommended this be modified to mandate buffers of at least 500 feet on all anadromous streams. This change has not been adopted because brown bear populations are healthy, the analysis contained in the Final EIS indicates they will remain so, and monitoring information suggests the current standard is adequate. In addition, other standards and guidelines offer protection related to brown bear foraging sites. For example, the beach and estuary fringe standard and guideline requires no-harvest buffers 1,000 feet inland from beach vegetation. When applied on the ground, other existing standards often result in stream buffers of 500 feet in the lower reaches of salmon streams. For these reasons, I conclude that protection of brown bear foraging sites can continue to be ensured at the project level without additional requirements being added to the Forest Plan.

The U.S. Fish and Wildlife Service recommended that goshawk nest buffers be increased from 100 acres to 500 acres of productive old-growth habitat to protect active and alternate nest sites and post-fledging habitat from timber harvest. This measure was not adopted because the Service's recent decision not to list the goshawk as a threatened or endangered species under the Endangered Species Act suggests that such action is not essential, and because the analysis contained in the Final EIS indicates that nest buffers, in addition to the other protective measures included in the Forest Plan, will provide adequate habitat for nesting and fledgling goshawks.

Additional details on proposed changes to the Forest Plan, and the reasons why such proposals were not adopted, are contained in Appendix H of the Final EIS.

Monitoring and Evaluation

The Forest Plan includes a monitoring and evaluation plan to continually assess the effectiveness of the Forest Plan standards and guidelines. Monitoring results will be used to evaluate the assumptions used in developing the Forest Plan, and may be the basis for amendments or revisions, just as the information from the monitoring conducted since 1997 helped form the basis for this Amendment. The Forest Plan may be amended at any time if changes to the standards and guidelines are needed. Monitoring will also ensure that both forest-wide and land use designation standards and guidelines are being correctly applied. The monitoring program will include monitoring of timber harvest levels under the Timber Program Adaptive Management Strategy to determine if and when the timber program can move from one phase of the Strategy to another.[21]

In addition to the Forest Service, nearly all other State and Federal natural resource agencies, the academic community, and numerous organizations and individuals want to know more about the social, economic and ecological uses and values, including ecosystem services values, of the Tongass National Forest and the environment in which it is located. I believe there are many opportunities to better align and coordinate the interests, resources, and efforts of these groups in monitoring and evaluating the implementation of the Forest Plan. As previously mentioned, details of the monitoring program such as data gathering protocols will continue to be developed in consultation with all interested State and Federal agencies.

Findings Related to Other Requirements

The Forest Service manages the Tongass National Forest in conformance with many Federal laws and regulations. In this section we consider each of the major laws involved in this programmatic-level decision.

[21] All scheduled timber harvest in a fiscal year will count toward the level needed to move the timber sale program to a higher phase.

National Environmental Policy Act

NEPA requires that Federal agencies prepare detailed statements on proposed actions that significantly affect the quality of the human environment. NEPA's requirement is designed to serve two major functions:

- To provide decision-makers with a detailed accounting of the likely environmental effects of proposed actions prior to adoption.
- To inform the public of, and allow comment on, such efforts.

The Forest Service has developed, gathered, and reviewed an enormous amount of information regarding the potential effects of each of the alternatives considered in the Final EIS. This information expands and refines the data, analyses, and public input described in the NEPA documents associated with the 1997 Forest Plan, including the 1989 Analysis of the Management Situation (which has been updated as part of the 2008 Forest Plan Amendment and is contained in the planning record); the draft, supplemental, and final EISs leading to the 1997 ROD; documents associated with the 2003 Supplemental EIS; and the Draft and Final EISs for the 2008 Tongass Forest Plan Amendment. My decision also considers the vast array of public input, including public meetings, comments from the internet website, and comments received during the 108-day comment period on the Draft EIS.

All substantive comments, written and oral, made on the 2007 Draft EIS have been summarized and responded to in Appendix H of the Final EIS. During the course of this effort, this public involvement has lead to substantial changes in the analysis and the alternatives.

I find the environmental analysis and public involvement process the Final EIS is based on complies with each of the major elements of the requirements set forth by the CEQ regulations for implementing NEPA (40 CFR 1500-1508). My conclusion is supported by the following findings.

First, the Final EIS considered a broad range of reasonable alternatives. The seven alternatives considered in detail in the Final EIS represent only part of the total number of alternatives considered over the course of the analysis. As described above in the "Alternatives Considered" section, 39 alternatives from previous EISs were considered before selecting the seven analyzed in detail in the Draft and Final EIS. These seven alternatives presented in the Final EIS encompass a broad range of response to issues, including a timber suitable land base ranging from 0.3 to 1.2 million acres and an average annual first-decade ASQ from 49 to 421 MMBF.

Second, the Final EIS reflects consideration of cumulative effects of the alternatives by evaluating past, present, and reasonably foreseeable future actions in the planning area including Federal, State, Tribal and private lands. The environmental effects analysis estimates the potential effects of timber activities and timber-associated activities, such as road construction, for 100 years. The analysis of effects to wildlife was based on the assumption that these activities would take place at their maximum allowable levels each year for 100 years, an extremely conservative assumption. This analysis considers changes to vegetation both temporally and spatially (Final EIS Appendix D). Moreover, although non-federal lands are outside the scope of this decision, effects from their management have been thoroughly considered in the Final EIS.

Third, the Final EIS makes use of the best available information. The geographic information system database, constructed during the development of the 1997 Forest Plan, has been thoroughly updated, and was used to evaluate complex spatial effects resulting from implementation of the alternatives, such as maintenance of connectivity corridors for wildlife and how visual condition could change over time. The best available science was used to help estimate environmental consequences, as evidenced from the extensive reference section of the Final EIS (Chapter 6), the multiple appendices that document methods or other technical information, and the involvement of other organizations as described in the section of this ROD dealing with the use of science in the planning process. Uncertainties connected with environmental impacts and market demand have been acknowledged and addressed through the Timber Sale Program Adaptive Management

Strategy. A linear optimization model was used to estimate the long-term flow of timber from the planning area. All of these tools, taken together, constitute use of the best available information.

The decision here does not authorize timber sales or any other specific activity on the Tongass National Forest. Site-specific decisions will be made on projects in compliance with NEPA, the Endangered Species Act, and other environmental laws following applicable public involvement and appeal procedures.

National Forest Management Act

The National Forest Management Act and implementing regulations specify a number of requirements that guide Forest Service planning. The Forest Plan complies with each of these management requirements, as explained in this ROD and accompanying Final EIS and appendices. Certain requirements that received heightened public attention are discussed in further detail below and in other sections of this ROD.

Diversity and Viability Provisions for Fish and Wildlife

As described in detail in the section of this ROD on protecting wildlife habitat and biodiversity, after considering the statute, regulation, case law, and examination of the record, I find that this decision satisfies the requirements of the law because it will provide an amount and distribution of habitat adequate to maintain viable populations of vertebrate species in the planning area and will maintain the diversity of plant and animal communities. I base my determination on the evidence in the planning record, as summarized in the above section of this ROD.

Sensitive Species

A Forest Plan-level Biological Evaluation was completed for the 24 species/subspecies (4 wildlife, 2 fish and 17 plant species/subspecies) currently listed in the Alaska Region's sensitive species list that are known or are suspected to occur on the Tongass National Forest. For some species, individuals or their habitats may be impacted by the selected alternative, but the impacts are not expected to contribute to a trend toward Federal listing or cause a loss of viability to the population or species.

Endangered Species Act

There are no terrestrial species on the Tongass National Forest that are listed as threatened or endangered under the Endangered Species Act. Threatened and endangered species that may be affected by future projects, as discussed in the updated Biological Assessment, are limited to marine species (mammals and fish). Consultation requirements for these species under Section 7 of the Act were met with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service.

Magnuson-Stevens Fishery Conservation and Management Act

Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act states that all Federal agencies must consult the National Marine Fisheries Service for actions or proposed actions that may adversely affect essential fish habitat. The Act promotes the protection of essential fish habitat through project review, assessment, and mitigation of activities that may adversely affect these habitats. The Forest Plan itself, including this amendment, does not authorize any specific project or actions and therefore does not affect essential fish habitat. Future project activities designed to implement the amended Forest Plan that may adversely affect essential fish habitat will go through consultation per the Act. The National Marine Fisheries Service was an important contributor in the development of the 1997 Forest Plan, participated in informal consultation and review of this amendment effort, and continues to be involved in the implementation and monitoring of projects and actions implementing the plan.

Tongass Timber Reform Act

The Tongass National Forest will continue to be managed in compliance with Section 101 of the TTRA, which states in part that the Secretary of Agriculture "…shall, to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle."

As discussed in detail in the section on market demand, the Forest Service has adopted an adaptive management approach to meeting these requirements. The requirement dealing with annual market demand is met through implementation of the Morse methodology, which estimates the volume of timber to be offered annually. The TTRA requirement regarding market demand for each planning cycle is met by adopting the selected alternative as described in the Final EIS and this ROD, and by a series of annual applications of the Morse methodology.

Coastal Zone Management Act

Under the Coastal Zone Management Act (CZMA), Federal agency activities that affect any land or water use or any natural resource of a State's coastal zone must be carried out in a manner that is consistent to the maximum extent practicable with the enforceable policies of that State's federally approved coastal management program. The Forest Plan does not, by itself, authorize activities such as timber harvest or road construction that may affect the coastal zone. Thus, the Forest Plan does not have coastal effects. Site-specific activities that affect the environment require further site-specific analysis and public involvement under NEPA, CZMA, and other Federal and State environmental laws and regulations.

This finding of no coastal effects is consistent with the Memorandum of Understanding between the Forest Service and the State of Alaska concerning CZMA consistency reviews, which does not list forest plans as one of the activities expected to affect the coastal zone. The State of Alaska has never conducted a consistency review of a forest plan or a forest plan amendment or revision.

During the NEPA process for site-specific activities, the Forest Service will continue to determine whether the subject project has coastal effects, and whether an individual CZMA consistency review is required. Under the General Consistency Determination for Tongass Timber Sales, approved by the State of Alaska in December 2006, most timber sales conducted on the Tongass National Forest have been determined to meet or exceed the standards of the Alaska Forest Resources and Protection Act. Accordingly, most timber sales have been determined to be consistent to the maximum extent practicable with the enforceable policies of the Alaska Coastal Management Program, and do not require individual consistency review. Only those timber sales that require a State or Federal license or permit under a provision of law other than the Alaska Forest Resources and Protection Act require individual review under the CZMA for consistency with the Alaska Coastal Management Program.

Alaska National Interest Lands Conservation Act

The Alaska National Interest Lands Conservation Act (ANILCA), as amended, contains numerous provisions, including provisions regarding access, that apply to management of the Tongass National Forest. However, it is not necessary to address these provisions in the context of this decision. An ANILCA Section 810 evaluation and determination is not required for approval of a Forest Plan amendment, a programmatic-level decision that is not a determination whether to "withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition" of National Forest lands. However, a forest-wide evaluation and determination is included for the Forest Plan revision to facilitate future project-level planning and decisionmaking in compliance with ANILCA Section 810 (16 U.S.C. § 3120).

Consistent with Section 810 of ANILCA, the Forest Plan has been evaluated for potential effects on subsistence uses and needs. A cumulative effects analysis of resource developments on subsistence resources is included in the Final EIS (Chapter 3, “Subsistence”). Based on this analysis, implementation of the Forest Plan may result in a significant restriction to subsistence use of deer due to the potential effects of projects on the abundance and distribution of these resources, and on competition for these resources.

Two actions included in Section 810 were completed for the Draft EIS: (1) giving notice to the appropriate State agency, local committees and regional councils; and, (2) giving notice of, and holding, “a hearing in the vicinity of the area involved.” Because the area is the entire Tongass National Forest, such hearings were held in 23 communities throughout Southeast Alaska for the Draft EIS.

Also included in Section 810 is the determination that: “(a) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands, (b) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition, and (c) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.” I will now discuss each of these three points.

Necessity, Consistent with Sound Management of Public Lands. The amended Forest Plan has been examined to determine whether its potential for a significant restriction of subsistence uses is necessary, consistent with the sound management of public lands, as required by the Multiple-Use Sustained Yield Act, the National Forest Management Act, the Alaska National Interest Lands Conservation Act, the Tongass Timber Reform Act, and relevant State laws. The requirements of these laws have been reviewed and several of these have been discussed in this ROD.

The Forest Plan must be designed to provide a mix of resources and uses to best meet the needs of the American people. It must be designed to maximize net public benefits, as previously discussed. Some of the resource uses necessary to achieve these benefits have the potential to adversely affect subsistence uses within the Tongass. However, given the multiple-use mandate and the other requirements of law, these effects to subsistence uses are necessary, consistent with the sound management of public lands.

Amount of Public Land Necessary to Accomplish the Proposed Action Purpose. The amount of land necessary to implement the Forest Plan is, considering sound multiple-use management of public lands and the goals and objectives of the Plan, the minimum necessary. A forest plan must involve, by law, the entire forest. The plan does not authorize by itself any land-disturbing activities. Most of the Tongass National Forest, except the icefields, is used by one or more rural communities for subsistence deer harvesting. Many of the land use designations protect high value subsistence areas.

Reasonable Steps to Minimize Adverse Impacts Upon Subsistence Uses and Resources. The continuation of subsistence opportunities, and reasonable steps to minimize effects on subsistence resources, are provided for by the forest-wide standards and guidelines for subsistence, as well as related standards and guidelines for riparian areas, fish, and wildlife. Many important subsistence areas were assigned land use designations that exclude timber harvesting. The beach and estuary fringe forest-wide standards and guidelines apply to all beach fringe and estuarine areas not under more restrictive designations. Adverse impacts to subsistence uses and resources are minimized through these measures. The potential site-specific effects on subsistence uses, and reasonable ways to minimize these effects, will be analyzed and considered during project-level planning.

It is not possible to substantially reduce timber harvest in some areas by concentrating it in other areas without affecting subsistence resources and uses important to one or more rural communities. Also, concentrating timber harvest outside more important subsistence areas while still meeting the timber harvest goals of the Forest Plan could not be done without affecting the natural distribution of wildlife species, or without potentially significant effects to watersheds.

Clean Water Act

Full implementation of the Plan and this ROD is expected to maintain and improve water quality and satisfy all State water quality requirements. I base this finding on the extensive standards and guidelines contained in the Plan, the application of State-approved "Best Management Practices" specifically designed to protect water quality, and the discussion of water quality and beneficial uses contained in Chapter 3 of the Final EIS. Examples include the beach and estuary fringe areas, riparian buffers, and road design requirements. Additionally, project level analysis for subsequent activities under the Plan will be required to demonstrate compliance with Clean Water Act and State water quality standards.

Clean Air Act

At the scale of a programmatic plan such as this, the overall level of activities proposed under this decision is not anticipated to degrade air quality or violate State implementation plans. This finding is based on information presented in the Final EIS. The only non-attainment area within the vicinity of the Tongass National Forest is Juneau. Conformity determinations and more detailed air quality impact analyses will be made at subsequent levels of planning and analysis, where emissions can be more accurately quantified and reasonably forecasted and local impacts assessed.

Floodplains and Wetlands (Executive Orders 11988 and 11990)

These Executive Orders require Federal agencies to avoid, to the extent possible, short- and long-term effects resulting from the occupancy and modification of flood plains, and the modification or destruction of wetlands. Forest-wide standards and guidelines are provided for soil and water, wetlands, and riparian areas to minimize effects to flood plains and wetlands. They incorporate the Best Management Practices of the Soil and Water Conservation Handbook. The forest-wide standards and guidelines for beach and estuary fringe apply to all estuaries where less restrictive management might otherwise occur.

Environmental Justice (Executive Order 12898)

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires each federal agency to make the achievement of environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The Order further stipulates that the agencies conduct their programs and activities in a manner that does not have the effect of excluding persons from participating in, denying persons the benefits of, or subjecting persons to discrimination under such programs, policies, and activities because of their race, color, or national origin.

The issue of environmental justice is analyzed within Chapter 3, Social and Economic Overview, of the Final EIS. The community assessment section indicates the per capita incomes (2000 Census), the population (2001, Alaska Department of Labor), the percent of Natives within the population (2000 Census), and recent trend and economic events for 32 Southeast Alaska communities. The analyses also includes discussions of potential timber harvesting within each community's use area, the potential impacts to the subsistence resources and land base used by each community, as well as potential impacts relative to recreation and tourism relative to each community.

The results of the analyses are very similar to those found in the 1997 Forest Plan Final EIS and the 2003 Forest Plan Final Supplemental EIS. I have concluded the amended Forest Plan results in a very low risk of disproportionate effects on minority or low-income populations in Southeast Alaska.

Civil Rights

Civil Rights are defined as "the legal rights of United States citizens to guaranteed equal protection under the law" (USDA Forest Service Manual 1730). Civil rights impact analysis for environmental or natural resource actions is part of the social impact analysis package in a necessary environmental impact statement and is not a separate report (USDA Forest Service Handbook 1709.11).

The Forest Service is committed to equal treatment of all individuals and social groups in its management programs in providing services, opportunities and jobs. Because no actual or projected violation of legal rights to equal protection under the law is foreseen under the Forest Plan for any individual or category of people, no civil rights impacts are reported in the Final EIS.

Implementation

Plan Effective Date

There are two different regulatory provisions governing the effective date for the amended Forest Plan. The NFMA planning regulations state that "[T]he approved plan shall not become effective until at least 30 days after publication of the notice of availability of the final environmental impact statement in the Federal Register…." (36 CFR § 219.10(c)(1).) The applicable appeal regulation states that "[I]mplementation of any decision subject to appeal pursuant to this part shall not occur for 7 calendar days following publication of the legal notice of the decision as required in this part." (36 CFR § 217.10(a).)

Therefore, the approved Tongass National Forest Land and Resource Management Plan Amendment is effective 30 days after the Notice of Availability of the Final EIS is published in the *Federal Register*, or 7 calendar days following publication of the legal notice of this decision in the Juneau Empire and the Anchorage Daily News, whichever is later.

Effective Direction

During the long and complex history of forest planning on the Tongass, many planning documents (forest plans, environmental impact statements, and records of decision) have been prepared. While all of these documents are useful and often build upon each other, it can be confusing to the public and to Forest Service employees searching for management direction or information to use in project level analysis. The planning record for the 2008 Tongass Forest Plan Amendment includes a summary of the current status of each of these documents.

In terms of management direction, this 2008 Record of Decision and the amended Forest Plan supersede all past forest plans and records of decision for the Tongass National Forest.

Continuing the Partnership with the State of Alaska

As described in a previous section of this ROD, the State of Alaska has participated as a cooperating agency in all phases of the planning process for this Forest Plan Amendment, under an MOU signed in 2006. The Forest Service and the State find it desirable to continue this relationship to promote effective and coordinated implementation of the Plan. Accordingly, as directed in the section of this ROD describing the decision, the Forest Supervisor will develop a comprehensive cost-sharing agreement with the State of Alaska regarding implementation of the 2008 Forest Plan within six months of the effective date of the Plan. I expect the agreement to outline the relationship between the Tongass National Forest and the State of Alaska regarding implementation of the Forest Plan, monitoring and evaluation, and making changes in response to new information from monitoring or other sources within an adaptive management framework. The cost-sharing agreement should also outline the roles and responsibilities of the Forest Service and the State throughout this process.

Timber Sale Program Adaptive Management Strategy

The Timber Sale Program Adaptive Management Strategy restricts timber sales and associated road construction to a specified portion, or phase, of the ASQ land base until actual timber harvest indicates the need for a larger land base. Land management activities unrelated to timber sales are not affected by the Strategy. The map of land included in each phase of the Strategy is included on the compact disc of the Final EIS and is also available on the internet at www.fs.fed.us/r10/tongass/.

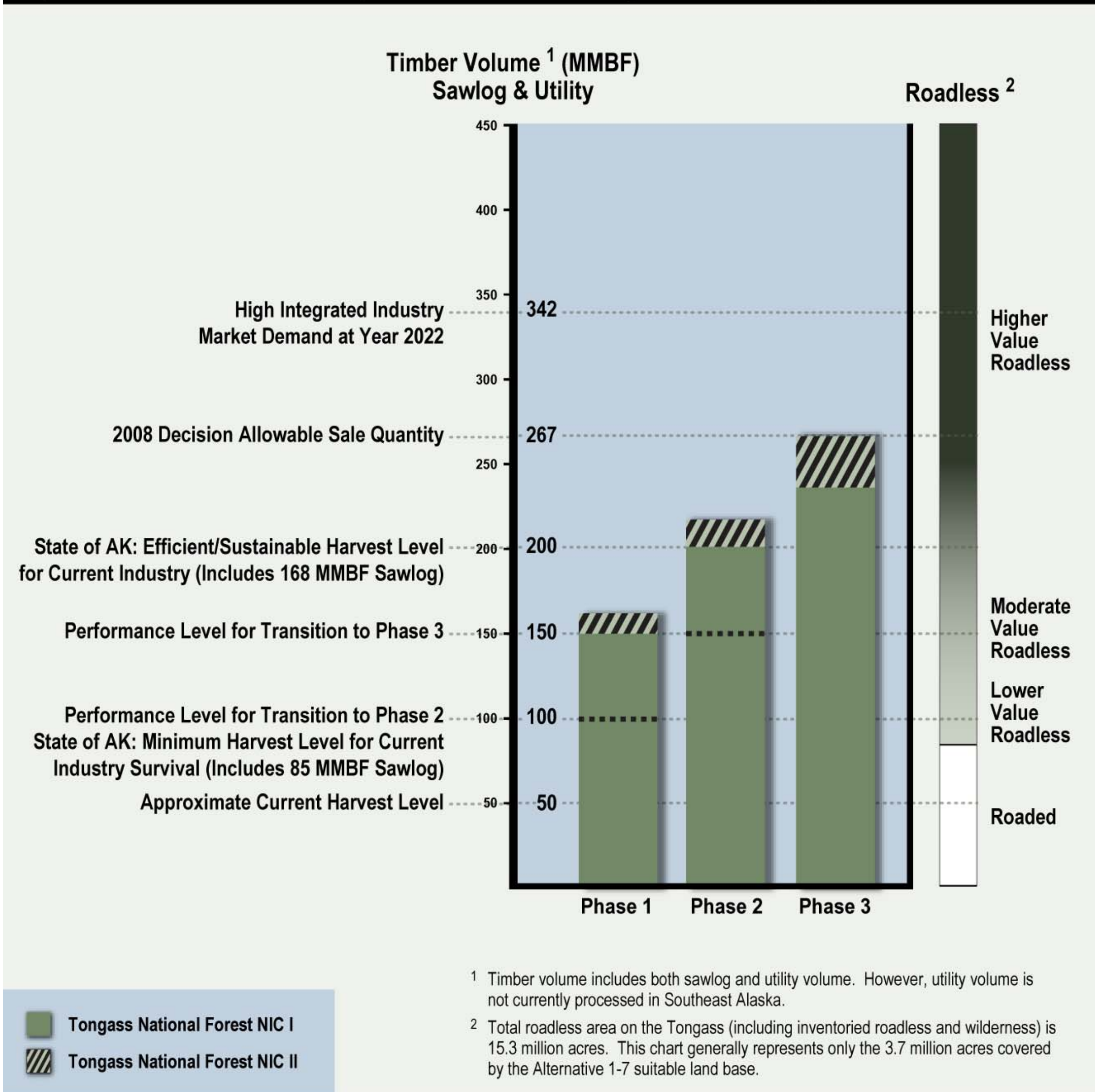
The Strategy is an extra step the Forest Service is taking to respond to recommendations from many parties that we avoid timber harvest and road construction in areas of the Tongass that are perceived as being more environmentally sensitive unless demand materializes to warrant such activity in those areas. The Strategy is based on three critical factors:

1. The long-term demand for timber from the Tongass is inherently very uncertain, and is influenced by the ability of all interested parties to work together to stabilize the timber supply.
2. The annual average ASQ of 267 MMBF is considerably higher than the current level of timber harvest on the Tongass.
3. The land base associated with the ASQ includes roadless areas, many of which are highly valued by substantial portions of the public.

As noted earlier, and as depicted in Figure 1, the VCUs in the Alternative 6 suitable land base have been evaluated according to each VCU's roadless values. The land base includes Roaded, Lower Value, Moderate Value, and Higher Value Roadless components. The Roadless column on the right side of the figure can be compared with the corresponding volume numbers on the left. The volume numbers reflect the estimated sustainable level of timber harvest associated with that portion of the land base. In general, a sustained harvest level of 100 MMBF would require the Roaded and much of the Lower Value Roadless portion of the land base; a level of 150 MMBF would require Roaded, Lower Value Roadless and some Moderate Value Roadless portions; a harvest level of 200 MMBF would require most of the remaining Moderate Value Roadless portions. Any harvest level over 200 MMBF would require entry into some of the Higher Value Roadless portions of the suitable land base.

Figure 1 also displays information received from the State of Alaska regarding the threshold levels of economically feasible Tongass timber sale volume that the State and the Forest Service believe are necessary over the short, medium, and long term. The State estimates that the currently operating sawmills need at least 83.5 MMBF of economically feasible sawtimber to remain in operation over the next one to two years. Over the longer term, an annual offer level of 167.5 MMBF of economic sawtimber from the Tongass would allow existing mills to operate efficiently, meaning two shifts per day, which would substantially increase their ability to compete in world markets. This level would also provide 30 MMBF annually for the veneer plant in Ketchikan to process low grade sawlogs. The majority of this volume would be derived from NIC I lands, which are more economically feasible because the timber can be harvested from them using conventional logging systems. Some volume from intermixed NIC II lands would also be included. When the utility volume is included, for which no processing facilities currently exist in Southeast Alaska, the total annual offer level needed from the Tongass to sustain the existing sawmills and veneer mill operating at efficient levels would be approximately 200 MMBF. The Strategy includes three phases:

Figure 1. Timber Sale Program Adaptive Management Strategy



Phase 1 – Phase 1 includes most of the roaded portion of the ASQ land base, along with most of the lower value inventoried roadless areas. The Phase 1 portion of the land base could sustain a level of timber harvest of about 150 MMBF. The scheduled timber sale program will generally be confined to this land base until such time as the level of timber harvest reaches at least 100 MMBF for two consecutive years. Personal use of timber, micro sales,[22] salvage sales, small commercial timber sales generally less than one MMBF, young-growth management projects, and the roads associated with these activities, would be allowed in development LUDs outside of the Phase 1 portion of the ASQ land base. Total scheduled timber harvest will be monitored each fiscal year and will count toward both ASQ and the 100 MMBF performance level. Timber harvest conducted in non-

[22] Micro sales are timber sales on Prince of Wales Island of down or dead trees totaling no more than 50 thousand board feet, to supply small niche-market timber processors.

development LUDs for purposes other than timber production (e.g., wildlife habitat improvement) will not count toward either ASQ or the Adaptive Management Strategy's performance levels.

Phase 2 – Phase 2 includes Phase 1 lands and most of the moderate value roadless areas. The Phase 2 portion of the ASQ land base could sustain a level of timber harvest of about 200 MMBF. The scheduled timber sale program will generally be confined to this land base until such time as the level of timber harvest reaches at least 150 MMBF for two consecutive years. Personal use of timber, micro sales, salvage sales, small commercial timber sales generally less than one MMBF, young-growth management projects, and the roads associated with these activities, would be allowed in development LUDs outside of the Phase 2 portion of the ASQ land base. Total scheduled timber harvest will be monitored each fiscal year and will count toward both ASQ and the 150 MMBF performance level. Timber harvest conducted in non-development LUDs for purposes other than timber production (e.g., wildlife habitat improvement) will not count toward either ASQ or the Adaptive Management Strategy's performance levels.

Phase 3 – Phase 3 includes the remaining ASQ land base.

In each phase, timber sale planning and sale preparation will be done within the corresponding portion of the land base (with the exceptions noted above for micro sales, small sales, salvage sales, and young-growth projects) until actual timber harvest performance indicates transition to the next phase is needed. The transition from one phase to the next must occur at a level lower than the maximum sustainable harvest level of the phase due to the lag time required for the timber sale planning process to be completed. This will allow flexibility for the Forest Service to complete the NEPA process and prepare a volume of timber ready to be offered for sale (referred to as shelf volume) ahead of actually offering the timber for sale (timber sold but not harvested is referred to as volume under contract). Adequate volume must be maintained in each category to respond quickly to short-term increases in harvest levels. A portion of shelf volume will normally be offered for sale each year to maintain an adequate level of volume under contract. Essentially, shelf volume replaces volume harvested each year, and would also be available for any new processing facilities that may be built. The amounts needed in these categories are a volume under contract equal to three years of volume harvested, and shelf volume equal to an additional three to five years of volume harvested. To the degree the Forest Service is successful in maintaining these levels, the transition from one phase of the Strategy to another will be seamless. The levels of volume available will be determined by the amount of funding appropriated by Congress; the ability of the Forest Service to prepare and offer economic timber for sale; and the ability of industry to purchase, harvest, process, and sell their products.

Timber Sale Economics

Providing economic timber sales in Southeast Alaska has always been a challenge and is expected to remain so into the future. The basic lack of infrastructure in a relatively isolated and harsh environment significantly affects development and operational costs. Earlier timber sale programs included significant investments in infrastructure development to aid individual timber sales be more economic. In recent years, investments in deferred road maintenance and construction of long term system roads in timber sale project areas has helped ensure timber sales are economic. Timber sale planning and the manner in which Forest Plan standards and guidelines are applied to specific timber sales can have significant cost consequences on the sales. Since 1997, monitoring of timber sale projects and of the implementation of the Forest Plan has revealed inconsistent interpretation and application of certain Forest Plan standards and guidelines, with resulting adverse consequences on timber sale economics. Similar issues that affect timber sale economics arose during the Forest Plan 5-Year Review and the review of the Forest Plan's conservation strategy. Evaluation of this issue during preparation of the 2008 Forest Plan Amendment indicates timber sales can be designed to be economic under most market conditions if the Forest Plan standards and guidelines are consistently interpreted and applied within the intent of the Forest Plan. Forest Plan implementation training will be conducted to ensure that the Plan is implemented consistently, effectively, and efficiently. This will include training in planning timber sales to fully meet the intent of the Forest Plan and also to be as economic as possible. Implementation of the 2008 Forest Plan will be monitored. If it is determined that the Plan unnecessarily affects the ability to produce economic timber sale projects, an amendment following similar processes as this effort will be conducted, focusing on opportunities to promote economic timber sales without compromising the Forest Plan goals and objectives. It must also be noted that investments in some infrastructure will still be necessary, especially as forest plan implementation progresses into phases 2 and 3 of the Adaptive Management Strategy.

Forest Plan Implementation Demonstration Area

During the Five-year Review of the 1997 Forest Plan, and through our consultation with the State of Alaska on this Amendment, it became evident that a more rigorous evaluation of the effectiveness of the Forest Plan could be accomplished if done at a scale wider than an individual watershed or a single project. Significant components of the Plan that warrant such evaluation include the conservation strategy (both the system of old-growth reserves and the set of standards and guidelines that apply to the development LUDs), access and travel management planning and design, young-growth management in the maturing stands, restoration of habitat in non-development LUDs, and effects of invasive species (terrestrial and aquatic).

Consequently, I direct the Tongass Forest Supervisor to explore developing a demonstration area of sufficient scale to test full implementation of the amended Forest Plan. Anticipated results of implementing the Forest Plan would be compared with actual results of such implementation. Where results differ significantly, modifications of the Forest Plan would be considered through the amendment or revision process. The ideal location for the project would be a roaded island with the following additional characteristics:

- No city or town.
- Low roadless values in portions of the island without roads.
- An adequate diversity of wildlife and fish species to monitor changes over time.
- A conservation strategy following the Forest Plan guidance.
- A wide range of previously harvested areas to provide several age classes of young-growth stands.
- Adequate access to provide for extensive monitoring and visitation of the area.

For this project to succeed, a collaborative effort would need to be developed between research, special interest groups, the State of Alaska, communities in the immediate vicinity of the project area, and other agencies interested in the results. The purpose of this collaborative effort would be to select the site and to ensure appropriate monitoring is performed to address the main questions relative to the effectiveness of the Forest Plan components.

Transition to the Amended Forest Plan

The amended Tongass Forest Plan does not provide final authorization for any activity, including timber sales, nor does it compel that any contracts or permits be advertised or awarded. Rather, like the 1997 Forest Plan, it provides a programmatic framework within which project-level decisions are considered. Projects must undergo appropriate site-specific analysis, and comply with applicable requirements for public participation, environmental analysis and disclosure, and the administrative appeal procedure before final authorization and implementation.

Exercising my discretion under NFMA, I have determined that it is not necessary to apply the amended Plan's standards and guidelines retroactively, and I find that NFMA does not require revision of any pre-existing use and occupancy authorizations. However, I have also determined that the Forest Service has the discretion, on a case-by-case basis, to modify pre-existing authorizations if they are not consistent with newly established standards, including the standards and guidelines in the amended Plan.

Because this was an amendment of the 1997 Plan, much of the management direction of the 1997 Plan is carried forward relatively unchanged into the amended Forest Plan. Therefore, many existing projects and ongoing actions that were consistent with the 1997 Plan will continue to be so with the amended Forest Plan. Many management actions decided prior to the issuance of this Record of Decision are routine and ongoing. Those decisions will generally be allowed to continue unchanged because implementing pre-existing decisions and the associated effects of that implementation were considered as part of the baseline and assumed to continue in the environmental analysis of alternatives in the Final EIS for the 2008 Forest Plan Amendment. Because we considered these earlier decisions in our effects analysis, their implementation is not in conflict with the amended Plan.

Existing timber sale contracts, in most cases, will be completed within three years. Other use and occupancy agreements may have a substantially longer life than timber contracts. These use and occupancy agreements will be reviewed to determine if or when the Forest Supervisor should exercise discretion to bring them into full compliance with the amended Forest Plan. As discussed below, recent project decisions that have not yet been implemented will be reviewed and adjusted, if necessary, in consideration of the new standards and guidelines in the amended Forest Plan.

Timber Sales

The relationship of 3 categories of timber sale projects to the amended Forest Plan is described below. Additional work on timber sale projects in Categories 2 and 3 (described below) will be done only to the degree such work is consistent with the Timber Sale Program Adaptive Management Strategy and any LUD changes included in the amended Forest Plan. If any portion of any project in Categories 2 or 3 is in a non-development LUD under the amended Forest Plan, that portion may not be implemented and no further planning work may be done unless the project is consistent with the management direction of the amended Forest Plan (e.g., it is being proposed for purposes other than timber production, such as wildlife habitat improvement).

The three categories of timber sale projects are as follows:

1. **Timber sales under contract before the effective date of this Plan.** I have decided not to modify any existing timber sale contracts. As I stated earlier, the effects analyses contained in the Final EIS assumed that these contracts would be executed according to their terms. Moreover, the environmental effects of these 36 projects have been disclosed to the public through their site-specific project-level environmental documents. Since existing timber sale contracts will generally be completed within three years, I find it reasonable to allow pre-existing standards to remain in effect for that period of time. The sales included in this category as of December 31, 2007 are listed below. Any timber sale contract signed between that date and the effective date of the amended Forest Plan will also be included in Category 1.

Timber Sales in Category 1--Under Contract--as of December 31, 2007

Above Road	Microsale #27
Ambrosia	Microsale # 126
Angel	Microsale #136
Backline	Microsale #137
Beaver Tail Special	Microsale #138
Big Bear	Microsale #139
Blind Slough	Midpoint Special Salvage
Bogo	Midway Reoffer II
Bohemia	Mink Tail Special Salvage
Boomerang	Moxie Special Salvage
Bound	Mustang Salvage Reoffer
Brisket Special Salvage	Power Lake
Buckdance Madder Reoffer	Quill
Bucktooth Special Salvage	Red Bull Salvage Sale
Buster Creek Stringer	Red Mountain
Crane	Revilla Road Microsale
Divide	Sandy Cove Special Salvage
Dogleg Special Salvage	Scratchings
Drumlin Reoffer II	Setter Lake
Finger Point	Shady
Fishsticks	Skipping Cow
Fishtrap Special Salvage	Small Otter
Fourleaf	Summore Change
Kensington Gold Project	Swan Tyee Timber Settlement
Kensington Settlement	Swingset Special Salvage
Kogish Shinaku II	Tall Tree
Kosciusko Stewardship	Three Moose
Last Call Reoffer	Turbo Otter
Licking Creek	Tuxekan
Lindenberg	Twin Shovel
Little Rock	Upper Carroll II
Low Ridge	Vientos Cinco #5
Luck Lac II	Wedge
Lucky Charm Reoffer	11 Permits
Lucky Duck Reoffer	

2. **Timber sale projects: (a) for which NEPA decision documents were signed before the effective date of this Plan, but whose timber volumes will not have been sold (wholly or in part) before the effective date of this Plan; (b) with a Final Environmental Impact Statement and no Record of Decision as a result of the May 18, 2007 Settlement Agreement in *Natural Resources Defense Council v. Forest Service*, Case No. 1:03-cv-00029-JKS (approved by the Alaska District Court on May 25, 2007); or (c) now being planned and for which a Draft Environmental Impact Statement has been released for public comment before the effective date of this Plan.** I have reviewed the 43 projects in this category and have determined that the 36 projects listed below are consistent with the goals and objectives of the amended Plan.[23]

[23] The environmental documents for seven projects in Category 2 cannot be found consistent with the amended Forest Plan without additional environmental analysis. These projects include Eight Fathom, Southeast Chichagof, Alaska Pulp Company Final Supplement to the EISs for the 1986-1990 Operating Periods, Kelp Bay, Northwest Baranof, Indian River, and Ushk Bay. Accordingly, any further work on these projects would require the issuance of a new draft EIS; therefore, these projects are treated as if they are in category 3.

Moreover, the environmental effects of these 36 projects have been disclosed to the public through their site-specific project-level environmental documents. These projects were also assumed to be implemented in the environmental analysis of Alternatives 5 and 6 in the 2008 Forest Plan Amendment Final EIS. Because the Final EIS considered these projects in its effects analysis, their implementation is not in conflict with the amended Plan.

I am directing the Forest Supervisor to review these projects, and incorporate the new direction in the amended Forest Plan to the extent this can be done without causing major disruptions in the implementation of these projects. Among the changes to be considered are the legacy standard and guideline in lieu of the 1997 Plan's standards and guidelines for goshawk foraging and marten habitat, and the new direction regarding probable goshawk nests. The Tongass Change Analysis Process[24] will be used on a project-by-project basis to determine whether additional environmental analysis and public involvement are necessary, and to document any modifications to the project in the project record.

The amended Forest Plan includes the new scenery management program, which is a replacement for the visual management system included in the 1997 Forest Plan. The two programs are essentially the same insofar as environmental effects are concerned, and the transition should be initiated only for new timber sale projects. I find that projects planned under the visual management system do not require changes to the scenery management program included in the amended Forest Plan.

Timber Sales Included in Category 2

Backline	Kosciusko
Baht	Kuiu
Bohemia Mountain	Madan
Boundary	Lab Bay
Canal Hoya	Navy
Chasina	Overlook
Cholmondeley	Roadside
Control Lake	Scott Peak
Couverden	Scratchings
Crane and Rowan Mountain	Sea Level
Crystal Creek	Soda Nick
Doughnut	Todahl Backline
Emerald Bay	Traitors Cove
Finger Mountain	Tuxekan
Goose Creek	Woodpecker 2002
Gravina	Woodpecker 2003
Heceta Commercial Thinning	Yakutat Salvage
Iyouktug	Yakutat Small Sales

3. **Timber sale projects for which a Draft Environmental Impact Statement has not been released for public comment before the effective date of this Plan.** These projects shall be based on the amended Plan and will be consistent with all applicable management direction.

[24] This process includes a review of new information and circumstances relevant to environmental concerns to determine if additional analysis is warranted.

Administrative Appeal Rights

This decision to amend the Tongass Forest Plan is subject to administrative review pursuant to 36 CFR Part 217. The Notice of Appeal must be in writing, meet the content requirements specified at 36 CFR 217.9, and be filed with the Reviewing Officer:

Regular Mail: Abigail Kimbell, Chief
USDA Forest Service
Attn: EMC Appeals
Mail Stop 1104
1400 Independence Avenue., SW
Washington, DC 20250-1104

Note that regular mail is irradiated before it is delivered to the National Headquarters, so regular mail may take longer than normal to arrive. Anything time sensitive should be sent via FedEx, UPS, Courier, etc. to the following address:

USDA Forest Service
Ecosystem Management Coordination
Attn: Appeals
Yates Building, 3CEN
201 14th Street, SW
Washington, DC 20250

Email Address: appeals-chief@fs.fed.us
Phone: 202-205-0895
Fax: 202-205-1012

Electronic appeals must be submitted in a format such as an email message, plain text (.txt), rich text format (.rtf), or Word (.doc). Appeals may also be hand delivered to the courier address above between the hours of 8:00 AM and 5:00 PM Monday through Friday, except Federal holidays.

The Notice of Appeal, including attachments, must be filed (regular mail, fax, email, express delivery, courier service, or hand delivered) with the Reviewing Officer at the correct location within 90 calendar days of the date the legal notice of this decision is published in the Juneau Empire and the Anchorage Daily News. The publication date in the newspapers of record is the exclusive means for calculating the time to file an appeal. Those wishing to appeal this decision should not rely upon dates or timeframe information provided by any other source.

I encourage anyone concerned about this decision, the Forest Plan, or the Final EIS, to contact the officials listed below before submitting an appeal. It may be possible to resolve the concern in a less formal manner.

Contact People

If you would like more information on the Forest Plan, the Final EIS, or this decision, please contact:

Forrest Cole Forest Supervisor Tongass National Forest Federal Building Ketchikan, AK 99901-6591 (907) 225-3101	or	Lee Kramer Plan Amendment Project Manager 8510 Mendenhall Loop Road Juneau, AK 99801 907-789-6246

Approval

Dennis E Bschor January 23, 2008

DENNIS E. BSCHOR Date

Regional Forester

Printed on Recycled Paper

Photograph taken looking northeast with Lindenberg Peninsula on Kupreanof Island and the mouth of Petersburg Creek (front cover) in the foreground, Petersburg Mountain (front cover) in the middleground, and Frederick Sound and the mainland in the background.

United States
Department of
Agriculture

Forest Service
R10-MB-603f

Tongass Land and Resource Management Plan

Final Environmental Impact Statement

Plan Amendment

SUMMARY

Tongass National Forest

Welcome

This Summary accompanies the Final Environmental Impact Statement (EIS) for a proposed amendment of the Tongass Land and Resource Management Plan (Forest Plan). Also included with the Summary are the Record of Decision (which selects Alternative 6 with minor modifications) and the amended Forest Plan. Most reviewers will receive an electronic version of these documents on a CD. The CD contains a cover letter, the Final EIS in two volumes, alternative maps, the Record of Decision and its accompanying maps, the Forest Plan, and a number of reference maps. These documents and maps are described when you open the CD.

A comprehensive Web site covering the Forest Plan adjustment process was developed to assist the public in reviewing and commenting on the various documents and maps developed during the process. This site will continue to be available at www.tongass-fpadjust.net for a period of time. At some point in the near future, this site will be removed, and the important documents will be transferred to the main Tongass Web site at www.fs.fed.us/r10/tongass.

Publication of the Notice of Availability for the Final EIS in the Federal Register will initiate a 90-day appeal period. The closing date of the appeal period will also be posted on the project Web site.

How to Use the CD

The CD-ROM has an "autostart" feature that should start the application when you put the CD in your computer. If the application starts correctly, a Welcome page containing links to the documents should open up. If the CD does not start by itself shortly after you insert it in your CD drive, then simply double-click on the Index.htm file on the CD.

Introduction

Land and Resource Management Plans (Forest Plans) are required by the National Forest Management Act (NFMA) of 1976. The 16.8-million acre Tongass National Forest, the largest forest in the National Forest System (NFS), was the first to complete a Forest Plan under the NFMA. The original Tongass Forest Plan was approved in 1979 and amended in 1986 and 1991. The Forest Plan revision process began in 1987 and the Final EIS, Record of Decision (ROD), and the revised Forest Plan were published in 1997. A Supplemental EIS that evaluated the wilderness potential of roadless areas was completed in 2003. The revised Forest Plan has been amended 28 times since 1997, primarily to adjust Old-Growth Habitat reserve boundaries and designate electronic/communication sites.

An August 2005 Ninth Circuit Court of Appeals ruling and the 5-Year Forest Plan Review, which was completed in January 2005, indicated the need to consider amending the Tongass Forest Plan. This 2008 Final EIS responds to the Court and the 5-Year Review by analyzing six alternatives for amending the Forest Plan in addition to the No-Action Alternative (Alternative 5). A separate document called the Proposed Forest Plan was published with the Draft EIS and represented the complete Forest Plan including all proposed amendments.

Purpose and Need

The purpose and need for this EIS is to respond to the Ninth Circuit Court's decision in *Natural Resources Defense Council vs. U.S. Forest Service* (421 F.3d 797, August 5, 2005). In that decision, the Court held that the EIS and ROD for the 1997 Forest Plan had errors relating to the use of projected market demand for timber, the range of alternatives considered relative to the market demand calculations, and the cumulative effects of activities on non-NFS lands. In addition, there is a need to consider adjustments to the Plan based on information generated during the 5-Year Review of the Forest Plan. Therefore, the purpose and need for this EIS primarily relates to the August 2005 Court decision, the 5-Year Plan Review, and other minor clarifications and updates.

Issues

Identification of issues helps define or predict the resources or uses that could be most affected by the management of NFS lands. These issues are then used as a basis to formulate management alternatives or to measure differences between alternatives.

Ten public issues were originally identified in 1988 for the Forest Plan Revision. These original issues included scenic quality, recreation, fish habitat, wildlife habitat, subsistence, timber harvest, roads, minerals, roadless areas, and local economy. The 1991 Forest Plan Revision Supplemental Draft EIS (SDEIS) added an additional concern: identifying and considering rivers for recommendation as Wild, Scenic, and Recreational rivers.

After the release of the 1991 SDEIS, considerable new information pertaining to the Tongass Forest Plan Revision became available. Out of this information emerged five additional issues, determined by the Regional Forester as needing more study and evaluation before a final revised Forest Plan could be adopted. Some of these issues were aspects or extensions of the ten public issues previously considered; others were new issues or had not been considered as issues in themselves. The five issues included wildlife viability, fish habitat, karst and caves, alternatives to clearcutting, and socioeconomic considerations. These issues were assessed in the 1996 Revised SDEIS and the 1997 Tongass Forest Plan Revision Final EIS.

The 2003 Supplemental EIS (SEIS) reviewed and evaluated roadless areas and analyzed alternative groupings of roadless areas for wilderness recommendations. Two broad issue categories, referred to as key issues, were identified as the major issues driving the SEIS alternatives analysis: 1) the long-term protection of roadless areas and associated values and 2) the social and economic well-being of the communities of Southeast Alaska.

Public Input

The scope of this EIS was initially determined by the Court in its 2005 ruling, and by the 5-Year Review of the Forest Plan. Additional information was considered to help clearly define the issues and for use in the development and analysis of alternatives. For the Final

EIS, comments and information from a wide variety of public inputs that were related to amending the Forest Plan were considered. This information included the following:

- Public comments generated during the 1997 Tongass Forest Plan Revision process;
- Tongass Forest Plan Revision appeals;
- Public input specific to the Tongass National Forest on the Forest Service's 2001 National Roadless Area Conservation Rule;
- Public comments generated relative to the 2003 SEIS;
- Public input expressed during project-level National Environmental Policy Act (NEPA) analyses over approximately the past 10 years; and
- Public input received in response to the Notice of Intent and the Web site for this EIS.

This record of public input on the management of the Tongass covers a period of more than 12 years. Of special note are the extensive public meetings held in Southeast Alaska for the 1997 Forest Plan Revision, the 2001 National Roadless Area Conservation Rule, and the 2003 SEIS.

In addition to the above, public involvement has occurred during the development of this EIS. Public involvement activities have included the following:

- The Notice of Intent was published in the Federal Register in March 2006.
- A Forest Plan Adjustment Web site was developed in January 2006 and has been maintained and continually updated to inform and engage the public since then. Several hundred comments and questions were received through the Web site or via emails associated with the Web site during the first several months of its operation.
- A Weblog regarding the Forest Plan adjustment effort was established in July 2006 and was maintained as another method of public communication.
- In response to the three above items, a number of letters were received containing comments regarding the issues and alternatives.
- Government-to-government consultation was conducted with federally recognized tribes.

- A number of group-specific meetings were conducted with various organizations (including Alaska Native groups).
- A variety of news releases were issued relative to the Forest Plan adjustment process.
- A series of ongoing meetings by a group known as the Tongass Futures Roundtable (hosted by the National Forest Foundation and The Nature Conservancy) resulted in considerable discussion of Tongass management issues among a broad spectrum of individuals and groups interested in the future of Southeast Alaska.
- Input received prior to issuance of the Draft EIS was reviewed and synthesized and a summary of this synthesis is presented as Appendix A (Issue Identification) to the Final EIS.
- A Draft EIS and Proposed Forest Plan were released on January 12, 2007. This began a 90-day comment period, which was later extended to 108 days. The comment period closed on April 30, 2007.
- During the comment period, open houses and public hearings were held in 24 Alaska communities. In addition to comments on the Draft EIS, the hearings provided opportunities to hear concerns related to subsistence and Alaska Native issues.
- On March 22, 2007, an open house and public hearing was held on the internet to solicit public comment in an open forum from individuals living anywhere in the world.

More than 84,000 comment documents were received, including individual letters, form letters, emails, hearing testimony, and comments submitted directly via the Forest Plan Adjustment Web site. Slightly more than 2,000 of these were classified as individual comment documents and the others were classified as form letters and emails. The individual comment documents were subdivided into approximately 5,500 individual comments. Responses were received from all 50 states and 89 foreign countries. A summary of the substantive comments and Forest Service responses to those comments is presented in Appendix H to the Final EIS (Volume II).

The Three Focus Issues

Key Issues

Any alternative that proposes to change the Forest Plan could affect resources and/or outputs relative to the current Forest Plan. Therefore, Chapter 3 of the EIS shows the effects of the various alternatives on all relevant resources and evaluates their effects relative to all of the issues and concerns previously identified during the 1997 Plan revision process. However, based on the purpose and need of this EIS and public input received during the current EIS process, some issues are more likely to influence the comparison among alternatives and represent the major issues to be evaluated. These issues were grouped into three broad issue categories, referred to as the key issues. These key issues are the major issues driving the alternatives and analyses.

Key Issue 1 – Protection of high value roadless areas from road development and timber harvest activity on the Tongass is of local and national importance, particularly for wildlife and biodiversity, recreation, and tourism.

Many people believe that roadless areas should be allowed to evolve naturally through their own dynamic processes and should be afforded protection to ensure that this will occur. The Tongass includes very large undeveloped land areas, with several portions of the Forest consisting of contiguous roadless areas that exceed 1 million acres and represent large, unfragmented blocks of wildlife habitat. This large scale of roadless lands does not exist anywhere else in the NFS, except on the Chugach National Forest in Southcentral Alaska.

Roadless areas are considered important because of their wildlife habitat and recreation values and their importance for tourism. They are also important because of the passive use values and ecosystem services values they provide. Passive use values represent the value that individuals assign to a resource independent of their use of that resource and typically include existence, option, and bequest values. These values represent the value that individuals obtain from knowing that expansive roadless areas exist, knowing that they are available to visit in the future should they choose to do so, and knowing that they are available for future generations to inherit. There is interest in preserving large portions of the Tongass because the majority of the Forest is in a natural condition, unlike most other national forests, and the Tongass represents a significant portion of the world's remaining temperate rainforests.

Ecosystem services represent the services provided to society by healthy ecosystems. These services and benefits include what some consider to be long-term life support benefits to society as a whole. Examples of ecosystem services include watershed services, soil stabilization and erosion control, improved air quality, climate regulation, carbon sequestration, and biological diversity.

Indicators: Analysis relative to this issue compares the amount and proportion of land protected in non-development land use designations (LUDs); the amount of inventoried roadless areas that would be protected under each alternative; and the amount of productive old-growth forest that would be protected under each alternative. The values of the lands protected are considered. Passive use or ecosystem services values are discussed qualitatively, with examples provided from other studies.

Key Issue 2 – The Tongass National Forest needs to provide a sufficient timber supply to meet the market demand and help maintain a vibrant economy in Southeast Alaska.

The Tongass Timber Reform Act (TTRA) (Section 101) requires the Forest Service to seek to provide a supply of timber from the Tongass National Forest that meets annual market demand and the market demand for each planning cycle, consistent with providing for the multiple-use and sustained yield of all renewable resources. With the cancellation of long-term contracts and the closure of two Southeast Alaska pulp mills, the timber industry in Southeast Alaska has been in a period of transition. Future or planning cycle demand scenarios, however, cover a wide range and depend on rates of economic growth in key markets, conditions faced by competitors, and the rate of investment and innovation in manufacturing in Alaska.

Over the past half a century, the timber industry has been a major component of the economy of Southeast Alaska. However, with closure of the two Southeast Alaska pulp mills in the 1990s and growth of the tourism economy, timber has played a lesser role in recent years. Because the economy of Southeast Alaska is based on relatively few industries, maintaining an active timber industry is important for maintaining a well-diversified economy.

Indicators: Analysis relative to this issue compares the likely demand for timber and the amount of harvest made available to meet that demand. It considers the type of wood (sawlogs vs. utility wood) made available and the usefulness of that wood type to the local industry. The analysis also considers the effects on regional and national economies and on local communities.

Key Issue 3 – Protection of wildlife habitat and biodiversity on the Tongass is of local and national significance and is affected by road development and timber harvest activities.

The Tongass National Forest supports a unique and important assemblage of wildlife, including the largest population of brown bears and breeding bald eagles in the world, species of high importance for subsistence (e.g., Sitka black-tailed deer), an extensive array of endemic mammals and other species, and a large number of species that are at least partially dependent on old-growth habitats (e.g., marten and goshawk). Populations of many of these species and the biodiversity of Southeast Alaska are affected by timber harvest and the development of roads.

Although less than 10 percent of the productive old-growth habitats on the Tongass have been converted to young growth, this percentage is much higher for certain types of old growth, such as low-elevation and large-tree old growth. In addition, a high percentage of non-NFS lands have been harvested and the rate of harvest is much higher on these lands. Therefore, the cumulative effects of harvest and road building on wildlife of Southeast Alaska are greater than the effects of harvest and road construction on the Tongass alone.

Indicators: Analysis relative to this issue compares the amount of productive old-growth forest that would be protected under each alternative, as well as the percentages of biogeographic provinces that would be protected in reserves. It also considers the role of the managed lands (development LUDs) in providing wildlife habitat. It rates the alternatives in terms of the expert panel ratings conducted for the 1997 Forest Plan Revision EIS. Habitat changes, as documented by habitat amounts, changes in road densities, and habitat models, are also used as indicators. Cumulative harvest and road development on non-NFS lands is quantified and evaluated in conjunction with harvest and road development on NFS lands.

Alternatives

Each alternative described in Chapter 2 of the Final EIS includes the following components:

- A framework;
- A general description of the desired condition;
- A table with the acreages allocated to each LUD;
- A map (included in the map packet accompanying the EIS hard copy or in the map section of the CD version) showing the distribution of LUDs across the Forest;
- A map showing the distribution of development, natural setting, and wilderness LUD groups;
- A description of proposed changes to the current Forest-wide standards and guidelines and management prescriptions; and
- A quantification of outputs and measures associated with each alternative.

The management prescriptions (i.e., LUD-specific standards and guidelines) for each LUD are included in the 1997 Forest Plan, as amended, for Alternative 5 (No Action) or in the Final Proposed Forest Plan (see below) for the action alternatives. The Forest-wide standards and guidelines that apply to each alternative are also included in these Forest Plans.

Chapter 2 of the Final EIS identifies the goals common to all alternatives. In addition, the TTRA (Section 101) direction for the Tongass to “seek to provide a supply of timber which 1) meets the annual market demand for timber from such forest and 2) meets the market demand from such forest for each planning cycle" is a goal for each alternative "to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources," as determined by that alternative, and subject to appropriations and applicable law.

Final Proposed Forest Plan

The No-Action Alternative (Alternative 5) represents the 1997 Forest Plan Revision, as amended to date. A number of changes to the Forest Plan text are being proposed under the action alternatives, based on the Forest Plan 5-Year Review and Forest Service staff recommendations. Most changes were incorporated into the Proposed Forest Plan that accompanied the Draft EIS. These changes were modified and updated for the Final EIS and the major changes being proposed are summarized below. The individual alternative descriptions on the following pages only identify items that are not consistent with the Final Proposed Forest Plan, which is defined by the Proposed Forest Plan that accompanied the Draft EIS, as modified in this section. A summary of the main changes that are incorporated into the Final Proposed Forest Plan are provided below.

Management Prescriptions

- Edits and clarifications were made regarding karst management programs, sacred site protection, minerals and geology, off-highway vehicle use, scenery management, and other areas for most LUD prescriptions.
- Substantial edits and clarifications were made to the Wilderness and Wilderness National Monument LUD prescriptions.

Forest-wide Standards and Guidelines

- Clarifications were made to the standards and guidelines regarding steep slopes and soil stability in the *Soils* and *Water* section.
- Clarifications were made to the standards and guidelines on Class III and IV streams and edits were made to the other standards and guidelines in the *Fish* section.
- The detailed stream process group-specific Riparian standards and guidelines are presented in an appendix in the Final Proposed

Forest Plan, instead of in the main body of the standards and guidelines, which is the way they were presented in the Proposed Forest Plan that accompanied the Draft EIS.

- A new section was added to Chapter 4 on Invasive Species.
- A new section was added to Chapter 4 on Plants.
- The Threatened, Endangered, and Sensitive Species standards and guidelines are incorporated into subsections under Fish, Wildlife, and Plants (as appropriate) in the Final Proposed Plan, instead of in a separate section as in the Proposed Plan that accompanied the Draft EIS.
- The goshawk foraging habitat and the marten habitat standards and guidelines in the *Wildlife* section were deleted and replaced with a Forest-wide legacy standard and guideline in the Proposed Forest Plan that accompanied the Draft EIS. In addition, the legacy standard and guideline for the Final Proposed Forest Plan was revised further. The revised standard and guideline requires legacy forest structure to be left only in harvest units greater than 20 acres and only in higher risk VCUs, as previously defined (49 VCUs).
- The goshawk nesting habitat standard and guideline in the *Wildlife* section was revised in the Proposed Forest Plan that accompanied the Draft EIS. In addition, the goshawk nesting habitat standard and guideline for the Final Proposed Forest Plan was revised further. The revised standard and guideline permits nesting habitat protection measures to be removed if, after 2 consecutive years of monitoring, evidence of confirmed or probable nesting is no longer observed.
- The requirement to conduct inventories to determine the presence of nesting goshawks for proposed projects that affect goshawk habitat is included in the Final Proposed Forest Plan (this was inadvertently removed from the Proposed Forest Plan that accompanied the Draft EIS).
- New standards and guidelines on sacred site protection were added in the *Heritage Resources and Sacred Sites* section.
- Extensive edits were made to the Karst and Cave Resources standards and guidelines and the Karst and Cave Resources appendix.
- Substantial edits were made to the Minerals and Geology standards and guidelines.

- Substantial edits were made to the Recreation and Tourism standards and guidelines. The detailed Recreation Opportunity Spectrum-specific standards and guidelines are presented in an appendix in the Final Proposed Forest Plan, instead of in the main body of the standards and guidelines, which is the way they were presented in the Proposed Forest Plan that accompanied the Draft EIS.
- The Scenery standards and guidelines were converted from the Visual Management System to the Scenery Management System.
- Edits were made to off-highway vehicle standards and guidelines in the *Lands* section.
- Edits were made to the road storage and decommissioning standards and guidelines in the *Transportation and Utilities* section.

In addition, there are a number of changes to other Forest Plan sections. These include changes to the Goals and Objectives (Chapter 2 of the Plan) and Monitoring and Evaluation (Chapter 6 of the Plan) chapters, as well as a number of the Forest Plan appendices, including Appendix B (Information Needs), Appendix F (Visual Priority Routes and Use Areas), Appendix I (Karst and Caves), Appendix K (Old-Growth Habitat Reserve Criteria), and Appendix L (Resource Schedules). The Monitoring and Evaluation chapter in the Final Proposed Plan was revised to be more focused, relative to the version in the Proposed Forest Plan that accompanied the Draft EIS. In addition, it is anticipated that the current list of Management Indicator Species (MIS) may be revised in the future, but a change in MIS is not part of the Final Proposed Plan.

Proposed LUD Changes Common to Most Alternatives

The LUD allocations for each alternative are described in the following alternative-specific descriptions. The alternatives do not vary in terms of the acreage allocated to congressionally designated areas (i.e., Wilderness, National Monument, and LUD II), nor do they vary in terms of allocations to Research Natural Areas, Enacted Municipal Watersheds, or Wild, Scenic, or Recreational River LUDs. However, they do vary with respect to the other non-development LUDs and all of the development LUDs. The LUDs for each alternative are displayed on alternative LUD maps that accompany the EIS.

The proposed expansion of the Special Interest Area LUD and the proposed replacement of the Young Bay Experimental Forest with the Cowee-Davies Experimental Forest are common to all alternatives except Alternative 5, which would follow the 1997 Forest Plan (as amended) for these two LUDs. In addition, the proposed expansion and refinement of the Old-Growth Habitat LUD is common under Alternatives 1, 2, 3, and 6, and is as a result of an interagency process completed in 2007. Under this process, the Tongass worked with the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service to conduct a comprehensive review and mapping effort for all small old-growth reserves (OGRs). The final proposal is included in Alternatives 1, 2, 3, and 6 of the Final EIS. Alternative 5 retains the 1997 Plan (as amended) reserve network and the reserves proposed under Alternatives 4 and 7 are not affected by this proposal. Further information on the refinement of small OGRs is included in Appendix D (Volume II).

Alternative 1

Under this alternative, forest management would provide a mix of national forest uses and activities, but would emphasize maintaining inventoried roadless areas, associated fish and wildlife values, and unroaded recreation, tourism, and subsistence opportunities, relative to the current Forest Plan. Timber would be managed within the roaded land base and inventoried roadless areas would remain in a natural condition. In addition, a number of higher value roaded areas, including all of Kuiu, Baranof, and Kruzof Islands, many portions of Chichagof Island, all mainland areas, and other areas, would be excluded from commercial timber management. A total of 840,000 acres of the Tongass would be in development LUDs and 15.9 million acres would be in non-development LUDs. The majority of the lands changed to non-development LUDs from development LUDs (in the 1997 Plan) would be designated Semi-Remote Recreation. Specific LUD changes under this alternative would include the addition and modification of a number of Geologic Special Interest Areas, recommendations to change the Young Bay Experimental Forest to Semi-Remote Recreation and the Cowee-Davies Creek watersheds from Scenic Viewshed to Experimental Forest, and converting a large area of Remote Recreation LUD north of Juneau to Semi-Remote Recreation. It also would include extensive refinements to the boundaries of the small Old-Growth Reserves, based on a recently completed interagency evaluation.

Alternative 1 would have 312,000 acres suitable for timber production and would have an Allowable Sale Quantity or ASQ (the maximum amount of timber that can be sold from the suitable land base on a sustained basis, expressed as an annual average) of 49 million board feet (MMBF). This alternative would approximately correspond with Scenario 1 (limited lumber production) of the Brackley et al. (2006a) timber demand study. It is similar to Alternative 8 of the 2003 SEIS in terms of the areas allocated to non-development LUDs.

Alternative 2

Under this alternative, forest management would provide a mix of national forest uses and activities, but would give additional emphasis to roadless areas, associated fish and wildlife values, and unroaded recreation, tourism, and subsistence opportunities, relative to the current Forest Plan. Timber would be managed within the roaded land base as well as within roadless areas with lower wilderness attribute ratings (primarily those adjacent to developed areas). The vast majority of current roadless areas would remain in a natural condition. A total of 1.9 million acres of the Tongass would be in development LUDs and 14.8 million acres would be in non-development LUDs. The majority of the lands changed to non-development LUDs from development LUDs (in the current Plan) would be designated Semi-Remote Recreation. All areas identified as development LUDs in Alternative 1 would also be development LUDs in this alternative, in addition to other areas. Specific LUD changes under this alternative would include the addition and modification of a number of Geologic Special Interest Areas, recommendations to change the Young Bay Experimental Forest to Semi-Remote Recreation and the Cowee-Davies Creek watersheds from Scenic Viewshed to Experimental Forest, and converting a large area of Remote Recreation LUD north of Juneau to Semi-Remote Recreation. It also would include extensive refinements to the boundaries of the small Old-Growth Reserves, based on a recently completed interagency evaluation.

Alternative 2 would have 545,000 acres suitable for timber production and would have an ASQ of 151 MMBF. This alternative would approximately correspond with Scenario 2 (expanded lumber production) of the Brackley et al. (2006a) timber demand study.

Alternative 3

Under Alternative 3, forest management would provide a mix of national forest uses and activities, but would give some additional emphasis to roadless areas, associated fish and wildlife values, and unroaded recreation, tourism, and subsistence opportunities, relative to the current Forest Plan. Timber would be managed within the roaded land base as well as within additional roadless areas; but these additional areas would not include the high value roadless areas identified in the 1999 Record of Decision (USDA Forest Service 1999) as the 18 Areas of Special Interest or the 23 areas proposed for wilderness in H.R. 987. The vast majority of current roadless areas would remain in a natural condition. A total of 2.8 million acres of the Tongass would be in development LUDs and 14.0 million acres would be in non-development LUDs. The majority of the lands changed to non-development LUDs from development LUDs (in the current Plan) would be designated Semi-Remote Recreation. All areas identified as development LUDs in Alternative 2 would also be development LUDs in this alternative, in addition to other areas. Specific LUD changes under this alternative would include the addition and modification of a number of Geologic Special Interest Areas, recommendations to change the Young Bay Experimental Forest to Semi-Remote Recreation and the Cowee-Davies Creek watersheds from Scenic Viewshed to Experimental Forest, and converting a large area of Remote Recreation LUD north of Juneau to Semi-Remote Recreation. It also would include extensive refinements to the boundaries of the small Old-Growth Reserves, based on a recently completed interagency evaluation.

Alternative 3 would have an estimated suitable forest land base of 661,000 acres and an ASQ of 204 MMBF. This alternative would approximately correspond with Scenario 3 (medium integrated industry) of the Brackley et al. (2006a) timber demand study. It is similar to Alternative 5 of the 2003 SEIS in terms of the areas allocated to non-development LUDs.

Alternative 4

Under Alternative 4, forest management would provide a mix of national forest uses and activities, but would give additional emphasis to timber management and associated economic stability of Southeast Alaska communities, relative to the current Forest Plan. Timber would be managed within an area expanded beyond the current Forest Plan. The vast majority of current roadless areas would remain in a natural condition; however, the majority of roadless areas that contain substantial productive old growth (POG), outside of wilderness, could be developed. A total of 4.7 million acres of the Tongass would be in development LUDs and 12.0 million acres would be in non-development LUDs. Almost all areas identified as development LUDs in Alternative 5 would also be development LUDs in this alternative, in addition to other areas. Specific LUD changes under this alternative would include the addition and modification of a number of Geologic Special Interest Areas, recommendations to change the Young Bay Experimental Forest to Semi-remote Recreation and the Cowee-Davies Creek watersheds from Scenic Viewshed to Experimental Forest, and converting a large area of Remote Recreation LUD north of Juneau to Semi-Remote Recreation.

Alternative 4 would have an estimated suitable forest land base of 999,000 acres and an ASQ of 360 MMBF by the second decade. This alternative would approximately correspond with Scenario 4 (high integrated industry) of the Brackley et al. (2006a) timber demand study. It is similar to Alternative 6 of the 1997 Final EIS.

Alternative 5

This is the No-Action alternative. It represents a continuation of the current Forest Plan and would result in a mix of national forest uses and activities. Timber would be managed in an area more extensive than under Alternative 3, but less extensive than under Alternative 4. The vast majority of current roadless areas would remain in a natural condition; however, the majority of roadless areas that contain substantial POG, outside of wilderness, could be partially developed. A total of 3.6 million acres of the Tongass would be in development LUDs and 13.2 million acres would be in non-development LUDs. This alternative is the same as the current Forest Plan (Alternative 11 from the 1997 Final EIS plus amendments).

Alternative 5 would have an estimated suitable forest land base of 757,000 acres and an ASQ of 267 MMBF. This alternative is the same as the 1997 Forest Plan, as amended (Alternative 11 from the 1997 Final EIS plus amendments).

Alternative 6

This is the Proposed Action alternative. It is very similar to the Alternative 5 (No Action) alternative in terms of LUD allocations; however, it includes extensive refinements to the boundaries of the small Old-Growth Reserves (based on a recently completed interagency evaluation), new Geologic Special Interest Areas, a new Experimental Forest, the conversion of a large area of Remote Recreation LUD north of Juneau to Semi-Remote Recreation, and other minor LUD refinements. Timber would be managed in an area more extensive than under Alternative 3, but less extensive than under Alternative 4. The vast majority of current roadless areas would remain in a natural condition; however, the majority of roadless areas that contain substantial POG, outside of wilderness, could be partially developed. A total of 3.5 million acres of the Tongass would be in development LUDs and 13.3 million acres would be in non-development LUDs. Specific LUD changes under this alternative would include the addition and modification of a number of Geologic Special Interest Areas, recommendations to change the Young Bay Experimental Forest to Semi-remote Recreation and the Cowee-Davies Creek watersheds from Scenic Viewshed to Experimental Forest, and converting a large area of Remote Recreation LUD north of Juneau to Semi-Remote Recreation. It also would include extensive refinements to the boundaries of the small Old-Growth Reserves, based on a recently completed interagency evaluation.

Alternative 6 would have an estimated 775,000 acres of lands suitable for timber production and an ASQ of 267 MMBF. This alternative is similar to Alternative 11 of the 1997 Final EIS.

Alternative 7

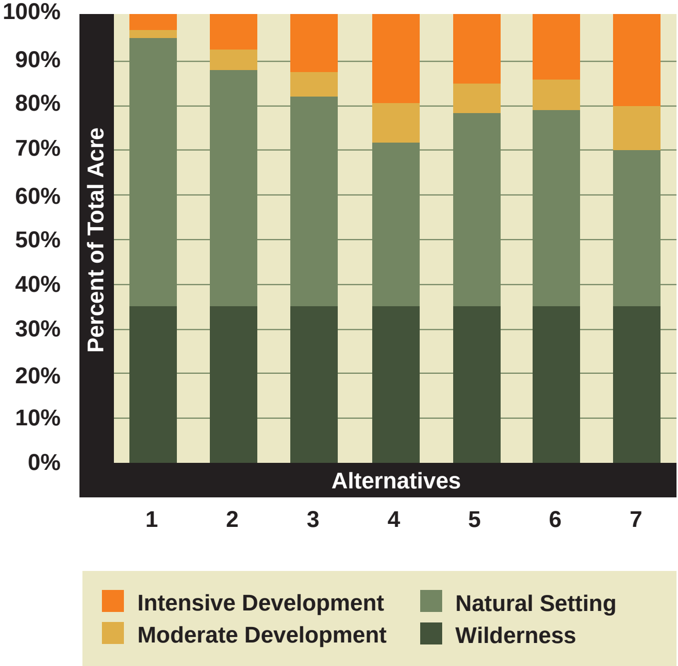
Under Alternative 7, forest management would provide a mix of national forest uses and activities, but would give much additional emphasis to timber management, relative to the current Forest Plan. Timber would be managed on a considerably expanded land base compared with the current Forest Plan. The vast majority of current roadless areas would remain in a natural condition; however, the majority of roadless areas that contain substantial POG, outside of wilderness, could be developed. A total of 5.0 million acres of the Tongass would be in development LUDs and 11.7 million acres would be in non-development LUDs. Almost all areas identified as development LUDs in Alternative 5 would also be development LUDs in this alternative, in addition to other areas. Specific LUD changes under this alternative would include the addition and modification of a number of Geologic Special Interest Areas and recommendations to change the Young Bay Experimental Forest to Semi-Remote Recreation and the Cowee-Davies Creek watersheds from Scenic Viewshed to Experimental Forest.

Alternative 7 would have an estimated suitable forest land base of 1,174,000 acres and an ASQ of 421 MMBF. This alternative is similar to Alternative 2 of the 1997 Final EIS.

Comparison of the Alternatives

This section briefly compares the environmental consequences of the seven alternatives with respect to the key issues described above. Prior to presenting the effects comparison, Figure 1 is displayed to help the reader compare the differences among the alternatives. It summarizes the LUD allocations of the alternatives using LUD Group combinations. The four LUD Groups combine the individual LUDs in terms of similarities in management.

Figure 1. Land Use Designation Group Comparison



Key Issue 1 – Protection of high value roadless areas from road development and timber harvest activity on the Tongass is of local and national importance, particularly for wildlife and biodiversity, recreation, and tourism.

The Tongass includes very large undeveloped land areas, with several portions of the Forest consisting of contiguous roadless areas that exceed 1 million acres and represent large, unfragmented blocks of wildlife habitat. This scale of roadless lands is not available elsewhere in the NFS, except on the Chugach National Forest. Roadless areas are considered important because of their wildlife habitat and recreation values and their importance for tourism. They are also important because of the passive use values and ecosystem services values they provide.

Direct Effects on Roadless Areas

The Tongass National Forest is about 91 percent roadless, including wilderness. Only small areas where communities are located, or where road construction and timber harvest have occurred, are “developed” to any noticeable degree. Developed areas and small unroaded areas (not included in inventoried roadless areas) cover about 1.51 million acres, or about 9 percent of the Tongass; wilderness covers about 5.75 million acres, or about 34 percent; and inventoried roadless areas (outside of wilderness) cover about 9.51 million acres, or about 57 percent. The maximum long-term reduction in roadless plus wilderness acreage on the Tongass and for all of Southeast Alaska (all Alaska lands southeast of Yakutat Bay) under each alternative are discussed in the following paragraphs and the alternatives are compared in Figure 2.

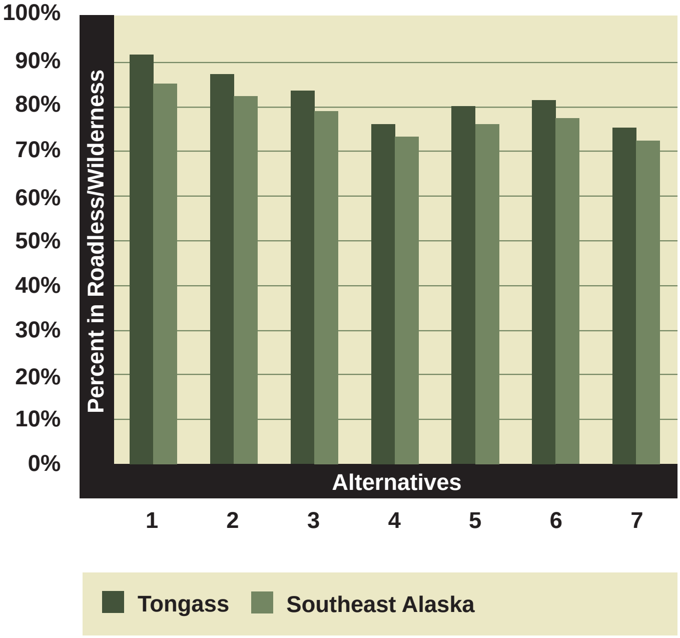
Alternative 1 is designed to avoid inventoried roadless areas and, because of this, after 100+ years of maximum implementation, 91 percent of the Tongass and 85 percent of Southeast Alaska would still be in roadless areas or wilderness.

Alternatives 2 and 3 would progressively enter more roadless areas with 0.8 million acres and 1.7 million acres of development LUDs in roadless areas, respectively. Alternative 2 would ultimately result in 87 percent of the Tongass and 82 percent of Southeast Alaska in roadless or wilderness and Alternative 3 would result in 83 percent and 79 percent.

Next in progression into roadless areas, Alternatives 5 and 6 would include 2.4 and 2.3 million acres of development LUDs in roadless, respectively. Alternative 5 would ultimately result in 80 percent of the Tongass and 76 percent of Southeast Alaska being in roadless or wilderness. These percentages would be 81 and 77 for Alternative 6.

Finally, Alternatives 4 and 7 both enter roadless areas to a higher degree. Alternative 4 would have 3.4 million acres of development LUDs in roadless and Alternative 7 would have 3.7 million. After 100 years or more of implementation, Alternative 4 would result in 76 percent of the Tongass and 73 percent of Southeast Alaska, and Alternative 7 would result in 75 percent of the Tongass and 72 percent of Southeast Alaska continuing as roadless or in wilderness.

Figure 2. Percent of the Tongass and Southeast Alaska in Roadless/Wilderness after 100+ Years



Distribution of Roadless Areas

Significant acreages of roadless areas would remain in all biogeographic provinces under all alternatives; however, some would maintain a higher percentage than others. Under Alternatives 1 and 2, none of the 21 biogeographic provinces within the Tongass boundary would have less than 50 percent of their areas in non-development LUDs. Alternative 1 would have 17 of the 21 provinces containing 90 percent or more acreage in non-development LUDs and Alternative 2 would have 13 provinces.

Alternative 3 would have 2 biogeographic provinces and Alternatives 5 and 6 would have 3 provinces with less than 50 percent in non-development LUDs. Alternative 3 would have 9 of the 21 provinces containing 90 percent or more of their acreage in non-development LUDs and Alternatives 5 and 6 would have 6 provinces.

Alternatives 4 and 7 would each result in 5 biogeographic provinces with less than 50 percent in non-development LUDs. These alternatives would have 6 of the 21 provinces containing 90 percent or more of their acreage in non-development LUDs.

Key Issue 2 – The Tongass National Forest needs to provide a sufficient timber supply to meet the market demand and help maintain a vibrant economy in Southeast Alaska.

Timber from the Tongass National Forest is the main source of raw materials for the region's wood products industry.

Demand may be thought of as the different amounts of a product that buyers are willing to purchase at different prices. Demand is not a single number, but instead a series of price-quantity relationships. The same is true of supply. It is the combination of supply and demand that determines the quantity and price of goods produced and consumed.

Accurately projecting future demand is difficult. Market demand for Southeast Alaska timber and wood products depends upon numerous, difficult to predict, factors, including changes in technology, growth and exchange rates in key markets, changes in consumer tastes and preferences, as well as developments in other producing regions whose products compete with those of Alaska.

The average timber sale on the Tongass includes spruce, hemlock, and cedar and results in a variety of log grades and species. In most forested conditions, the tree species, tree sizes, and tree quality are all mixed together. When a timber sale is purchased, the buyer is usually required to purchase all of the volume in that sale regardless of the composition. At present, none of the purchasers is set up to efficiently process all grades and species from such sales, nor is the local industry set up to process all of the components of the timber sales. In the absence of a facility to use utility and lower grade logs, a timber sale must be sustained solely on the profits made from the higher grade sawlogs, even though the operator must harvest and pay for the lower grade logs.

It should be noted that the Alaska Regional Forester (Region 10) signed a new policy in March 2007 that approved limited interstate shipments of unprocessed Sitka spruce and western hemlock. This policy is expected to increase the utilization of timber harvested on the Tongass and improve overall timber sale economics by providing a market for smaller diameter and low-grade material that cannot be processed profitably by sawmills in Southeast Alaska.

The wood products analysis prepared for this EIS is divided into long- and short-term effects. The long-term effects analysis evaluates the alternatives with respect to a) the projections developed by the Pacific Northwest Research Station of the Forest Service, and b) current production levels, installed capacity, and the minimum volumes required by various processing facilities. These benchmarks are used to evaluate the long-term effects of the alternatives. Long-term effects are assessed based on the ASQ projected under each alternative.

The short-term effects analysis discusses three key components of the "timber pipeline:" volume under contract, NEPA-cleared volume (i.e., sales that have approved NEPA documents but have not yet been sold), and timber volume in preparation (i.e., proposed sales that are currently being evaluated under the NEPA process).

Long-Term Effects

Pacific Northwest Research Station Projections. The Forest Service commissioned the Pacific Northwest Research Station to develop a series of demand projections. This resulted in a "derived demand" analysis that projected various demand figures for four scenarios based upon differing assumptions about future markets and future processing facilities in Southeast Alaska (Brackley et al. 2006a). These future visions of the Southeast Alaska wood products industry are hypothetical and are used in this EIS to illustrate the type of developments that might take place in cases where different volumes are made available for harvest. The transition from one scenario to the next involves new private investment and market development. A key factor in attracting new investment is whether or not a supply of timber “shelf volume” is available for purchase.

Alternatives 1 through 4 were designed to correspond with timber demand Scenarios 1 through 4, respectively, while also responding to other concerns. The discrepancy between the second decade ASQs for Alternatives 1 and 2 and projected demand for 2022 under Scenarios 1 and 2 reflects these other concerns. These scenarios are briefly summarized in the following paragraphs, along with the ability of the alternatives to meet each scenario in 2022.

Scenario 1 – Limited Lumber Production. This scenario approximates the status of the timber industry in Southeast Alaska at the time that the Brackley et al. study was completed. Total derived demand is projected to be 68 MMBF in 2022 under this scenario. It is likely that this volume would be primarily logs from more economical (non-interchangeable component [NIC I]) lands.

> **Alternative 1**, with a projected total output of 49 MMBF, could not provide sufficient volume to meet this scenario, as currently modeled.
>
> **Alternatives 2, 3, 4, 5, 6, and 7** could all provide sufficient volume to meet this scenario in 2022.

Scenario 2 – Expanded Lumber Production. This scenario also projects that only higher value logs are processed, with limited new investments in the existing mills in Southeast Alaska. Total derived demand is projected to be 187 MMBF in 2022 under this scenario. As in Scenario 1, it is likely that this volume would be primarily higher value logs from the more economical (NIC I) lands.

> **Alternatives 1 and 2**, with projected total outputs of 49 MMBF and 151 MMBF, could not provide sufficient volume to meet this scenario.
>
> **Alternatives 3, 4, 5, 6, and 7** could all provide sufficient volume to meet this scenario.

Scenario 3 – Medium Integrated Industry. This scenario builds on Scenario 2 and would establish processing capacity to fully utilize sawlogs and low grade and utility logs from federal and state timber sales. Under this scenario the current sawlog milling capacity would operate efficiently and new processing capacity would be developed to utilize the material that has formerly been left in the woods or exported. Total derived demand is projected to be 204 MMBF in 2022 under this scenario.

Alternatives 1 and 2, with projected total outputs of 49 MMBF and 151 MMBF, respectively, could not provide sufficient volume to meet this scenario.

Alternatives 3, 4, 5, 6, and 7 could provide sufficient volume to meet this scenario.

Scenario 4 – High Integrated Industry. This scenario builds on Scenario 3 and provides an estimate of the upper market level for the foreseeable future. In order for this situation to be realized, new investments in processing capacity would need to be made and additional market shares established. Total derived demand is projected to be 342 MMBF in 2022 under this scenario.

Alternatives 1, 2, 3, 5 and 6, with projected total outputs of 49 MMBF, 151 MMBF, 205 MMBF, 267 MMBF, and 267 MMBF, respectively, could not provide sufficient volume to meet this scenario.

Alternatives 4 and 7 could provide sufficient volume to meet this scenario.

Current Production Levels, Installed Capacity and Minimum Volumes Required by Various Processing Facilities. The existing mills in Southeast Alaska had an estimated active installed processing capacity of 261 MMBF in 2006 and a total processing capacity of 361 MMBF. The estimated NIC I components of the harvest volumes projected under each alternative range from 9 percent of the active installed processing capacity under Alternative 1 to 71 percent under Alternative 7. The NIC I volume projected under Alternative 5 (No Action) represents about 46 percent of the existing active processing capacity. The projected NIC I components represent smaller shares of the total installed capacity, ranging from 7 percent under Alternative 1 to 51 percent under Alternative 7.

Two of the future demand scenarios evaluated by Brackley et al. (2006a) involve an integrated industry. These scenarios are based on the assumption that as stable volumes get higher, the industry will develop in an integrated fashion, with operations and production that utilize materials that are inefficient or excess to one another's production. The potential components of an integrated industry could include sawmills, a veneer plant, and a medium density fiberboard (MDF) or bioenergy facility, among others. The different facilities would process different types of log. Sawmills would generally process higher quality material (high grade sawlogs), with the other types of facility processing lower quality material (low grade sawlogs and utility logs).

Based on the projected harvest volumes, only Alternatives 4 and 7 would provide sufficient volume to support an integrated industry that consisted of the existing sawmills, a veneer plant, and an MDF or Bioenergy facility. Under Alternative 5 (No Action), there would be sufficient volume to support the existing sawmills. There would also be sufficient volume to support one or more veneer plants or an MDF or other chip-related operation, but not both.

A number of timber projections were reviewed as part of this analysis. Based on this review, the Forest Service identified a potential upper planning cycle demand of 360 MMBF from all sources. Only Alternative 7 includes sufficient volume to meet this level of demand only from NFS acres.

Direct Employment and Income. Direct sawmill and logging employment estimates are presented in job-years, which represent the equivalent of one year's employment. This potential employment would not necessarily occur all in one year and estimated job totals do not directly translate into estimated numbers of affected workers. These estimates assume a linear relationship between harvest and employment levels, with a 1 percent change in harvest resulting in a 1 percent change in employment. In reality, changes in volume will have a lagged response in employment, but the assumed linear relationship is an approximation that can be used to compare alternatives.

Based on projected harvest volumes, average annual direct wood products employment would range from 494 annualized jobs under Alternative 1 to 1,922 jobs under Alternative 7. Approximately 274 of these annualized jobs would be associated with non-Tongass harvest under each alternative. Viewed in relation to Alternative 5

(No Action), projected direct employment would range from a 63 percent decrease under Alternative 1 to an increase of approximately 43 percent under Alternative 7.

Projected annual direct income, which is calculated based on the projected number of jobs, would range from $19.5 million under Alternative 1 to $72.5 million under Alternative 7. These totals also include income that would be generated by non-Tongass harvest.

Short-Term Effects

The following discussion provides an indication of potential short-term effects. Actual effects would depend on the volumes in each pool when the decision is implemented. In the case of the volume under contract, potential impacts would also depend on whether potentially affected sales were cancelled or exempted as part of the decision.

Volume under Contract. Alternative 1 would maintain the majority of the Inventoried Roadless Areas on the Tongass in a natural condition and would not allow timber harvest in those areas. Alternative 1 would affect 52 percent (54 MMBF) of the volume under contract as of August 2006 (104 MMBF). The volume currently under contract would not be affected by any of the other alternatives.

NEPA-Cleared Volume. Alternative 1 would affect 56 percent (255 MMBF) of the current NEPA-cleared volume as of August 2006 (454 MMBF). It should be noted that not all this volume is considered economic under current market conditions. Alternative 2 would affect 44 percent or 198 MMBF of this volume, which represents the volume that has passed through the NEPA process and is scheduled to be available for sale in the near future. None of the other alternatives would affect this volume.

Timber Volume in Preparation. Alternative 1 would affect 56 percent (298 MMBF) of the timber volume in preparation as of September 2006 (536 MMBF). Alternatives 2 and 3 would each affect approximately 7 percent or 40 MMBF of this volume and Alternatives 4, 5, 6, and 7 would not affect this volume.

Key Issue 3 – Protection of wildlife habitat and biodiversity on the Tongass is of local and national significance and is affected by road development and timber harvest activities.

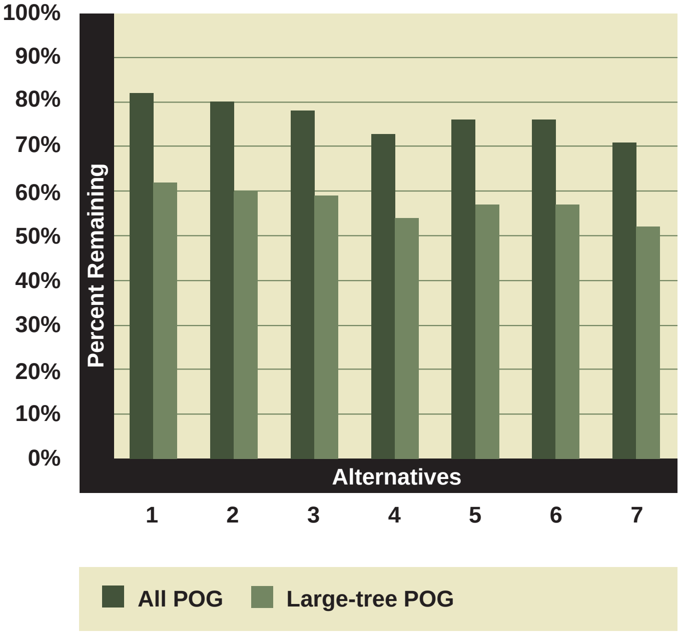
The Tongass National Forest supports a unique and important assemblage of wildlife including the largest population of brown bears and breeding bald eagles in the world, species of high importance for subsistence (e.g., Sitka black-tailed deer), an extensive array of endemic mammals and other species, and a large number of species that are at least partially dependent on old-growth habitats (e.g., marten and goshawk). Populations of many of these species and the biodiversity of Southeast Alaska are affected by timber harvest and the development of roads.

Old-Growth Harvest

The amount of productive old growth (POG) harvest is a key indicator of effects on many species, including goshawks, marten, endemic mammals, and deer. The range of old-growth harvest is wide among the alternatives. Alternative 1 has the lowest maximum harvest of POG at 86,000 acres, while Alternative 7 has the highest maximum at 807,000 acres. After 100 years or so, a minimum of 90 percent of the original POG on NFS lands would remain under Alternative 1 and 77 percent would remain under Alternative 7. Percentages for all of Southeast Alaska, including non-NFS lands, would be 82 percent for Alternative 1 and 71 percent for Alternative 7. The other five alternatives would rank between Alternatives 1 and 7; their order from lowest to highest harvest would have Alternative 2 at the low end progressing to Alternative 3, then 6, then 5, and then 4.

For large-tree POG after 100+ years, a minimum of 78 percent of the original amount would remain on the Tongass under Alternative 1 and 64 percent would remain under Alternative 7. Percentages for all of Southeast Alaska, including non-NFS lands, would be 62 percent for Alternative 1 and 52 percent for Alternative 7. Figure 3 compares the percentages for all POG and large-tree POG for all of Southeast Alaska, by alternative.

Figure 3. Minimum Percent of Original POG and Original Large-tree POG Remaining in 100+ Years in All of Southeast Alaska



Road Development

The Tongass currently has 4,941 miles of existing roads (including closed and non-system roads). This total includes 2,619 miles of open roads, plus 913 miles of closed roads that are in storage and 1,409 miles of non-system roads. Road construction can negatively affect wildlife by eliminating habitats and by permitting increased access, which can result in larger harvests and more human-large predator interactions.

Under Alternative 1, an estimated maximum of 774 new road miles would be developed over 100 years. For Alternatives 2 and 3 the estimated maximum new road construction would be 2,079 and 2,799 miles, respectively. The majority of these road miles would be closed after harvest activities are completed, and reopened at the next entry. The maximum road miles to be constructed under Alternatives 5 and 6 would be 3,874 and 3,744, respectively. Alternative 4 would construct a maximum of 4,890 miles of new road and Alternative 7 would construct a maximum of 5,825 miles of new road.

A useful indicator of road effects on wildlife is the road density within Wildlife Analysis Areas (WAA). On Tongass NFS lands, 8 percent of the WAAs that make up the Tongass have a road density greater than 1.0 mile per square mile under existing conditions. Road density would increase in many areas after 100+ years of implementation of the alternatives. Under Alternative 1, the density would increase so that a maximum of 11 percent of the WAAs would have a density greater than 1.0 mile per square mile. Alternatives 2, 3, and 6 would have a maximum of 16 to 18 percent, Alternative 5 would have a maximum of 19 percent, and Alternatives 4 and 7 would have 23 to 25 percent. These percentages would increase further when cumulative road development, including future road development on non-NFS lands, is considered. The percentage of WAAs with road density on all lands (including non-NFS lands) greater than 1.0 mile per square mile would be 20 percent for Alternative 1, 23 to 26 percent for Alternatives 2, 3, 5, and 6, and 28 to 31 percent for Alternatives 4 and 7.

Representation of Old-Growth Forests

The percentage of POG remaining in each biogeographic province is an indication of the degree to which all potentially valuable ecological communities remain fully represented.

After 100 years of Alternative 1 implementation, 19 of the 23 biogeographic provinces covering Southeast Alaska would have 75 percent or more of their POG remaining and none would have less than 50 percent (minimum value = 55 percent). For large-tree POG, 16 out of 23 provinces would have at least 50 percent of the original amount remaining (minimum value = 32%).

At the other end of the spectrum, after 100 years of implementation of Alternatives 4 or 7, 11 to 12 of the 23 biogeographic provinces would have 75 percent or more of their POG remaining and one would have less than 50 percent (minimum value = 44 percent for Alternative 7). Considering large-tree POG, 13 to 14 of the provinces would have at least 50 percent of the original amount remaining (minimum value = 29 percent under Alternative 7).

The other four alternatives (Alternatives 2, 3, 5, and 6) would all have values within these ranges; they would have 13 to 18 of the 23 biogeographic provinces covering Southeast Alaska with 75 percent or more of their POG remaining. None of these alternatives would have any biogeographic provinces with less than 50 percent of their POG. Each of them would also have 16 out of 23 provinces with least 50 percent of the original large-tree POG remaining (minimum value = 31%).

Conservation Strategy and Landscape Connectivity

An adequate amount and distribution of high quality old-growth blocks with good landscape connectivity is fundamental to the "coarse filter" aspect of the Old-Growth Forest Conservation Strategy and is important for the maintenance of viable, well-distributed populations of many species of wildlife. Because of the spacing of old-growth reserves and other non-development LUDs, Alternatives 1 and 2 would result in a good to excellent distribution of high quality old-growth blocks over the long term, and would have little to no effects on landscape "pinch-points." Alternatives 3, 5, and 6 would have good to very good spacing of old-growth reserves and other non-development LUDs and would similarly affect only one "pinch-point."

Under Alternative 4, the long-term result would be a good distribution of high quality old-growth blocks in the four biogeographic provinces with old-growth reserves, but a poor to fair distribution in the other provinces over the long term. The old-growth retention requirement would mitigate this to some degree, but would not necessarily result in blocks or large patches of POG being retained. This alternative would also negatively affect three critical landscape "pinch-points."

Alternative 7 would result in a poor distribution of high quality old-growth blocks over the long term throughout most of the Tongass because of the lack of old-growth reserves, the lack of an old-growth retention requirement, and the high acreage of development LUDs.

It would negatively affect four critical landscape "pinch-points" and result in a lower degree of landscape connectivity due to narrower beach buffers.

Species-Specific Effects

Expert panel viability assessments were conducted for key species to rate the alternatives considered in the 1997 Forest Plan Revision EIS. These ratings were transferred to the alternatives in this EIS, based on the four alternatives that are similar between EISs (i.e., 1997-Alternative 6 is similar to 2007-Alternative 4, 1997- Alternative 11 is similar to 2007-Alternatives 5 and 6, and 1997-Alternative 2 is similar to 2007-Alternative 7), and based on harvest acreage similarities. The ratings were also transferred into a relative qualitative description of the likelihood of maintaining viable, well-distributed populations so that the alternatives could more easily be compared.

Under Alternative 1, the likelihood of maintaining viable, well-distributed populations on the Tongass after 100 years is estimated to be very high for the goshawk, marten, wolf, and brown bear, and moderate for endemic mammals. Alternative 2 would rate almost as high. Under Alternative 3, this likelihood is estimated to be very high for the goshawk; high for the marten, wolf, and brown bear; and moderate for endemic mammals.

Alternatives 5 and 6 would have similar ratings. The likelihood of maintaining viable, well-distributed populations on the Tongass after 100 years is estimated to be high for the goshawk, wolf and brown bear; and moderate for the marten and endemic mammals.

Alternatives 4 and 7 rate the lowest among the alternatives. For Alternative 4, the likelihood of maintaining viable, well distributed populations on the Tongass after 100 years is estimated to be high for the wolf; moderately high for the goshawk and brown bear; moderate for the marten; and moderately low for endemic mammals. For Alternative 7, the likelihood is estimated to be moderately high for the wolf and brown bear; moderate for the goshawk and marten; and very low for endemic mammals.

Deer habitat capability expressed in terms of percent of 1954 values can be used to identify the amount of habitat change over time (current habitat capability = 88 percent of 1954 value, based on the deer model). After 100 years of Forest Plan implementation, the percentage for Alternative 1 could drop as low as 86 percent, 84 percent under Alternative 2, 83 percent under Alternative 3, 82 percent under Alternative 6, 81 percent under Alternative 5, 79 percent under Alternative 4, and 77 percent under Alternative 7. These percentages could be increased somewhat with more intensive management of young-growth forests.

Photograph taken looking northeast with Lindenberg Peninsula on Kupreanof Island and the mouth of Petersburg Creek (front cover) in the foreground, Petersburg Mountain (front cover) in the middleground, and Frederick Sound and the mainland in the background.

USDA

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Agriculture

Forest Service
R10-MB-603c

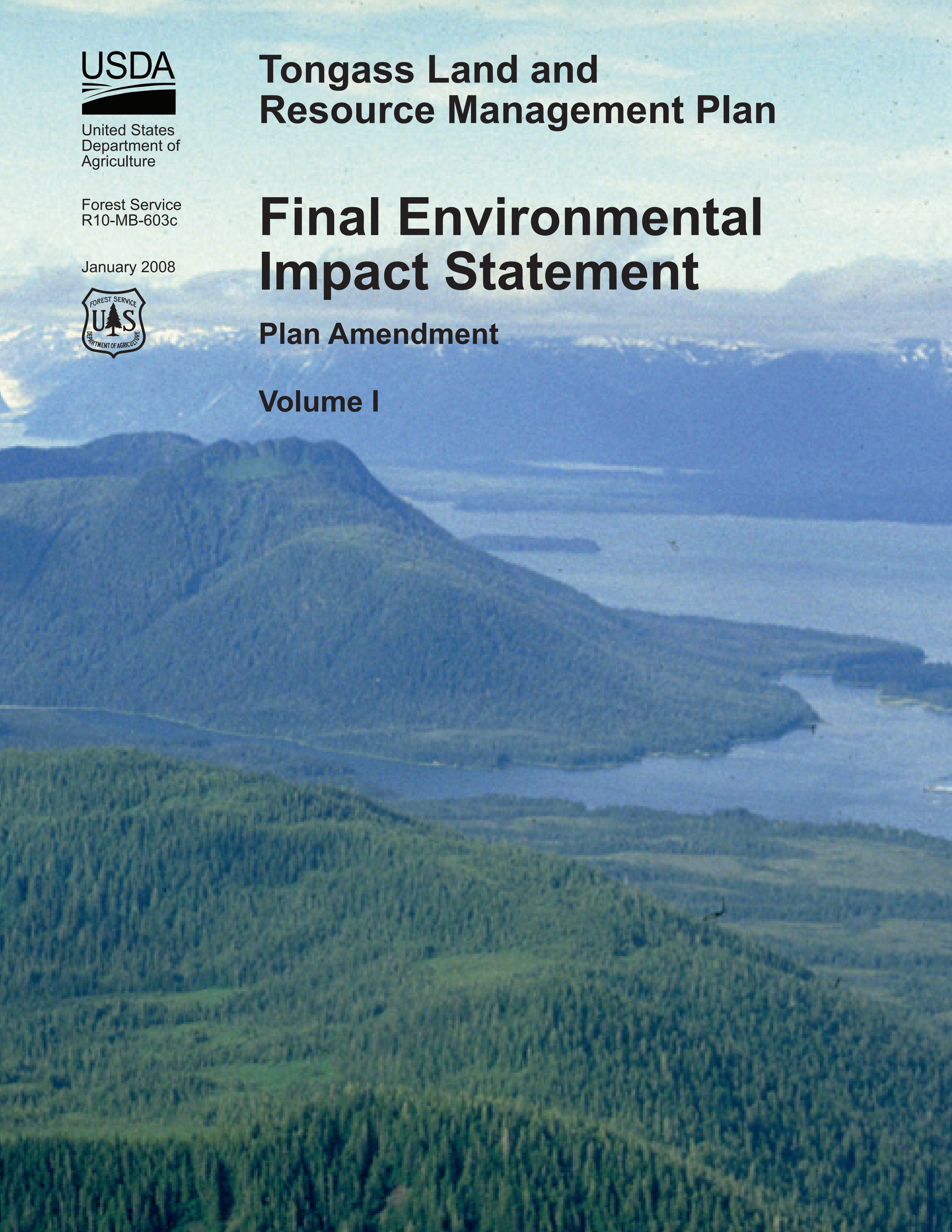
January 2008

Tongass Land and Resource Management Plan

Final Environmental Impact Statement

Plan Amendment

Volume I



Tongass Land Management Plan Amendment

Final Environmental Impact Statement

January 2008

Lead Agency: USDA Forest Service

Cooperating Agency: State of Alaska

Responsible Official: Dennis E. Bschor, Regional Forester
USDA Forest Service, Alaska Region

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Abstract:

A Ninth Circuit Court ruling (2005) and the 5-Year Forest Plan Review (completed in January 2005) indicated the need to consider amending the Tongass National Forest Land and Resource Management Plan. This Final EIS responds to the Court and the 5-Year Review by analyzing seven alternatives for amending the Plan, including the No-Action alternative. Maps accompanying this Final EIS depict the land use designations proposed under each alternative. A separate document, called the Proposed Land and Resource Management Plan (Forest Plan), was published with the Draft EIS and was revised, as indicated in Chapter 2 of this Final EIS, to represent the Final Proposed Forest Plan. The action alternatives incorporate this Final Proposed Plan entirely, or with modifications. A number of issues are addressed, but three key issues are identified: 1) protecting high-value roadless areas from road development and timber harvest activity in order to protect roadless area values; 2) providing a sufficient timber supply to meet the market demand and help maintain a vibrant economy in Southeast Alaska; and 3) protecting the wildlife habitat and biodiversity of the Tongass, which is affected by road development and timber harvest activities. The seven alternatives are designed to provide a range of options for addressing these issues. Direct, indirect, and cumulative effects of the alternatives are quantified and compared in Chapters 2 and 3, based on inventory data and modeling.

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ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
ACMP	Alaska Coastal Management Program
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AFHA	Anadromous Fisheries Habitat Assessment
AHRS	Alaska Heritage Resource Survey
AKEPIC	Alaska Exotic Plants Information Clearinghouse
AMHS	Alaska Marine Highway System
AMS	Analysis of the Management Situation
ANCSA	Alaska Native Claims Settlement Act of 1971
ANHP	Alaska Natural Heritage Program
ANILCA	Alaska National Interest Lands Conservation Act of 1980
APC	Alaska Pulp Company
ASQ	allowable sale quantity
AVSP	Alaska Visitor Statistics Program
BIA	U.S. Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	Best Management Practice
BP	before present
BTU	British Thermal Unit
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMAI	Culmination of Mean Annual Increment
Corps	U.S. Army Corps of Engineers
DBH	diameter at breast height
DCBD	Division of Community and Business Development
DCED	Department of Community and Economic Development
DEIS	Draft Environmental Impact Statement
DGC	Division of Governmental Coordination
DOL	Department of Labor
DOT&PF	Department of Transportation and Public Facilities
EA	environmental assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EVC	existing visual condition
°F	degrees Fahrenheit
FCRPA	Federal Cave Resources Protection Act
FERC	Federal Energy Regulatory Commission
FG	foreground
F.I.R.E.	finance, insurance, and real estate
FORPlan	Previous Forest Planning Model

FRESH	Forest Resource Evaluation System for Habitat
FSM	Forest Service Manual
FY	fiscal year
GIS	geographic information system
GMU	Game Management Unit
GSA	General Services Administration
HCA	Habitat Conservation Area
HSI	Habitat Suitability Index
IDT	Interdisciplinary Team
IFA	Inter-Island Ferry Authority
IPM	Integrated Pest Management
IRA	Inventoried Roadless Area
km	kilometer
KMDA	known mineral deposit area
KPC	Ketchikan Pulp Company
kV	kilovolt
LSTA	Logging Systems and Transportation Analysis
LTF	log transfer facility
LTSY	long-term sustained yield
LUD	Land Use Designation
LWD	large woody debris
MG	middleground
MM LUD	Minerals Land Use Designation
MBF	thousand board feet
MDP	mineral development potential
MEP	mineral exploration potential
MIRF	Model Implementation Reduction Factor
MIS	Management Indicator Species
MMBF	million board feet
MOU	Memorandum of Understanding
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act of 1976
NHPA	National Historic Preservation Act
NIC	non-interchangeable component
NMFS	National Marine Fisheries Service
NFS	National Forest System
NPS	National Park Service
NRDC	Natural Resources Defense Council
NVCS	National Vegetation Classification Standard
NVUM	National Visitor Use Monitoring
NWI	National Wetland Inventory
OGR	old-growth reserve
OHV	off-highway vehicle
ORV	off-road vehicle
P	Primitive

PAOT	persons at one time
PNV	Present Net Value
POG	productive old growth
POW	Prince of Wales
PPI	Producer Price Index
ppm	parts per million
R	Rural
RARE	Roadless Area Review and Evaluation
RM	Roaded Modified
RN	Roaded Natural
RNA	Research Natural Area
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
RPA	Resources Planning Act of 1974
RVD	Recreation Visitor Day
SATP	Southeast Alaska Transportation Plan
SDEIS	Supplemental Draft Environmental Impact Statement
SEACC	Southeast Alaska Conservation Council
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
SIO	Scenic Integrity Objective
SPM	Semi-Primitive Motorized
SPNM	Semi-Primitive Non-Motorized
TES	threatened, endangered, and sensitive
TRUCS	Tongass Resource Use Cooperative Survey
TTRA	Tongass Timber Reform Act of 1990
U	Urban
USGCRP	U.S. Global Change Research Program
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VCU	Value Comparison Unit
VQO	Visual Quality Objective
WAA	Wildlife Analysis Area
WARS	Wilderness Attribute Rating System
WTP	willingness to pay

Contents

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CHAPTER 1
PURPOSE AND NEED

Purpose and Need

Introduction

Forest land and resource management planning is a process for developing, amending, and revising land and resource management plans for each of the National Forests in the National Forest System (NFS). Forest plans are required by the National Forest Management Act of 1976 (NFMA). The 16.8-million-acre Tongass National Forest was the first forest to complete a Land and Resource Management Plan (Forest Plan or Plan) under the NFMA in 1979. The original Forest Plan was amended in 1986 and 1991 and revised in 1997. A Supplemental Environmental Impact Statement (SEIS) was completed in 2003, which further evaluated roadless areas for their wilderness potential. The revised Plan has been amended 24 times since 1997, primarily to adjust Old-Growth Habitat Reserve boundaries and for electronic/communication site designation.

A recent Ninth Circuit Court ruling (2005) and the 5-Year Plan Review (completed in January 2005) indicated the need to amend the current Tongass National Forest Land and Resource Management Plan. This Final EIS responds to the Court and the 5-Year Review by thoroughly analyzing six alternatives for amending the Plan in addition to the No-Action Alternative (Alternative 5). The analysis is being published in two volumes: the first volume contains the main EIS, and the second volume contains the appendices to the EIS. A separate document titled Land and Resource Management Plan (Forest Plan or Plan) is also being published and represents the complete Forest Plan including all amendments. This document represents the Forest Plan that is used in all alternatives, except for differences that are outlined in Chapter 2. Finally, the Record of Decision (ROD), describing the decision and rationale for that decision, is also being published.

This EIS analyzes a possible amendment to the current Forest Plan and is tiered to the 1997 Tongass Land Management Plan Revision EIS and the 2003 Supplemental EIS for Roadless Area Evaluation for Wilderness Recommendations.

Forest Planning History on the Tongass National Forest

NFMA, passed in 1976, required each national forest to develop a land and resource management plan and revise its plan every 10 to 15 years. The Tongass became the first forest to complete a Forest Plan under NFMA in April 1979. The Alaska National Interest Lands Conservation Act (ANILCA) passed December 2, 1980. The 1979 Forest Plan was amended in 1986, reflecting changes mandated by ANILCA. The Forest Plan revision process began in 1987 and a Draft EIS was published in June 1990. In November 1990, the Tongass Timber Reform Act (TTRA) was passed. The Forest Plan was amended in February 1991 to incorporate the TTRA changes. The Forest Plan Revision process continued with a Supplement to the Draft EIS published in September 1991, which incorporated all changes required by TTRA and evaluated a new set of alternatives. Because Congress had just acted on the wilderness issue following completion of the June 1990 Draft EIS, the Forest Service did not reconsider roadless areas for potential wilderness recommendation. The Forest Service prepared a Final EIS in the fall of 1992, but did not publish an associated Record of Decision (ROD). The Regional Forester found there was new information that should be collected to respond to 36 CFR 219.19. That process led to the 1997 Final EIS and the Forest Plan Revision ROD (1997 ROD).

The 1997 Forest Plan was the subject of 33 separate appeals by organizations and individuals. In 1999, the Under Secretary of Agriculture affirmed the Regional Forester's decision regarding all 33 appeals, based on the 1997 Tongass Forest Plan Revision Final EIS and planning record. The Under Secretary also issued a new ROD (1999 ROD) for the 1997 Tongass Land Management Plan Revision.

1 Purpose and Need

Two lawsuits challenged the 1997 and 1999 RODs in the U.S. District Court for the District of Alaska. The Alaska Forest Association and some Southeast Alaska communities challenged many aspects of the 1997 Plan and the process by which the 1999 ROD was issued. The Sierra Club and other environmental groups challenged the lack of wilderness area consideration and potential recommendations in the 1997 Plan Revision, FEIS and ROD. The Court issued a single opinion for both cases in March 2001.

In the Alaska Forest Association case *(Alaska Forest Ass'n v. United States Dep't of Agric.* No. J99-0013 CV [JKS] [D. Alaska]), the U.S. District Court upheld the 1997 ROD against all challenges, but held that the 1999 ROD was not properly adopted. The Court vacated the 1999 ROD and enjoined the Forest Service from implementation. The Court further directed the Forest Service to prepare an SEIS addressing the changes from the 1997 Tongass Forest Plan. Because of the extensive public involvement and scientific review in the 1997 ROD, and its thorough policy and legal review of the administrative appeal process and by the District Court, the Forest Service did not propose changes to the 1997 ROD similar to those enjoined by the District Court.

In the Sierra Club challenge of the 1997 Tongass Forest Plan Revision FEIS (*Sierra Club v. Lyons*, No. J00-0009 CV [JKS] [D. Alaska]), the Ninth Circuit Court found the 1997 Tongass Forest Plan should have considered making wilderness recommendations in the Final EIS. The Court ordered the Forest Service to prepare an SEIS evaluating wilderness recommendations for roadless areas on the Tongass and provide the relative contribution to the National Wilderness Preservation System in its Analysis of the Management Situation. The Forest Service issued a Final SEIS and ROD for Roadless Area Evaluation for Wilderness Recommendations in February 2003.

The Natural Resources Defense Council (NRDC) filed a lawsuit (referred to as NRDC I) in the U.S. District Court of Alaska in December 2003 challenging the 1997 Forest Plan and six timber sales. In January they filed a separate lawsuit on a seventh timber sale (referred to as NRDC II) and another lawsuit challenging an eighth sale in March 2004 (referred to as NRDC III). The District Court upheld the 1997 Forest Plan and related National Environmental Policy Act (NEPA) documents on all claims in September 2004. NRDC appealed this ruling to the Ninth Circuit Court of Appeals. The Ninth Circuit Court issued a ruling on NRDC I and NRDC II in August 2005. It found inadequacies primarily relating to the NEPA process for the 1997 Forest Plan. These inadequacies dealt with the timber demand estimates, the range of alternatives related to timber demand, and the cumulative effects analysis related to activities on non-NFS lands. While this process was taking place, the Forest completed a 5-Year Review of the Forest Plan. This review identified a number of items that could lead to adjustments to the Plan.

Purpose and Need

The purpose and need for this EIS is to respond to the Ninth Circuit Court's decision in *Natural Resources Defense Council vs. U.S. Forest Service* (421 F.3d 797, August 5, 2005). In that decision, the Court held that the EIS and ROD for the Forest Plan adopted in 1997 had errors relating to the use of projected market demand for timber, the range of alternatives considered relative to the market demand calculations, and the cumulative effects of activities on non-NFS lands. In addition, there is a need to consider adjustments to the Plan based on information generated during the recent 5-Year Review of the Forest Plan. Therefore, the purpose and need for this EIS primarily relates to the August 2005 Court decision, the 5-Year Plan Review, and other minor clarifications and updates.

Forest Location and Description

The 16.8-million-acre Tongass National Forest (Tongass or Forest) occupies about 7 percent of the area of Alaska. The Tongass is located in the southeastern portion of the state (the area commonly called the panhandle of Alaska or Southeast Alaska) and extends from Dixon Entrance in the south to Yakutat Bay in the north, and is bordered on the east by Canada and on the west by the Gulf of Alaska. The Tongass extends approximately 500 miles north to south and approximately 120 miles east to west at its widest point. Figure 1-1 is a vicinity map of the Forest.

The Tongass includes a narrow mainland strip of steep, rugged mountains and icefields and more than 1,000 offshore islands known as the Alexander Archipelago. Together, the islands and mainland have nearly 11,000 miles of meandering shoreline, with numerous bays and coves. A system of seaways separates the many islands and provides a protected waterway called the Inside Passage. Federal lands comprise about 95 percent of Southeast Alaska, with about 80 percent in the Tongass National Forest and most of the rest in Glacier Bay National Park and Preserve. The remaining land is held in state, Native corporations, and other private ownerships.

Most of the area of the Tongass is wild and undeveloped. Approximately 73,000 people inhabit Southeast Alaska, primarily in 32 communities located on islands or mainland coastal areas. Only eight of the communities have populations greater than 1,000 persons. Most of these communities are surrounded by, or adjacent to, NFS land. Only three communities are connected to other parts of the mainland by road: Haines and Skagway in the north, and Hyder in the southeast.

The economies of Southeast Alaska's communities rely on the Tongass National Forest to provide natural resources for uses such as fishing, timber harvesting, recreation, tourism, mining, and subsistence. Maintaining the abundant natural resources of the Forest, while providing opportunities for their use, is a major concern of Southeast Alaska residents.

Ranger District offices on the Tongass National Forest are located in Yakutat, Juneau, Hoonah, Sitka, Petersburg, Wrangell, Thorne Bay, Craig, and Ketchikan. There are also two National Monuments, Admiralty Island with an office in Juneau and Misty Fiords with an office in Ketchikan (Figure 1-1).

Public Issues

Identification of issues helps define or predict the resources or uses that could be most affected by the management of NFS lands. These issues are used as a basis to formulate management alternatives or to measure differences between alternatives.

Ten public issues were originally identified in 1988 for the Forest Plan Revision. These original issues included scenic quality, recreation, fish habitat, wildlife habitat, subsistence, timber harvest, roads, minerals, roadless areas, and local economy. The 1991 Forest Plan Revision Supplemental Draft EIS (SDEIS) added an additional concern, identifying and considering for recommendation potential wild, scenic, and recreational rivers.

After the release of the 1991 SDEIS, considerable new information pertaining to the Tongass Forest Plan Revision became available. Out of this information emerged five additional issues, determined by the Regional Forester to need more study and evaluation before a final revised Forest Plan could be adopted. Some of these issues were aspects or extensions of the ten public issues previously considered; others were new as issues or had not been considered as issues in themselves. The five issues were wildlife viability, fish habitat, karst and caves, alternatives to clearcutting, and socioeconomic considerations. These issues were assessed in the 1996 Revised SDEIS and the 1997 Tongass Forest Plan Revision Final EIS.

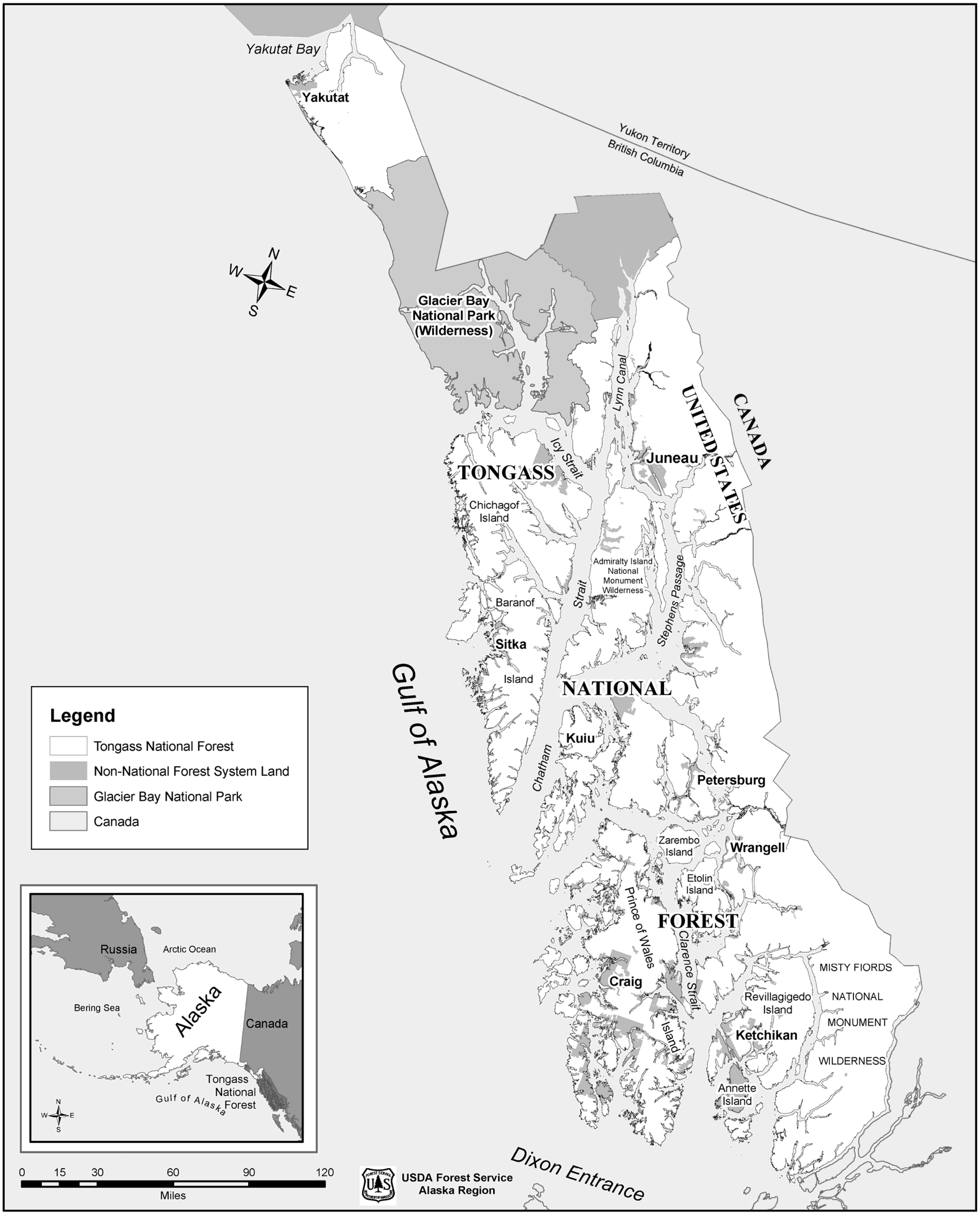


Figure 1-1.
Tongass National Forest Vicinity Map

The 2003 SEIS reviewed and evaluated roadless areas and analyzed alternative groupings of roadless areas for wilderness recommendations. Two broad issue categories, referred to as key issues, were identified as the major issues driving the alternatives of the SEIS analysis. They included 1) the long-term protection of roadless areas and associated values, and 2) the social and economic well-being of the communities of Southeast Alaska.

Public Input

The scope of <u>this</u> EIS was initially determined by the Court in its 2005 ruling, and by the 5-Year Review of the Forest Plan. Additional information was considered to help clearly define the issues and for use in the development and analysis of alternatives. For this Final EIS, comments and information from a wide variety of public input that related to amending the Forest Plan were considered. This information included the following:

- Public comments generated during the 1997 Tongass Forest Plan Revision process;
- Tongass Forest Plan Revision appeals;
- Public input specific to the Tongass National Forest on the Forest Service's 2001 National Roadless Area Conservation Rule;
- Public comments generated relative to the 2003 Supplemental EIS;
- Public input expressed during project-level NEPA analyses over the past 10 years or so; and
- Public input received in response to the Notice of Intent and the Web site for this EIS.

The planning record of the Tongass includes public input encompassing most of the last 2 decades. Of special note are the extensive public meetings held in Southeast Alaska for the 1997 Forest Plan Revision, the 2001 National Roadless Area Conservation Rule, and the 2003 SEIS.

In addition to the above, public involvement has occurred during the development of this EIS. Public involvement activities that have taken place during this time frame include the following:

- The Notice of Intent was published in the Federal Register in March 2006.
- A Forest Plan Adjustment Web site was developed in January 2006 and has been maintained to inform and engage the public since then. It is updated as new information is developed or published and provides a mechanism for public input. Several hundred comments and questions were received through the Web site or via emails associated with the Web site in the first few months of operation.
- A Weblog regarding the Forest Plan adjustment effort was established in July 2006 and was continually maintained as another method of public communication.
- In response to the above items, a number of letters were received containing comments regarding the issues and alternatives. These included letters from environmental organizations, the timber industry, Southeast Alaska community organizations, and a number of individuals from Southeast Alaska and across the nation.

- Government-to-government consultation has been conducted throughout the process, and is ongoing, with federally recognized Tribes.
- A number of group-specific meetings have also occurred with various organizations (including Alaska Native groups).
- A variety of news releases were issued relative to the Forest Plan adjustment throughout the process.
- A series of ongoing meetings, hosted by the National Forest Foundation and The Nature Conservancy, known as the Tongass Futures Roundtable, have resulted in considerable discussion of Tongass management issues among a broad spectrum of individuals and groups interested in the future of Southeast Alaska since May 2006.
- The input received prior to issuance of the Draft EIS was reviewed and a summary of this synthesis is presented as Appendix A (Issue Identification) to the Final EIS.
- A Draft EIS and Proposed Forest Plan were released on January 12, 2007. This began a 90-day comment period, which was later extended to 108 days. The comment period closed on April 30, 2007.
- During the comment period, open houses and public hearings were held in 24 Alaska communities. In addition to comments on the Draft EIS, the hearings provided opportunity to hear concerns related to subsistence and Alaska Native issues.
- On March 22, 2007, an open house and public hearing was held on the internet, to solicit public comment in an open forum from individuals living anywhere in the world.
- Over 84,000 comment documents were received, including individual letters, form letters, emails, hearing testimony, and comments submitted directly via the Forest Plan Adjustment Web site. Slightly more than 2,000 of these were classified as individual comment documents and the others were classified as form letters and emails. The individual comment documents were subdivided into approximately 5,500 individual comments. Responses were received from all 50 states and 89 foreign countries. A summary of the substantive comments and Forest Service responses to those comments can be found in Appendix H.

The Three Focus Issues

Key Issues

Any alternative that proposes to change the Forest Plan could affect resources and/or outputs relative to the current Forest Plan. Therefore, Chapter 3 of the EIS shows the effects of the various alternatives on all relevant resources and evaluates their effects relative to all of the issues and concerns previously identified during the 1997 plan revision process. However, based on the purpose and need of this EIS and the public input received during the current EIS process, some issues are more likely to influence the comparison among alternatives and represent the major issues to be evaluated. These issues were grouped into three broad issue categories, referred to as the key issues. These key issues are the major issues driving the alternatives and analyses.

Key Issue 1 – Protection of high value roadless areas from road development and timber harvest activity on the Tongass National Forest is of local and national importance, particularly for wildlife and biodiversity, recreation, and tourism.

Many people believe roadless areas should be allowed to evolve naturally through their own dynamic processes and should be afforded protection that ensures this will occur. The Tongass includes very large undeveloped land areas with several portions of the Forest consisting of contiguous roadless areas that exceed 1 million acres and represent large, unfragmented blocks of wildlife habitat. This large scale of roadless lands does not exist on any other National Forest, except the Chugach National Forest in Southcentral Alaska.

Roadless areas are considered important because of their wildlife habitat and recreation values and their importance for tourism. They are also important because of the passive-use and ecosystem services values they provide.

Passive-use values represent values that individuals assign to a resource independent of their use of that resource. Typically this includes existence, option, and bequest values, and represents the value individuals obtain from knowing that expansive roadless areas exist, knowing that they are available to visit in the future should they choose to do so, and knowing that they are available for future generations to inherit. There is interest in preserving large portions of the Tongass because so much of it is in a natural condition, unlike most other national forests, and because the Forest represents a significant portion of the world's remaining temperate rainforests.

Ecosystem services represent the services provided to society by healthy ecosystems. These services and benefits include what some consider to be long-term life support benefits to society as a whole. Examples of ecosystem services include watershed services, soil stabilization and erosion control, improved air quality, climate regulation and carbon sequestration, and biological diversity.

Indicators: Analysis relative to this issue compares the amount and proportion of land protected in non-development Land Use Designations (LUDs); the amount of inventoried roadless areas that would be protected under each alternative; and the amount of productive old-growth forest that would be protected under each alternative. Also, the values of the lands protected are considered. Non-use or passive-use values are discussed qualitatively and with examples provided from other studies.

Key Issue 2 – The Tongass National Forest needs to seek to provide a sufficient timber supply to meet the market demand and help maintain a vibrant economy in Southeast Alaska.

TTRA (Section 101) requires the Forest Service to seek to provide a supply of timber from the Tongass National Forest that meets the annual market demand and the market demand for each planning cycle, consistent with providing for the multiple-use and sustained yield of all renewable resources. With the cancellation of long-term timber contracts and the closure of two Southeast Alaska pulp mills in the 1990s (discussed in detail in Chapter 3 Environment and Effects), current demand for Alaska's National Forest timber depends on markets for sawn wood and the option of exporting manufacturing residues and lower grade logs. Future or planning cycle demand scenarios cover a wide range of issues and depend on rates of economic growth in key markets, conditions faced by competitors, and the rate of investment and innovation in Alaskan manufacturing.

Over the past half a century, the timber industry has been a major component of the economy of Southeast Alaska. However, with the closure of two Southeast Alaska pulp mills and the growth of tourism, timber has played a lesser role. Because the economy of Southeast Alaska is based on relatively few industries, maintaining an active timber industry is important for maintaining a well-diversified economy.

Indicators: Analysis relative to this issue compares the likely demand for timber based on capacity of the local industry and the amount of harvest made available to meet that demand. It also considers the type of wood (sawlogs and utility wood) made available and the usefulness of that wood type to the local industry, as well as the amount of timber that would be available from state and private sources. Finally, it considers the effects on the regional and national economies and the effects on the local communities.

Key Issue 3 – Protection of the wildlife habitat and biodiversity of the Tongass National Forest is of local and national significance and is affected by road development and timber harvest activities.

The Tongass National Forest supports a unique and important assemblage of wildlife including the largest population of brown bears and breeding bald eagles in the world, species of high importance for subsistence (e.g., Sitka black-tailed deer), an extensive array of endemic mammals and other species, and a large number of species that are at least partially dependent on old-growth habitats (e.g., marten and goshawk). Populations of many of these species and the biodiversity of Southeast Alaska are affected by timber harvest and the development of roads.

Although less than 10 percent of the productive old-growth habitat on the Tongass has been converted to young growth, the percentage is much higher for certain types of old growth, such as lowland and large-tree old growth. In addition, a high percentage of non-NFS lands have been harvested at a much higher rate. Therefore, the cumulative effects of harvest and road building on wildlife in Southeast Alaska are greater than the effects for the Tongass by itself.

Indicators: Analysis relative to this issue compares the amount of productive old-growth forest that would be protected under each alternative, as well as the percentages of biogeographic provinces that would be protected in reserves. It also considers the role of the managed lands (development LUDs) in providing wildlife habitat. It rates the alternatives in terms of the expert panel ratings conducted for the 1997 Forest Plan Revision EIS. Habitat changes, as documented by habitat amounts, changes in road densities, and habitat models are also used as indicators. Finally, cumulative harvest and road development on non-NFS lands is quantified and evaluated in conjunction with harvest and road development on NFS lands.

Changes between the Draft EIS and Final EIS

A number of updates and changes were made in the Final EIS in response to new information and to comments received on the Draft EIS. The main areas of change are described below:

1. Refinements were made to base Geographic Information System (GIS) coverages such as ownership, past harvest, roads, and LUDs to reflect updates due to changes in the existing condition and refinement of inventory data.
2. Because of refinements made to the base GIS coverages, the acreages and mileages associated with the existing condition and the alternatives changed, in many cases, and were updated throughout the document. Sometimes analysis methods were also refined, which resulted in changes to the quantification of effects.

3. Expanded discussion and analysis and incorporation of additional scientific references and studies were included in many sections of the Final EIS. This expanded discussion and analysis included elaboration on the risk and scientific uncertainty associated with issues.
4. The *Biodiversity* section of Chapter 3 was expanded to more fully address issues related to disproportionate past harvest, harvest on non-NFS lands and related cumulative effects, and effects on intact watersheds.
5. Alternative 1 was modified in response to comments on the Draft EIS. It now has a significantly smaller timber management land base, and excludes all inventoried roadless areas and many higher value roaded areas from commercial timber management. Examples include areas such as all of Kuiu, Baranof, and Kruzof Islands, much of Chichagof Islands, and all mainland areas.
6. Alternative 7 was modified in response to comments on the Draft EIS. It now deletes the requirement for buffers on Class III streams.
7. Further refinements and changes to the proposed Forest Plan were developed between the Draft EIS and Final EIS.
8. Appendix B was substantially updated and additional information on modeling and analysis techniques was added.
9. Appendix C was substantially revised based on updated and new information on the likelihood of various land adjustments.
10. A new Appendix D was developed, which presents background, rationale, assumptions, and additional analyses related to the old-growth conservation strategy, Wildlife Standards and Guidelines, and wildlife viability analyses as they relate to the Final EIS alternatives.
11. Although extensive mapping, quantification, and analysis of past harvest on non-NFS lands was completed for the Draft EIS, a more extensive analysis of past old-growth harvest, including the past disproportionate harvest of several categories of old growth, and the effects of this harvest, was completed and documented in the Final EIS, primarily in the *Biodiversity* section of Chapter 3;,a catalogue of past harvest is presented in Appendix E.
12. The Biological Assessment for threatened and endangered species that was originally developed for the 1997 Forest Plan Revision was updated and refined and included as Appendix F.
13. Appendix G was developed to summarize new information on timber demand and supply on the Tongass National Forest.
14. A new Appendix H was developed, which summarizes the comments received on the Draft EIS and the Forest Service responses to these comments. Copies of the letters received from agencies and elected officials, including tribal governments, are also included..

Organization of the Document

This Final EIS is organized into several chapters and a number of appendices. Chapter 1, "Purpose and Need," describes the reasons for proposing and completing a plan amendment. Chapter 2, "Alternatives," describes the process used to develop alternatives, explains the components of a Forest Plan, discusses alternatives not considered in detail, and describes the No-Action Alternative and Proposed Action Alternative as well as five other alternatives. Maps of the proposed LUDs under each alternative are also displayed in Chapter 2. Finally, a comparison of these alternatives based on the issues and significant environmental effects is presented.

The discussions of the “Affected Environment” and the “Environmental Consequences” are combined in Chapter 3, “Environment and Effects.” This is done so the environmental consequences (effects) of the alternatives on forest resources, and the background information needed to understand these consequences, are discussed together for each resource. The focus is on significant effects, with the analysis centered on the public issues. Chapter 3 also begins with a general description of the Tongass National Forest.

The Final EIS also includes a list of preparers; a list of agencies, organizations, and persons receiving copies of the document; a bibliography; a glossary; and an index (Chapters 4 through 8). Appendices to the Final EIS are contained in a separate volume (Final EIS Volume II). They provide more background on planning actions, certain resources and analyses, modeling and analysis techniques, a catalogue of past harvest, and a summary of the comments on the Draft EIS with Forest Service responses (Appendix H).

In addition to the two Final EIS volumes, three separate documents are associated with the Final EIS. First, a separate Summary booklet is included within the CD case. Second, the Record of Decision (ROD), which discloses the decision and its rationale, is published along with the Final EIS. Third, the Forest Plan, which includes goals and objectives, the management prescriptions for each LUD, Forest-wide standards and guidelines, plan implementation direction, a monitoring and evaluation plan, and related appendices, accompanies the ROD. In addition, a map packet includes color maps of the LUDs for each alternative and a ROD map that displays the LUDs associated with the decision.

The CD version of the Final EIS, Forest Plan, and ROD includes all of the documents described above, plus additional maps. As noted above, a Summary booklet is included in the CD case. Additional information, maps, and reference documents used in the Tongass Forest Plan Amendment process are contained in the planning record. Many of these documents and records are also available on the Forest Plan Adjustment Web site (http://tongass-fpadjust.net/). These can also be accessed through the main Tongass Web site (www.fs.fed.us/r10/tongass). The planning record in its entirety is incorporated here by reference.

CHAPTER 2
ALTERNATIVES

Alternatives

Introduction

Chapter 2 is divided into four parts:

1. A discussion of how alternatives were developed and of what constitutes an alternative;
2. A discussion of alternatives considered but eliminated from detailed study;
3. A full description of the alternatives that are considered in detail; and
4. A comparison of the alternatives considered in detail.

A color map for each of the seven alternatives considered in detail is included in the *Map Section* of the CD version of the EIS and in the *Map Packet* accompanying the hard copy version. These maps are also available on the EIS Web site at www.tongass-fpadjust.net. Each alternative map shows the locations of the Land Use Designations (LUDs) for that alternative.

Alternative Development Process

What a Forest Plan Includes

Land management planning may be compared to city, county, or borough zoning. Just as areas in a community are zoned as commercial (allowing business uses), industrial (allowing factories), or residential (allowing only homes, schools, etc.), the forest is also zoned to allow, or not allow, various uses and activities. Land management (forest plan) zoning is done through the use of LUDs. This Forest Plan only applies to federal lands within the Tongass National Forest.

Land Use Designations specify ways of managing an area of land and the resources it contains. LUDs may emphasize certain resources (such as remote recreation or old-growth wildlife habitat) or combinations of resources (such as providing for scenic quality in combination with timber harvesting). Each LUD has a detailed management prescription, which includes standards and guidelines.

Prescriptions are specific actions or treatments used in the management of forest resources, such as two-age timber harvest methods. Each management prescription specifies what is allowed to be considered for site-specific project proposals, and under what conditions. *Standards and guidelines* impose limitations on how, where, and when management activities are carried out, usually for specific resource protection purposes. Management prescriptions and standards and guidelines only apply to federal lands.

LUDs are assigned, or allocated, to specified areas of land. Under any one alternative, a given area of land will generally have only one LUD assigned to it; however, the Minerals and Transportation and Utility Systems LUDs are overlay LUDs and can apply to a given piece of ground when and if minerals or transportation/utility systems are to be developed on that piece of ground. In some other cases, two LUDs may apply to the same area, such as a Wild River within a Wilderness. In these cases, the more restrictive direction always applies. Some LUDs, such as Wilderness and LUD II, are congressionally designated and represent permanent allocations.

Forest resource use opportunities, such as timber harvesting or recreation, can be made available in different amounts. What lands to make available for timber harvest or how much of a particular kind of recreation opportunity to provide are questions that land management planning must also address. It is not always possible to provide all resource use opportunities in the amounts desired by everyone. The National Forest Management Act mandates the Forest Service to provide for multiple use and the sustained yield of the products and services obtained from the Forest.

The alternatives themselves are usually designed around a "framework" that establishes how much emphasis is placed on each of the key issues or other issues. The EIS alternatives are directly related to the issues described in Chapter 1. How alternatives were developed to address the issues is discussed below. The *Comparison of Alternatives* section at the end of this chapter also discusses ways in which the alternatives address the issues.

How Alternatives are Described

Each alternative for this EIS is presented in the same format. This includes the following components:

- **Framework.** The basis for alternative design.
- **Desired Condition.** A general description of the ecological, physical, and economic/social conditions that are expected in the future under each alternative framework.
- **Land Use Designations.** The acreages allocated to each Land Use Designation.
- **Standards and Guidelines and Management Prescriptions.** What changes to the existing Forest-wide standards and guidelines and management prescriptions are proposed?
- **Selected Outputs and Measure.** A summary of predicted outputs and measures associated with each alternative.

Land Use Designations

The alternatives are constructed using the LUD allocations defined in the 1997 Tongass Forest Plan as the base. This base represents the current Tongass Forest Plan and consists of Alternative 11 in the 1997 Tongass Forest Plan Revision Final EIS, adjusted by the 1997 Record of Decision (ROD) and subsequent non-significant Forest Plan Amendments made for projects since 1997.

The LUD allocations of the current Tongass Forest Plan define the No-Action Alternative (Alternative 5). The LUD allocations for the Proposed Action alternative (Alternative 6) are very similar to the No Action, but incorporate some adjustments. The other five alternatives differ more substantially from the No Action and Proposed Action in terms of their LUD allocations.

The management prescriptions for each specific LUD under the No Action alternative are the same as under the current Forest Plan (see Chapter 3 of the current Forest Plan, USDA Forest Service 1997b). These management prescriptions are summarized below, following a discussion of current Forest Plan LUDs. The management prescriptions for the other alternatives incorporate very slight modifications; these modifications are fully described in the amended Forest Plan that accompanies this Final EIS, and are summarized in the alternative descriptions, along with the exceptions to the amended Forest Plan.

Wilderness and National Monument

- **Wilderness and Wilderness National Monument** – Manage for the protection and perpetuation of essentially natural biophysical and ecological conditions and provide outstanding opportunities for solitude, primitive recreation, and scientific and educational uses, consistent with ANILCA, the Wilderness Act, and TTRA. Roads are normally not permitted and use of mechanical transport and motorized equipment is limited.

- **Non-wilderness National Monument** – Manage the non-wilderness portions of Admiralty Island and Misty Fiords National Monuments to facilitate development of significant mineral resources and to ensure that mining activities are compatible, to the maximum extent feasible, with the purposes for which the Monuments were established.

Mostly Natural Setting

- **LUD II** – Manage these Congressionally designated areas in a roadless state to retain the wildland character. Wildlife and fish habitat improvement and primitive recreational facility development may be permitted. Timber harvesting is limited to insect and disease control. Roads will not be built except to serve mining and other authorized activities and vital Forest transportation and utility system linkages. (These areas are sometimes referred to as "legislated LUD II.")

- **Research Natural Area** – Manage forest resources for research and education and/or to maintain natural diversity. Current natural conditions are maintained where possible. No timber harvest is allowed.

- **Enacted Municipal Watershed** – Manage enacted municipal watersheds to meet State Water Quality Standards for domestic use. Timber harvest is limited to insect and disease control; however, timber may be removed under conditions that safeguard the quantity and quality of water. Roads are generally limited to those needed to administer the municipal watersheds.

- **Old-growth Habitat** – Maintain a diversity of old-growth conifer habitats in their natural condition to favor old-growth associated fish and wildlife species. No timber harvesting will be scheduled and roads will be located outside the area when possible.

- **Semi-remote Recreation** – Provide motorized and non-motorized recreation opportunities in natural and natural-appearing environments where interaction with others is low and the opportunity for independence and self-reliance is moderate to high. Allow occasional concentrated recreation and tourism facilities in a natural-appearing setting. When present, roads are few and used primarily to expand and improve access to recreation opportunities or to permit access to other parts of the Forest and other ownerships. Timber harvest is limited to salvage of catastrophic events or beach log recovery.

- **Remote Recreation** – Provide recreation opportunities and experiences outside Wilderness in unmodified natural environments where interaction with other visitors is infrequent, and the opportunity for independence and self-reliance is high. Timber harvesting is limited to insect and disease control. Roads are generally absent.

- **Special Interest Area** – Provide for the inventory, maintenance, protection, and interpretation of areas with unique archeological, historical, recreational, scenic, geological, botanical, zoological, or paleontological features. No timber harvest is scheduled. Roads are normally not permitted unless compatible with interpretive objectives.

- **Wild River** – Maintain and enhance the outstandingly remarkable values of river segments that qualify the river to be classified a Wild River and recommended in the 1997 Tongass Forest Plan ROD. Shorelines are primitive and undeveloped. Timber harvesting is limited to insect and disease control. Roads are generally not present. Access is by trail, airplane, or boat.

- **Scenic River** – Maintain and enhance the outstandingly remarkable values of river segments which qualify the river to be classified a Scenic River and recommended in the 1997 Tongass Forest Plan ROD. Shorelines are largely undeveloped but may be accessible in places by roads. Timber harvesting is limited by the ability of the landscape to visually absorb the activity. Roads are designed to be compatible with the landscape.

- **Recreational River** – Maintain and enhance the outstandingly remarkable values of river segments that qualify the river to be classified a Recreational River and recommended in the 1997 Tongass Forest Plan ROD. Shoreline development may occur and the river may be readily accessible by road. Timber harvesting is allowed with priority to maintain existing and proposed recreation sites within the corridor. Roads are permitted.

Moderate Development

- **Experimental Forest** – Manage to provide a variety of long-term opportunities for Forest research and demonstration areas. Timber harvesting will occur only for these purposes. Roads may be developed to facilitate ongoing research.

- **Scenic Viewshed** – Management activities are not visually apparent to the casual observer in the near distance from visual priority travel routes and use areas. In the middle to background distance, activities are subordinate to the landscape character of the area. Timber harvest is allowed and roads are permitted.

- **Modified Landscape** – Manage for a variety of uses. Management activities are subordinate to scenic quality as seen in the near distance. In the middle to background distance, activities may dominate but are designed to be compatible with features found in the characteristic landscape. Timber harvest is allowed and roads are permitted.

Intensive Development

- **Timber Production** – Manage the area to maintain and promote industrial wood production. These lands will be managed to advance conditions favorable for the timber resource and for long-term timber production. Roads are permitted.

Overlay LUDs

- **Minerals** – Encourage the exploration and development of mineral resources in areas having high potential for mineral commodities, including nationally designated strategic and critical minerals. Until mineral activities are initiated, the area will be managed according to the underlying LUD.

- **Transportation and Utility Systems** – Emphasize existing and potential state-identified major public transportation and utility systems. Until transportation or utility systems are constructed, the area will be managed according to the underlying LUD.

Development of Potential Alternatives

As indicated by the Ninth Circuit Court of Appeals, there is a need to evaluate a wide range of alternatives that relate to varying degrees of development of roadless lands, while at the same time providing a supply of timber that corresponds with the full range of timber demand scenarios. Therefore, the array of EIS alternatives was designed to address a full range of roadless development and timber supply/demand levels. Adjustments to the standards and guidelines of the Forest Plan were also incorporated into various alternatives to address clarifications and updates identified as needed in the 5-Year Review and by Forest Service staff.

Basic tools used in the development of the alternatives were the recent timber demand projections (Brackley et al. 2006), the existing inventory of roadless lands, and various sources of information regarding the qualities of the roadless lands. In addition, because of the rigorous level of scientific review that went into designing the current conservation strategy, strong consideration was given to maintaining its elements. Other alternative proposals considered during the 1997 Forest Plan Revision and the 2003 Supplemental EIS processes were given consideration.

A total of 49 alternatives were considered as part of the alternative development process. Of these, 42 alternatives were eliminated from detailed study and are discussed in the following section (*Alternatives Eliminated from Detailed Study*). The remaining seven alternatives are considered in detail in this EIS.

The set of alternatives that are analyzed in detail were designed to fully bracket the range of timber demand scenarios identified by Brackley et al. (2006). Equally important, they were designed to range from very limited development of inventoried roadless areas to more intensive development within roadless areas. This range is captured by the seven alternatives.

Brackley et al. (2006) described four timber demand scenarios: limited lumber production, expanded lumber production, medium integrated industry, and high integrated industry. The following table compares the projected demand for 2022 under these four scenarios with the Allowable Sale Quantity (ASQ) identified for the second decade of each of the alternatives considered in detail (ASQ is discussed in more detail below in the *Alternatives Considered in Detail* section).

Table 2-1
Projected Demand for 2022 under Brackley et al.'s Four Timber Demand Scenarios

Brackley et al. Demand Scenarios & Projected 2022 Demand[1] (MMBF)	Alternatives Considered in Detail & Second-Decade ASQ (MMBF)
	Alternative 1 – 49
Scenario 1 – 68	
	Alternative 2 – 152
Scenario 2 – 187	
	Alternative 3 – 203
Scenario 3 – 204	
	Alternative 5 – 267
	Alternative 6 – 267
Scenario 4 – 342	Alternative 4 – 342
	Alternative 7 – 421

[1] These figures include total volume that would need to be harvested to meet the demand projected by Brackley et al. 2006

Alternatives 1 through 4 were designed to correspond with Scenarios 1 through 4, respectively, while also responding to other concerns. The discrepancies between the second decade ASQs for Alternatives 1 and 2 and projected demand for 2022 under Scenarios 1 and 2 reflect these concerns.

The ASQ for Alternative 1 is 19 MMBF (28 percent) below the projected demand of Scenario 1. There are several reasons for this difference. First, the purpose of Alternative 1 is to depict the current situation, meaning annual timber harvest levels over the last few years of around 50 MMBF. In addition, Alternative 1 responds to the court's direction and public comments by scheduling no timber harvest in roadless areas, as discussed below. This alternative also responds to recommendations from the public to avoid harvest on Kuiu Island. The ASQ of Alternative 2 is 25 MMBF (19 percent) below the projected demand of Scenario 2. The purpose of Alternative 2 is to display an alternative that restricts development activities to lower value roadless areas. Alternative 3 differs from Scenario 3 by only 1 MMBF; Alternative 4 matches Scenario 4 exactly.

Alternatives Eliminated from Detailed Study

The Forest Plan revision process started in 1987 and resulted in the development of dozens of alternatives that were described in the Draft EIS (1990), Supplement to the Draft EIS (1991), Revised Supplement (1996), Final EIS (1997), and Supplemental EIS (2003). In addition, a 1992 draft version of the Final EIS included alternatives that became the basis of some 1996 Revised Supplement and 1997 Final EIS alternatives. Each of these alternatives was considered for detailed study and comparison in this EIS, in their original form or in a modified form. Altogether, 41 alternatives were considered for detailed study prior to the selection of the EIS alternatives—39 of these were based on previous alternatives and 2 were new ones. The 39 previous alternatives are summarized in Table 2-2.

These alternatives were considered in light of the key issues and the purpose and need. They ranged in allowable sale quantity (which is the maximum annual average amount of timber that can be sold from the suitable forest land base) from 0 to almost 700 MMBF per year. Development LUD acres in these alternatives ranged from a few hundred acres to almost 8 million acres and forest lands suitable for timber harvest ranged from 0 to over 2 million acres.

Five alternatives, which were largely based on previously developed alternatives, and two new alternatives were selected for detailed study. Therefore, 34 of the previously developed alternatives were considered, but eliminated from detailed study. The reasons for not selecting them were either that they were similar to and within the range of the selected alternatives, they were outside the range of timber demand estimates, or they would result in substantial changes to the current Forest Plan standards and guidelines that are not warranted based on the purpose and need or the key issues.

In addition to the 41 alternatives discussed above, 8 other alternatives were considered, but not evaluated in detail. Therefore, overall, 49 alternatives were considered and evaluated to varying degrees, with 7 of these being analyzed in detail and 42 being eliminated from further detailed study. The eight additional alternatives that were not analyzed in detail include three alternatives with timber volumes below the volume to be harvested under Alternative 1, one alternative described by The Nature Conservancy and Audubon Alaska, modified versions of Alternatives 4 and 7, an alternative proposed by the Southeast Conference, and a partial alternative proposed by the City and Borough of Yakutat. These eight alternatives are described in the following paragraphs.

Table 2-2
Tongass Forest Plan Alternatives Considered in Detail: 1990 – 2003

Alternative and Source		ASQ (MMBF annual)	Suitable lands (Acres X 1,000)	Non-Development LUDs (Acres X 1,000)	Development LUDs (Acres X 1,000)
1	1997	0	0	16,700	200
1	1996	0	74	16,700	200
6	2003	92	344	15,700	1,200
8	2003	96	351	15,700	1,200
5	1997	122	786	12,100	4,800
4	1997	130	845	11,700	5,200
5	1996	139	1,400	12,100	4,800
4	1996	145	1,507	11,700	5,200
7	2003	174	521	14,300	2,600
A	1990	181	536	13,600	3,300
5	2003	209	589	13,800	3,100
3	2003	236	620	13,500	3,400
3	1997	256	795	12,700	4,200
1	2003	259	664	13,200	3,700
2	2003	259	664	13,200	3,700
4	2003	259	664	13,200	3,700
11	1997	267	676	13,200	3,700
3	1996	278	1,188	12,600	4,300
E	1990	280	717	11,600	5,300
A	1991	298	1,173	13,700	3,200
10	1997	300	924	12,700	4,200
6	1997	309	1,024	12,100	4,800
B	1991	343	1,360	13,000	3,900
B	1990	354	1,101	12,900	4,000
6	1996	362	1,400	12,100	4,800
8	1996	364	1,389	10,500	6,400
F	1990	389	1,111	11,000	5,900
G	1990	390	1,112	11,000	5,900
P	1991	418	1,649	11,700	5,200
C	1990	450	1,200	10,500	6,400
C	1991	451	1,732	11,200	5,700
2	1997	463	1,180	11,700	5,200
D	1991	472	1,818	11,400	5,500
2	1996	489	1,526	11,700	5,200
9	1996	513	1,869	10,800	6,100
9	1997	549	1,390	10,800	6,100
D	1990	640	1,575	9,100	7,800
7	1997	640	1,575	9,100	7,800
7	1996	689	2,044	9,100	7,800

Sources: 1990 Draft EIS, 1991 Supplement to the Draft EIS, 1996 Revised Supplement to the Draft EIS, 1997 Final EIS, and 2003 Supplemental EIS.

Zero to Very Low Volume (ASQ) Alternatives

Consideration was initially given to evaluating zero to very low volume alternatives and recommendations were also made in Draft EIS comments that various zero to very low volume alternatives should be considered for detailed evaluation. As a result, a no-commercial harvest alternative was considered, an alternative with an ASQ at a stable level significantly below Alternative 1 was considered, and a declining volume alternative that started with an ASQ near the Alternative 1 level, but declined over time, was considered. Partially in response to these comments, the development land base of Alternative 1 was significantly reduced and the ASQ was slightly reduced between the Draft EIS and the Final EIS. As a result, even Alternative 1 would produce only 28 MMBF of NIC I sawlogs (the type that could be utilized by the existing sawmills) on an annual basis. This volume is equivalent to less than 15 percent of the estimated mill capacity of the four largest existing sawmills, 11 percent of the estimated active installed processing capacity of all existing Southeast Alaska mills, and only 7 percent of the total processing capacity of existing Southeast Alaska mills. In addition, the recent actual mill output level has been about 35 MMBF. Even Alternative 1 is considered to be a non-sustainable alternative for the existing timber industry because it does not meet these volume levels (see *Economic and Social Environment*, Regional and National Economy, in Chapter 3). Because the three additional alternatives under consideration, by definition, would produce a significantly lower volume than Alternative 1, they would clearly not be sustainable for even a portion of the existing timber industry.

The Tongass Timber Reform Act requires the Forest Service “to seek to meet the market demand.” Providing a timber volume that would meet neither the current estimated annual demand nor the recent actual mill output levels, and which would produce only a fraction of estimated existing mill capacities, would clearly not be consistent with TTRA and, therefore, is determined to not be a reasonable alternative. Alternative 1 provides an alternative “sideboard” at the low end of the timber volume range that is already in the “non-sustainable” category.

The Nature Conservancy/Audubon Alaska Alternative

A number of organizations suggested that they might generate a low-harvest alternative for consideration. The only low-harvest alternative that was described was one by The Nature Conservancy and Audubon Alaska in their Conservation Assessment for Southeast Alaska (Albert and Schoen 2007).

This alternative was defined based on modeling of relative ecological values and the ranking of relative suitability for timber production. It includes conservation priority watersheds, other watersheds to be managed for intact conditions, as well as timber production and integrated management watersheds. The EIS team determined that Alternatives 1, 2, and 3 captured the range defined by this alternative and they also represented alternatives that were similar to others that would be developed by other groups (e.g., they avoid the roadless areas and intact watersheds or different combinations of high-value roadless areas or intact watersheds).

Modified Alternatives 4 and 7

A modified version of Alternatives 4 and 7 were evaluated for consideration. The modification involved replacing portions of the development LUDs in these alternatives with the Old-Growth Habitat LUDs from Alternative 6. It was determined that the modified Alternative 4 did not produce significantly more timber volume than Alternatives 5 and 6 and the modified Alternative 7 was not substantially different than Alternative 4. Therefore, these modified alternatives were well within the range of the existing alternatives and it was decided they did not need to be analyzed in detail.

Southeast Conference Alternative

In its comments on the Draft EIS, the Southeast Conference (an association of municipalities, businesses, Native corporations and village councils, civic organizations, and individuals from Southeast Alaska) identified specific lands they believe should be allocated to the Timber Management LUD to allow for reestablishment of an integrated timber industry in Southeast Alaska. These lands were reviewed by the EIS team and it was determined that the vast majority of these lands (plus additional lands) were included as development LUDs in Alternative 7 and most of them were also included in several other alternatives. The lands that were not included were identified as Old-Growth Habitat, Special Interest Area, or Experimental Forest LUDs in most of the alternatives. It was determined that the current range of alternatives captured these lands and there was no need to develop a new alternative based on them.

City and Borough of Yakutat Alternative

In its comments on the Draft EIS, the City and Borough of Yakutat recommended a modification of Alternative 2 for the Yakutat Ranger District. This alternative involved reducing the development LUDs in the ranger district and changing them to Semi-Remote Recreation. Between the Draft EIS and the Final EIS the development LUDs of Alternative 1 in this ranger district were converted to Semi-Remote Recreation. Therefore, it was determined that the City and Borough of Yakutat recommendation was bracketed by the revised Alternative 1 and Alternative 2 in the Final EIS and, therefore, it was not necessary to add an additional alternative for this specific area.

Alternatives Considered in Detail

The following section defines terminology and presents information regarding several aspects of the alternatives. The alternatives considered in detail are presented afterward.

The Allowable Sale Quantity

The amount of timber that could be sold under a Forest Plan is expressed as an Allowable Sale Quantity (ASQ). The ASQ is the maximum amount of timber that may be sold from the area of suitable land contained under the Forest Plan within a given decade (although it is usually expressed in average annual terms). It is neither a targeted amount, nor is it a required amount. It is a ceiling. The amount of timber offered for sale in any year can exceed the annual average as long as the total decade's ASQ is not exceeded, and can also be anywhere below the annual average; the amount offered for sale over a decade can be below the decadal ASQ. Many factors can result in timber sale offerings that are below the average annual ASQ, including lack of program funding, new resource issues that need to be addressed, changes in timber markets, sales delayed by appeals or lawsuits, or other factors that reduce the actual volume.

In some situations, timber can be harvested from unsuitable lands and can contribute to satisfying timber demand, but cannot contribute to the ASQ. An example is the timber produced from thinning of second-growth stands for wildlife habitat enhancement, within LUDs identified as not suitable for timber production.

Non-interchangeable Components

Economics is an important consideration in determining what land can be harvested; however, economic conditions can fluctuate greatly from year to year, shifting specific forest stands from being economic to uneconomic to harvest. As a result, the Tongass National Forest uses the concept of non-interchangeable components

(NIC) to consider economics. NICs allow the separation of ASQ into discrete, individually accountable categories. All seven alternatives have an ASQ for the first decade made up of two NICs:

> **NIC I.** Normal operable volume scheduled from suitable lands that are available for harvest using standard logging systems. This is the most economically operable ground and is typically where the Tongass National Forest has been offering most sales.
>
> **NIC II.** Non-standard (difficult and isolated) operable volume scheduled from suitable lands that are available for harvest using logging systems not in common use. These lands are currently considered economically and technologically marginal. In the past, this land has rarely been economical to harvest.

Chargeable timber volume from one NIC cannot be substituted for the achievement of the volume limit of another NIC, nor can the limits on the sale of chargeable timber volume associated with each NIC be exceeded.

Standards and Guidelines and Management Prescriptions

The Forest-wide standards and guidelines in Chapter 4, the management prescriptions in Chapter 3, and other chapters of the current Tongass Forest Plan (USDA Forest Service, 1997b) apply to Alternative 5, the No-Action Alternative in this EIS, and are not repeated here. An updated and edited version of the 1997 Forest Plan (as amended) was developed for Alternative 6, the Proposed Action, and for Alternatives 1, 2, and 3. A Proposed Forest Plan was released in January 2007 with the Draft EIS at the beginning of the comment period. This Proposed Forest Plan is modified and updated further for this Final EIS, and is referred to as the Final Proposed Forest Plan (see below). Alternatives 4 and 7 also follow the updated Forest Plan , with the exceptions noted in their alternative descriptions (see below).

Applicable LUD management prescriptions and Forest-wide standards and guidelines are discussed throughout the environmental consequences sections of Chapter 3 because they serve as the basic mitigation measures for individual projects under the Forest Plan. The Forest-wide standards and guidelines, and the LUD-specific standards and guidelines that constitute the management prescriptions, are the full set of mitigation measures for each alternative.

Goals Common to All Alternatives

Air. Maintain the current air resource condition to protect the Forest's ecosystems from on- and off-Forest air emission sources.

Biodiversity. Maintain healthy forest ecosystems; a mix of habitats at different spatial scales (site, watershed, island, province, and forest) capable of supporting the full range of naturally occurring flora, fauna, and ecological processes native to Southeast Alaska.

Ecosystem Services and Non-Use Values. Maintain the broad range and high level of ecosystem services (e.g., watershed, water quality, air quality, biodiversity), and non-use values (e.g., existence, option, and bequest values associated with natural areas) that are provided by the Tongass National Forest.

Fish. Maintain or restore the natural range and frequency of aquatic habitat conditions on the Tongass National Forest to sustain the diversity and production of fish and other freshwater organisms.

Heritage Resources. Identify, evaluate, preserve, and protect heritage resources.

Local and Regional Economies. Provide a diversity of opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska.

Rare Natural Areas. Protect a variety of areas with natural, scenic, or geologic features distinct to the region, including areas set aside specifically for future research needs.

Research. Continue to seek out and promote research opportunities that are consistent with identified information needs.

Soil and Water. Maintain soil productivity Forest-wide, and minimize soil erosion resulting from land-disturbing activities. Minimize sediment transported to streams from land-disturbing activities. Maintain and restore the biological, physical, and chemical integrity of Tongass National Forest waters.

Subsistence. Provide for the continuation of subsistence uses and resources by all rural Alaskan residents.

Wetlands. Minimize the destruction, loss or degradation of wetlands, and preserve and enhance the associated wetland functions and values.

Wilderness. Manage designated Wilderness to maintain an enduring wilderness resource while providing for public access and uses consistent with the Wilderness Act of 1964 and the Alaska National Interest Lands Conservation Act of 1980 (ANILCA).

Descriptions of the Alternatives

Each alternative description includes the following components: 1) a framework; 2) a general description of the desired condition; 3) a table with the acreages allocated to each LUD; 4) a map (included in the *Map Packet* accompanying the EIS hard copy or in the *Map Section* of the CD version) showing the composition of LUDs across the Forest; 5) a map showing the distribution of development, natural setting, and wilderness LUDs; 6) a description of proposed changes to the current Forest-wide standards and guidelines and management prescriptions; and 7) a quantification of outputs and measures associated with each alternative.

The management prescriptions (i.e., LUD-specific standards and guidelines) for each LUD are included in the 1997 Forest Plan, as amended, or in the Final Proposed Forest Plan (see next section), as are the Forest-wide standards and guidelines that apply to each alternative. Details on the modeling of each alternative are included in Appendix B to this EIS (included Volume II).

In the LUD tables for each alternative, the changes from existing acreages represent the differences between the decisions made in the 1997 Tongass Forest Plan Revision ROD, as amended, and the Forest Plan Amendment EIS alternatives.

The goals common to all alternatives are provided below. In addition, the Tongass Timber Reform Act (Section 101) direction for the Tongass to "seek to provide a supply of timber which 1) meets the annual market demand for timber from such forest and 2) meets the market demand from such forest for each planning cycle" will be followed by each alternative "to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources," as determined by that alternative, and subject to appropriations and applicable law.

Summary of Final Proposed Forest Plan

The 1997 Forest Plan (USDA Forest Service 1997b), as amended, is the plan associated with Alternative 5, the No-Action Alternative. A number of changes to the Forest Plan text are being proposed under the other alternatives, based on the

Forest Plan 5 Year Review and Forest Service staff recommendations. Most changes were incorporated into a Proposed Forest Plan (Land and Resource Management Plan), which accompanied the Draft EIS. These changes were modified and updated for the Final EIS and the major changes being proposed are summarized in this section. The individual alternative descriptions on the following pages only identify items that are not consistent with the Final Proposed Forest Plan, which is defined by the Proposed Forest Plan that accompanied the Draft EIS, as modified in this section. A summary of the main changes that are incorporated into the Final Proposed Forest Plan are provided below.

Management Prescriptions

- Edits and clarifications were made regarding karst management programs, sacred site protection, minerals and geology, off-highway vehicle use, scenery management, and other areas for most LUD prescriptions
- Substantial edits and clarifications were made to the Wilderness and Wilderness National Monument LUD prescriptions

Forest-wide Standards and Guidelines

- Clarifications were made to the standards and guidelines regarding steep slopes and soil stability in the *Soils* and *Water* section.
- Clarifications were made to the standards and guidelines on Class III and IV streams and edits were made to the other standards and guidelines in the Fish section
- The detailed stream process group-specific riparian standards and guidelines are presented in an appendix in the Final Proposed Forest Plan, instead of in the main body of the standards and guidelines, which is the way they were presented in the Proposed Forest Plan that accompanied the Draft EIS.
- A new section was added to Chapter 4 on Invasive Species.
- A new section was added to Chapter 4 on Plants.
- The Threatened, Endangered, and Sensitive Species standards and guidelines are incorporated into subsections under Fish, Wildlife, and Plants (as appropriate) in the Final Proposed Plan, instead of in a separate section as in the Proposed Plan that accompanied the Draft EIS.
- The goshawk foraging habitat and the marten habitat standards and guidelines in the *Wildlife* section were deleted and replaced with a Forest-wide legacy standard and guideline in the Proposed Forest Plan that accompanied the Draft EIS. In addition, the legacy standard and guideline for the Final Proposed Forest Plan is revised further. The revised standard and guideline requires legacy forest structure to be left only in harvest units greater than 20 acres and only in higher risk VCUs, as previously defined (49 VCUs).
- The goshawk nesting habitat standard and guideline in the *Wildlife* section was revised in the Proposed Forest Plan that accompanied the Draft EIS. In addition, the goshawk nesting habitat standard and guideline for the Final Proposed Forest Plan is revised further. The revised standard and guideline permits nesting habitat protection measures to be removed if, after 2 consecutive years of monitoring, evidence of confirmed or probable nesting is no longer observed.
- The requirement to conduct inventories to determine the presence of nesting goshawks for proposed projects that affect goshawk habitat is included in the

Final Proposed Forest Plan (this was inadvertently removed from the Proposed Forest Plan that accompanied the Draft EIS).

- New standards and guidelines on sacred site protection were added in the *Heritage Resources and Sacred Sites* section.
- Extensive edits were made to the Karst and Cave Resources standards and guidelines and the Karst and Cave Resources appendix.
- Substantial edits were made to the Minerals and Geology standards and guidelines.
- Substantial edits were made to the Recreation and Tourism standards and guidelines. The detailed Recreation Opportunity Spectrum-specific standards and guidelines are presented in an appendix in the Final Proposed Forest Plan, instead of in the main body of the standards and guidelines, which is the way they were presented in the Proposed Forest Plan that accompanied the Draft EIS.
- The Scenery standards and guidelines were converted from the Visual Management System to the Scenery Management System.
- Edits were made to off-highway vehicle standards and guidelines in the *Lands* section.
- Edits were made to the road storage and decommissioning standards and guidelines in the *Transportation and Utilities* section.

In addition, there are a number of changes to other Forest Plan sections. These include changes to the Goals and Objectives (Chapter 2 of the Plan) and Monitoring and Evaluation (Chapter 6 of the Plan) chapters and to a number of the Forest Plan appendixes, including Appendix B (Information Needs), Appendix F (Visual Priority Routes and Use Areas), Appendix I (Karst and Caves), Appendix K (Old-Growth Habitat Reserve Criteria), and Appendix L (Resource Schedules).

Finally, the 1982 Planning Regulations implementing NFMA include identification of Wildlife Management Indicator Species (MIS) in Forest Plans. The primary intent of MIS was to monitor populations of selected species to see if longer term trends were indicating they could become threatened or endangered across the national forest. The 1997 Forest Plan identified 13 wildlife and 4 fish MIS species with associated monitoring guidelines. The Tongass National Forest has analyzed MIS monitoring information assembled since 1997. Chapter 3 includes information for each of the species. It has been determined this information is lacking in sufficient detail to help guide management of the selected species on the Forest. The Tongass hosted an interagency review of the Forest Plan Conservation Strategy in April of 2006, which included updated information related to most of the MIS species. Much discussion at the review and in other related venues locally and nationally indicate monitoring should be more focused on wildlife habitats instead of species population trends by themselves. Interagency discussions related to wildlife monitoring and the MIS themselves are ongoing. As a result, the Monitoring and Evaluation chapter in the Final Proposed Plan is revised to be more focused, relative to the version in the Proposed Forest Plan that accompanied the Draft EIS. It is anticipated that the current list of MIS may be revised in the future, but a change in MIS is not part of the Final Proposed Plan.

Proposed LUD Changes Common to Most Alternatives

The LUD allocations for each alternative are described in the following alternative-specific descriptions. The alternatives do not vary in terms of the acreage allocated to congressionally designated areas (i.e., Wilderness, National Monument, and LUD II), nor do they vary in terms of allocations to Research Natural Areas, Enacted Municipal Watersheds, or Wild, Scenic, or Recreational River LUDs. However, they do vary with respect to the other non-development LUDs and all of the development LUDs. The LUDs for each alternative are displayed on alternative LUD maps that accompany this EIS.

Proposed changes to the Special Interest Area and Experimental Forest LUDs are common under all alternatives except Alternative 5, which would follow the 1997 Forest Plan (as amended) for these two LUDs. The proposed changes to Special Interest Area and Experimental Forest LUDs are quantified in the following alternative description sections and shown on the alternative LUD maps, and are described in detail in the *Other Special Land Use Designation* section of Chapter 3.

Proposed changes to the Old-Growth Habitat LUD are common under Alternatives 1, 2, 3, and 6, and are as a result of an interagency process that took place in parallel with this EIS, and was initiated in 2006 and completed in 2007. Under this process, the Tongass worked with the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service to conduct a comprehensive review and mapping effort for all small old-growth reserves (OGR). The objective of the interagency team review was to develop a consensus biological recommendation on small OGR composition and locations that was consistent with the Forest Plan. This process included the development of a biological recommendation, the refinement of that proposal with Forest Service Ranger District staff, and further refinement by the Forest Supervisor. The refinement process was conducted in order to consider multiple-use objectives in addition to pure biological ones. The final proposal is included in Alternatives 1, 2, 3, and 6 of the Final EIS. Alternative 5 retains the 1997 Plan (as amended) reserve network and the reserves proposed under Alternatives 4 and 7 are not affected by this proposal. Further information on the refinement of small OGRs is included in Appendix D.

Alternative 1

Framework

Under this alternative, forest management would provide a mix of National Forest uses and activities, but would emphasize maintaining inventoried roadless areas, associated fish and wildlife values, and unroaded recreation, tourism, and subsistence opportunities, relative to the current Forest Plan. Timber would be managed within the roaded land base and all inventoried roadless areas would remain in a natural condition. In addition, a number of higher value roaded areas, including all of Kuiu, Baranof, and Kruzof Islands, many portions of Chichagof Island, all mainland areas, and other areas, would be excluded from commercial timber management. A total of 840,000 acres of the Tongass would be in development LUDs and 15.9 million acres would be in non-development LUDs. The majority of the lands changed to non-development LUDs from development LUDs (in the current Plan) would be designated Semi-Remote Recreation. Specific LUD changes under this alternative would include the addition and modification of a number of Geologic Special Interest Areas, recommendations to change the Young Bay Experimental Forest to Semi-Remote Recreation and the Cowee-Davies Creek watersheds from Scenic Viewshed to Experimental Forest, and converting a large area of Remote Recreation LUD north of Juneau to Semi-Remote Recreation. It also would include extensive refinements to the boundaries of the small Old-Growth Reserves, based on a recently completed interagency evaluation.

This alternative would approximately correspond with Scenario 1 (limited lumber production) of the Brackley et al. (2006) timber demand study. It is similar to Alternative 8 of the 2003 SEIS in terms of the areas allocated to non-development LUDs.

Desired Conditions

The vast majority of the currently undisturbed areas of the Forest remain in a natural state and all existing inventoried roadless areas remain roadless. Old-growth conditions prevail on forest lands within these roadless areas. A small, but predictable and sustainable supply of forest products contributes to a very limited Southeast Alaska timber industry, probably based primarily in Ketchikan and Prince of Wales Island. A mixture of old growth, recently harvested areas, and various ages of young growth occurs within roaded areas. Recreation, tourism, and subsistence opportunities emphasize natural setting types, although roaded opportunities expand slightly from current conditions due to construction of additional roads primarily in already roaded areas.

Land Use Designations

If Alternative 1 is selected, the LUD allocation acres shown in Table 2-3 would result. Figure 2-1 shows the distribution of LUDs across the Tongass under Alternative 1 according to three LUD groups (see Table 2-3 for definitions of the LUD groups). A complete LUD map is provided as the Alternative 1 map in the *Map Section* of the CD version of this EIS or in the *Map Packet* accompanying the EIS hard copy.

Management Prescriptions and Standards and Guidelines

Under Alternative 1, the management prescriptions and standards and guidelines identified in the Final Proposed Land and Resource Management Plan would be adopted. These are generally the same as the management prescriptions and standards and guidelines in the 1997 Forest Plan, as amended; however, a number of changes and refinements are proposed. A summary of the main changes to the 1997 Forest Plan, as amended, is provided above in the section titled "Final Proposed Forest Plan."

Selected Outputs

Table 2-4 displays selected outputs and other measures associated with this alternative.

Table 2-3
Land Use Designations for Alternative 1[1]

Land Use Designation	Acres Allocated	Net Change from Current Forest Plan Acres[2]
Wilderness LUD Group		
Wilderness	2,637,292	0
National Monument[3]	3,278,734	0
Total for Wilderness LUD Group	**5,916,026**	**0**
Natural Setting LUD Group		
LUD II	721,002	0
Research Natural Area	26,093	0
Old Growth	1,221,174	38,749
Special Interest Area	221,174	46,712
Enacted Municipal Watershed	45,226	0
Wild, Scenic, and Recreational River	117,319	0
Remote Recreation	2,369,831	238,776
Semi-Remote Recreation	5,296,773	2,442,548
Total for Natural Setting LUD Group	**10,018,592**	**2,766,786**
Development LUD Group		
Experimental Forest	31,405	14,310
Scenic Viewshed	59,296	(417,923)
Modified Landscape	188,357	(413,005)
Timber Production	560,129	(1,950,169)
Total for Development LUD Group	**839,187**	**(2,766,786)**
Total National Forest System Lands	**16,773,804**	**0**

1 When more than one LUD is applied to the same area, such as a Special Interest Area within Wilderness, only the acreage of the more restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and LUD II acres are always shown. The acreage for the Minerals LUD would be 249,570; these acres are not included in the table because the Minerals LUD is an overlay. No acreages have been calculated for the Transportation and Utility Systems LUD because it is a series of corridors with undefined width and imprecise locations. Totals may not exactly equal the sum of individual entries due to rounding.

2 These changes from current Forest Plan acres are the differences from the decision made in the 1997 Tongass Forest Plan Revision ROD, as amended, which is represented by Alternative 5.

3 The majority of the National Monument acres are wilderness; only 166,942 acres are non-wilderness.

4 Small old-growth reserves and Special Interest Area LUDs increased relative to Alternative 5; however, they overlap extensively, especially on Heceta, Kosciusko, and northeast Chichagof Islands, and the acreages where they overlap were counted with Special Interest Areas.

Figure 2-1
Wilderness, Natural Setting, and Development LUDs on the Tongass National Forest under Alternative 1

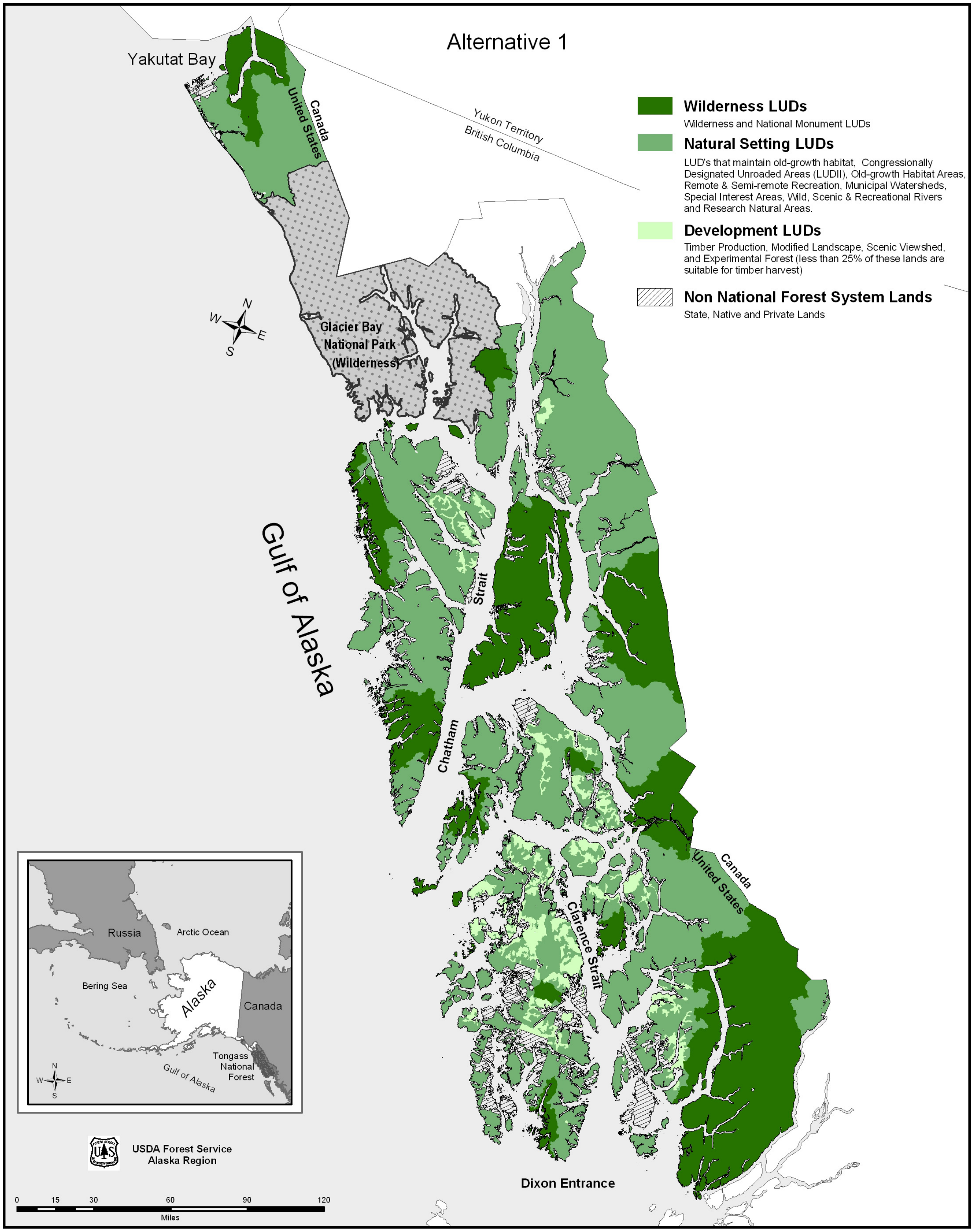


Table 2-4
Selected Outputs and Measures Associated with Alternative 1[1]

Resource/Category	Output/Measure
Percent in Wilderness LUD Group	35%
Percent in Natural Setting LUD Group	60%
Percent in Development LUD Group	5%
Amount of Development LUDs in Inventoried Roadless Areas (millions of acres)[2]	0.0
Percent of Current Productive Old Growth Protected in Reserves (Wilderness/Nat. Mon. and Natural Setting LUDs)	93%
Productive Old Growth after 100+ Years (millions of acres)	4.9
Estimated Forest Land Suitable for Timber Production (acres)[3]	312,000
Scheduled Suitable Forest Land (acres)[3]	144,000
Allowable Sale Quantity or ASQ (millions of board feet)[4]	
1st Decade ASQ	49
2nd Decade ASQ	49
Maximum New Road Construction after 100+ Years (miles)	774
Maximum Average Annual Timber Harvest during 1st Decade, based on the ASQ (acres)	1,774
Potential Short-term Effects on Timber Industry[5]	
Effect on Timber Volume Under Contract	High
Effect on NEPA-cleared Volume	Low
Effect on Timber Volume in Preparation	Low
Percent of Identified Mineral Tracts and Undiscovered Mineral Areas in Open LUDs with Higher Development Costs	
Percent of Identified Mineral Tracts	36%
Percent of Undiscovered Mineral Areas	57%
Recreation Opportunity Spectrum Classes after 150 Years (millions of acres)	
Primitive and Semi-Primitive Non-Motorized	13.2
Semi-Primitive Motorized	1.4
Roaded Natural and Roaded Modified	2.1

[1] Totals may not add exactly due to rounding.

[2] No lands suitable for timber management and no lands within Timber Production, Modified Landscape, or Scenic Viewshed LUDs are included in inventoried roadless areas under Alternative 1. Approximately 27,000 acres of Experimental Forest are included.

[3] Estimated forest land suitable for timber production represents the mapped suitable forest land minus the estimated portion that is unsuitable, but not mapped as such. The scheduled suitable forest land is the portion of the estimated suitable forest land that is scheduled for harvest by ASQ modeling.

[4] ASQ volumes expressed as annual averages and include sawlog plus utility.

[5] This evaluation provides an indication of potential effects; actual effects would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales are cancelled or exempted as part of the decision.

Alternative 2

Framework

Under this alternative, forest management would provide a mix of National Forest uses and activities, but would give additional emphasis to roadless areas, associated fish and wildlife values, and unroaded recreation, tourism, and subsistence opportunities, relative to the current Forest Plan. Timber would be managed within the roaded land base as well as within roadless areas with lower wilderness attribute ratings (primarily those adjacent to developed areas). The vast majority of current roadless areas would remain in a natural condition. A total of 1.9 million acres of the Tongass would be in development LUDs and 14.8 million acres would be in non-development LUDs. The majority of the lands changed to non-development LUDs from development LUDs (in the current Plan) would be designated Semi-Remote Recreation. All areas identified as development LUDs in Alternative 1 would also be development LUDs in this alternative, in addition to other areas. Specific LUD changes under this alternative would include the addition and modification of a number of Geologic Special Interest Areas, recommendations to change the Young Bay Experimental Forest to Semi-Remote Recreation and the Cowee-Davies Creek watersheds from Scenic Viewshed to Experimental Forest, and converting a large area of Remote Recreation LUD north of Juneau to Semi-Remote Recreation. It also would include extensive refinements to the boundaries of the small Old-Growth Reserves, based on a recently completed interagency evaluation.

This alternative would approximately correspond with Scenario 2 (expanded lumber production) of the Brackley et al. (2006) timber demand study.

Desired Conditions

The vast majority of the currently undisturbed areas of the Forest remain in a natural state and most existing roadless areas remain roadless. However, some roadless areas adjacent to existing roaded areas are developed. Old growth conditions prevail on forest lands within roadless areas. A moderate, predictable, and sustainable supply of forest products contributes to a limited Southeast Alaska timber industry, probably based in Ketchikan, Prince of Wales Island, and other communities. A mixture of old growth, recently harvested areas, and various ages of young growth occurs within roaded areas. Recreation, tourism, and subsistence opportunities emphasize natural setting types, although roaded opportunities expand from current conditions.

Land Use Designations

If Alternative 2 is selected, the LUD allocation acres shown in Table 2-5 would result. Figure 2-2 shows the distribution of LUDs across the Tongass under Alternative 2 according to three LUD groups (see Table 2-5 for definitions of the LUD groups). A complete LUD map is provided as the Alternative 2 map in the *Map Section* of the CD version of this EIS or in the *Map Packet* accompanying the EIS hard copy.

Management Prescriptions and Standards and Guidelines

Under Alternative 2, the management prescriptions and standards and guidelines identified in the Final Proposed Forest Plan would be adopted. These are generally the same as the management prescriptions and standards and guidelines in the current Forest Plan; however, a number of changes and refinements are proposed. A summary of the main changes to the current Forest Plan is provided above in the section titled “Final Proposed Forest Plan.”

Selected Outputs

Table 2-6 displays selected outputs and other measures associated with this alternative.

Table 2-5
Land Use Designations for Alternative 2[1]

Land Use Designation	Acres Allocated	Net Change from Current Forest Plan Acres[2]
Wilderness LUD Group		
Wilderness	2,637,292	0
National Monument[3]	3,278,734	0
Total for Wilderness LUD Group	**5,916,026**	**0**
Natural Setting LUD Group		
LUD II	721,002	0
Research Natural Area	26,093	0
Old Growth	1,221,173	38,749
Special Interest Area	221,176	46,713
Enacted Municipal Watershed	45,226	0
Wild, Scenic, and Recreational River	117,319	0
Remote Recreation	2,344,149	213,095
Semi-Remote Recreation	4,232,082	1,377,857
Total for Natural Setting LUD Group	**8,928,220**	**1,676,414**
Development LUD Group		-
Experimental Forest	31,405	14,310
Scenic Viewshed	213,193	(264,026)
Modified Landscape	331,955	(269,407)
Timber Production	1,353,006	(1,157,291)
Total for Development LUD Group	**1,929,559**	**(1,676,414)**
Total National Forest System Lands	**16,773,805**	**0**

[1] When more than one LUD is applied to the same area, such as a Special Interest Area within Wilderness, only the acreage of the more restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and LUD II acres are always shown. The acreage for the Minerals LUD would be 249,570; these acres are not included in the table because the Minerals LUD is an overlay. No acreages have been calculated for the Transportation and Utility Systems LUD because it is a series of corridors with undefined width and imprecise locations. Totals may not exactly equal the sum of individual entries due to rounding.

[2] These changes from current Forest Plan acres are the differences from the decision made in the 1997 Tongass Forest Plan Revision ROD, as amended, which is represented by Alternative 5.

[3] The majority of the National Monument acres are wilderness; only 166,942 acres are non-wilderness.

[4] Small old-growth reserves and Special Interest Area LUDs increased relative to Alternative 5; however, they overlap extensively, especially on Heceta, Kosciusko, and northeast Chichagof Islands, and the acreages where they overlap were counted with Special Interest Areas.

Figure 2-2
Wilderness, Natural Setting, and Development LUDs on the Tongass National Forest under Alternative 2

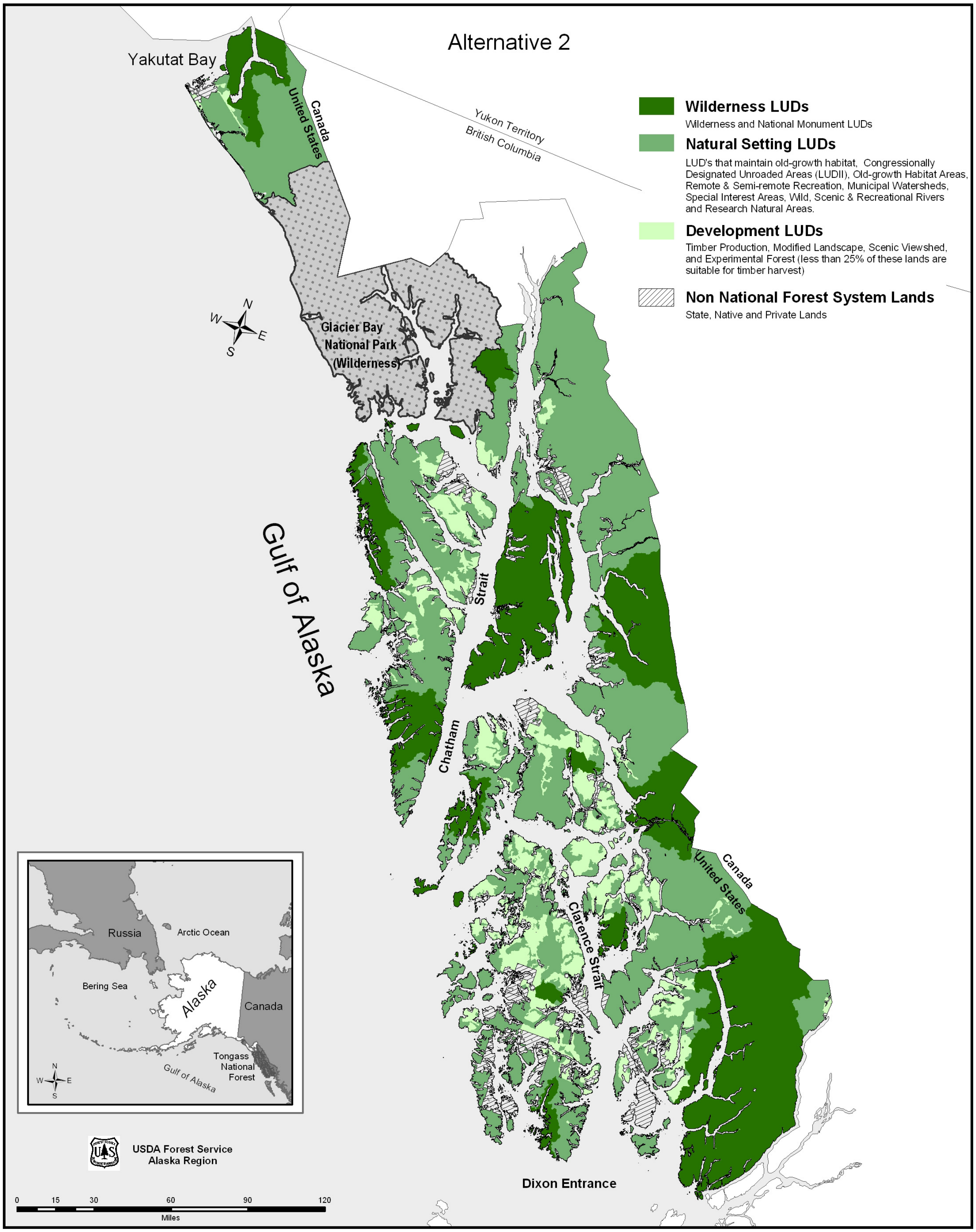


Table 2-6
Selected Outputs and Measures Associated with Alternative 2[1]

Resource/Category	Output/Measure
Percent in Wilderness LUD Group	35%
Percent in Natural Setting LUD Group	53%
Percent in Development LUD Group	12%
Amount of Development LUDs in Inventoried Roadless Areas (millions of acres)	0.8
Percent of Current Productive Old Growth Protected in Reserves (Wilderness/Nat. Mon. and Natural Setting LUDs)	84%
Productive Old Growth after 100+ Years (millions of acres)	4.7
Estimated Forest Land Suitable for Timber Production (acres)[2]	545,000
Scheduled Suitable Forest Land (acres)[2]	403,000
Allowable Sale Quantity or ASQ (millions of board feet)[3]	
1st Decade ASQ	151
2nd Decade ASQ	151
Maximum New Road Construction after 100+ Years (miles)	2,079
Maximum Average Annual Timber Harvest during 1st Decade, based on the ASQ (acres)	5,387
Potential Short-term Effects on Timber Industry[4]	
Effect on Timber Volume Under Contract	None
Effect on NEPA-cleared Volume	Low
Effect on Timber Volume in Preparation	Very Low
Percent of Identified Mineral Tracts and Undiscovered Mineral Areas in Open LUDs with Higher Development Costs	
Percent of Identified Mineral Tracts	29%
Percent of Undiscovered Mineral Areas	51%
Recreation Opportunity Spectrum Classes after 150 Years (millions of acres)	
Primitive and Semi-Primitive Non-Motorized	12.8
Semi-primitive Motorized	1.3
Roaded Natural and Roaded Modified	2.6

[1] Totals may not add exactly due to rounding.

[2] Estimated forest land suitable for timber production represents the mapped suitable forest land minus the estimated portion that is unsuitable, but not mapped as such. The scheduled suitable forest land is the portion of the estimated suitable forest land that is scheduled for harvest by ASQ modeling.

[3] ASQ volumes expressed as annual averages and include sawlog plus utility.

[4] This evaluation provides an indication of potential effects; actual effects would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales are cancelled or exempted as part of the decision.

Alternative 3

Framework

Under Alternative 3, forest management would provide a mix of National Forest uses and activities, but would give some additional emphasis to roadless areas, associated fish and wildlife values, and unroaded recreation, tourism, and subsistence opportunities, relative to the current Forest Plan. Timber would be managed within the roaded land base as well as within additional roadless areas; but these additional areas would not include the high value roadless areas identified in the 1999 Record of Decision (USDA Forest Service 1999) as the 18 Areas of Special Interest or the 23 areas proposed for wilderness in H.R. 987. The vast majority of current roadless areas would remain in a natural condition. A total of 2.8 million acres of the Tongass would be in development LUDs and 14.0 million acres would be in non-development LUDs. The majority of the lands changed to non-development LUDs from development LUDs (in the current Plan) would be designated Semi-Remote Recreation. All areas identified as development LUDs in Alternative 2 would also be development LUDs in this alternative, in addition to other areas. Specific LUD changes under this alternative would include the addition and modification of a number of Geologic Special Interest Areas, recommendations to change the Young Bay Experimental Forest to Semi-Remote Recreation and the Cowee-Davies Creek watersheds from Scenic Viewshed to Experimental Forest, and converting a large area of Remote Recreation LUD north of Juneau to Semi-Remote Recreation. It also would include extensive refinements to the boundaries of the small Old-Growth Reserves, based on a recently completed interagency evaluation.

This alternative would approximately correspond with Scenario 3 (medium integrated industry) of the Brackley et al. (2006) timber demand study. It is similar to Alternative 5 of the 2003 SEIS in terms of the areas allocated to non-development LUDs.

Desired Conditions

The vast majority of the currently undisturbed areas of the Forest remain in a natural state and most existing roadless areas remain roadless. However, over half of the roadless areas to be developed under the current Forest Plan are developed. Old growth conditions prevail on forest lands within the roadless areas. A predictable and sustainable supply of forest products contributes to a medium integrated timber industry in Southeast Alaska, probably based in Ketchikan, Prince of Wales Island, Wrangell, and Hoonah. A mixture of old growth, recently harvested areas, and various ages of young growth occurs within roaded areas. Recreation, tourism, and subsistence opportunities occur in natural setting types, but roaded opportunities are considerably expanded from current conditions, although not as much as under the current Plan.

Land Use Designations

If Alternative 3 is selected, the LUD allocation acres shown in Table 2-7 would result. Figure 2-3 shows the distribution of LUDs across the Tongass under Alternative 3 according to three LUD groups (see Table 2-7 for definitions of the LUD groups). A complete LUD map is provided as the Alternative 3 map in the *Map Section* of the CD version of this EIS or in the *Map Packet* accompanying the EIS hard copy.

Management Prescriptions and Standards and Guidelines

Under Alternative 3, the management prescriptions and standards and guidelines identified in the Final Proposed Forest Plan would be adopted. These are generally the same as the management prescriptions and standards and guidelines in the current Forest Plan; however, a number of changes and refinements are proposed. A summary of the main changes to the current Forest Plan is provided above in the section titled “Final Proposed Forest Plan.”

Selected Outputs

Table 2-8 displays selected outputs and other measures associated with this alternative.

Table 2-7
Land Use Designations for Alternative 3[1]

Land Use Designation	Acres Allocated	Net Change from Current Forest Plan Acres[2]
Wilderness LUD Group		
Wilderness	2,637,292	0
National Monument[3]	3,278,734	0
Total for Wilderness LUD Group	**5,916,026**	**0**
Natural Setting LUD Group		
LUD II	721,002	0
Research Natural Area	26,093	0
Old Growth	1,221,173	38,749
Special Interest Area	221,176	46,712
Enacted Municipal Watershed	45,226	0
Wild, Scenic, and Recreational River	117,319	0
Remote Recreation	2,182,091	51,036
Semi-Remote Recreation	3,519,753	665,527
Total for Natural Setting LUD Group	**8,053,833**	**802,025**
Development LUD Group		
Experimental Forest	31,405	14,309
Scenic Viewshed	320,457	(156,763)
Modified Landscape	478,541	(122,820)
Timber Production	1,973,542	(536,755)
Total for Development LUD Group	**2,803,945**	**(802,025)**
Total National Forest System Lands	**16,773,803**	**0**

1 When more than one LUD is applied to the same area, such as a Special Interest Area within Wilderness, only the acreage of the more restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and LUD II acres are always shown. The acreage for the Minerals LUD would be 249,570; these acres are not included in the table because the Minerals LUD is an overlay. No acreages have been calculated for the Transportation and Utility Systems LUD because it is a series of corridors with undefined width and imprecise locations. Totals may not exactly equal the sum of individual entries due to rounding.

2 These changes from current Forest Plan acres are the differences from the decision made in the 1997 Tongass Forest Plan Revision ROD, as amended, which is represented by Alternative 5.

3 The majority of the National Monument acres are wilderness; only 166,942 acres are non-wilderness.

4 Small old-growth reserves and Special Interest Area LUDs increased relative to Alternative 5; however, they overlap extensively, especially on Heceta, Kosciusko, and northeast Chichagof Islands, and the acreages where they overlap were counted with Special Interest Areas.

Figure 2-3
Wilderness, Natural Setting, and Development LUDs on the Tongass National Forest under Alternative 3

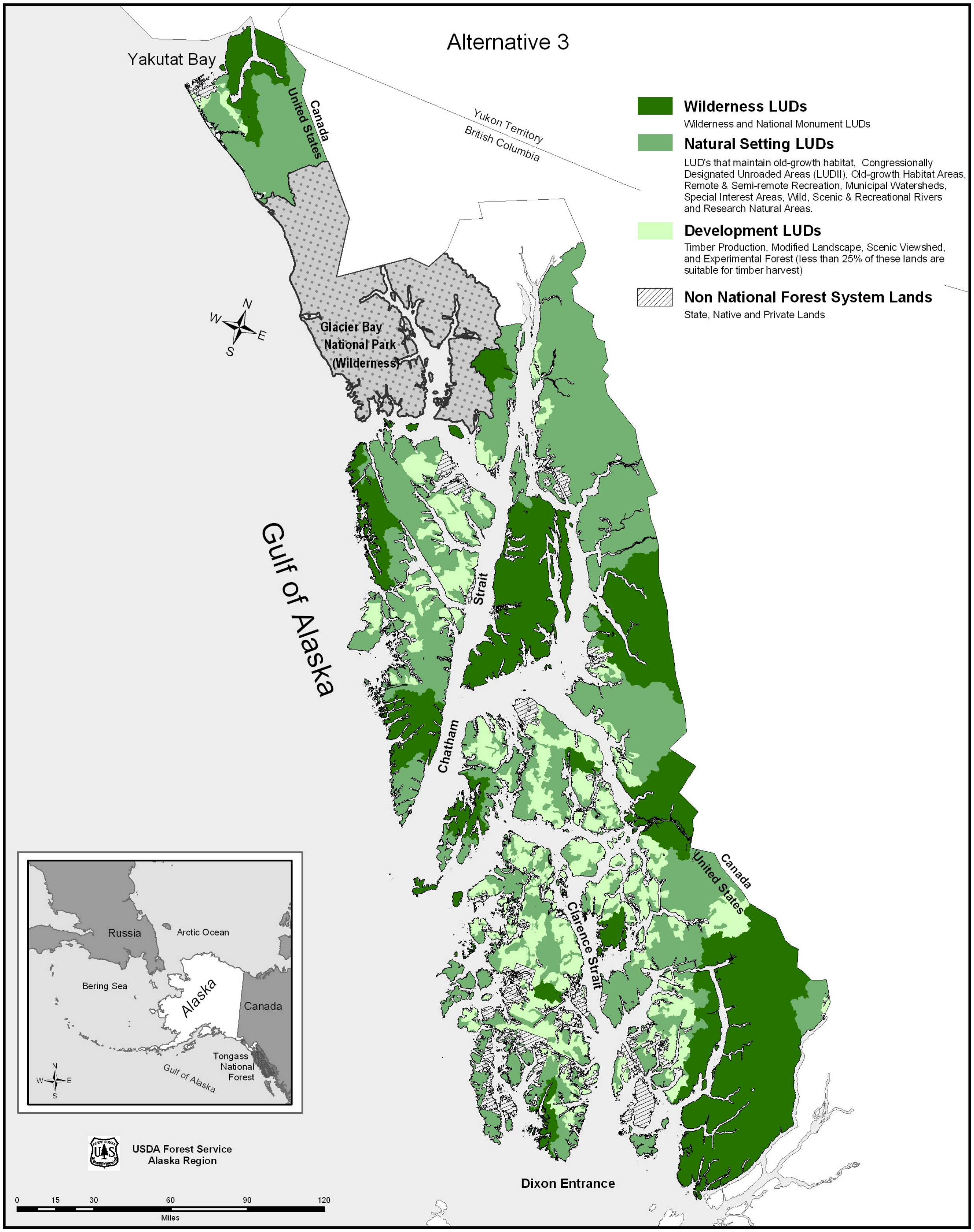


Table 2-8
Selected Outputs and Measures Associated with Alternative 3[1]

Resource/Category	Output/Measure
Percent in Wilderness LUD Group	35%
Percent in Natural Setting LUD Group	48%
Percent in Development LUD Group	17%
Amount of Development LUDs in Inventoried Roadless Areas (millions of acres)	1.7
Percent of Current Productive Old Growth Protected in Reserves (Wilderness/Nat. Mon. and Natural Setting LUDs)	78%
Productive Old Growth after 100+ Years (millions of acres)	4.6
Estimated Forest Land Suitable for Timber Production (acres)[2]	661,000
Scheduled Suitable Forest Land (acres)[2]	526,000
Allowable Sale Quantity or ASQ (millions of board feet)[3]	
1st Decade ASQ	204
2nd Decade ASQ	205
Maximum New Road Construction after 100+ Years (miles)	2,799
Maximum Average Annual Timber Harvest during 1st Decade, based on the ASQ (acres)	6,824
Potential Short-term Effects on Timber Industry[4]	
Effect on Timber Volume Under Contract	None
Effect on NEPA-cleared Volume	None
Effect on Timber Volume in Preparation	Very Low
Percent of Identified Mineral Tracts and Undiscovered Mineral Areas in Open LUDs with Higher Development Costs	
Percent of Identified Mineral Tracts	26%
Percent of Undiscovered Mineral Areas	45%
Recreation Opportunity Spectrum Classes after 150 Years (millions of acres)	
Primitive and Semi-Primitive Non-Motorized	12.4
Semi-Primitive Motorized	1.3
Roaded Natural and Roaded Modified	3.1

1 Totals may not add exactly due to rounding.
2 Estimated forest land suitable for timber production represents the mapped suitable forest land minus the estimated portion that is unsuitable, but not mapped as such. The scheduled suitable forest land is the portion of the estimated suitable forest land that is scheduled for harvest by ASQ modeling.
3 ASQ volumes expressed as annual averages and include sawlog plus utility.
4 This evaluation provides an indication of potential effects; actual effects would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales are cancelled or exempted as part of the decision.

Alternative 4

Framework

Under Alternative 4, forest management would provide a mix of National Forest uses and activities, but would give additional emphasis to timber management and associated economic stability of Southeast Alaska communities, relative to the current Forest Plan. Timber would be managed within an area expanded beyond the current Forest Plan. The vast majority of current roadless areas would remain in a natural condition; however, the majority of roadless areas that contain substantial productive old growth (POG), outside of wilderness, would be developed. A total of 4.7 million acres of the Tongass would be in development LUDs and 12.0 million acres would be in non-development LUDs. Almost all areas identified as development LUDs in Alternative 5 would also be development LUDs in this alternative, in addition to other areas. Specific LUD changes under this alternative would include the addition and modification of a number of Geologic Special Interest Areas, recommendations to change the Young Bay Experimental Forest to Semi-remote Recreation and the Cowee-Davies Creek watersheds from Scenic Viewshed to Experimental Forest, and converting a large area of Remote Recreation LUD north of Juneau to Semi-Remote Recreation.

This alternative would approximately correspond with Scenario 4 (high integrated industry) of the Brackley et al. (2006) timber demand study. It is similar to Alternative 6 of the 1997 FEIS.

Desired Conditions

The vast majority of the currently undisturbed areas of the Forest remain in a natural state and most existing roadless areas remain roadless. However, all of the roadless areas to be developed under the current Forest Plan are developed along with some additional roadless areas. Old growth conditions prevail on forest lands within roadless areas. The Tongass produces a predictable and sustainable supply of forest products that contributes to a high integrated timber industry in Southeast Alaska, probably based in Ketchikan, Prince of Wales Island, Wrangell, Hoonah, and other communities; however, private and state lands also contribute to satisfying the demand for timber. A mixture of old growth, recently harvested areas, and various ages of young growth occurs within roaded areas. Recreation, tourism, and subsistence opportunities occur in natural setting types, but roaded opportunities are substantially expanded from current conditions.

Land Use Designations

If Alternative 4 is selected, the LUD allocation acres shown in Table 2-9 would result. Figure 2-4 shows the distribution of LUDs across the Tongass under Alternative 4 according to three LUD groups (see Table 2-9 for definitions of the LUD groups). A complete LUD map is provided as the Alternative 4 map in the *Map Section* of the CD version of this EIS or in the *Map Packet* accompanying the EIS hard copy.

Management Prescriptions and Standards and Guidelines

Under Alternative 4, the management prescriptions and standards and guidelines identified in the Final Proposed Forest Plan would be adopted, with the exceptions noted below. The Alternative 4 management prescriptions and standards and guidelines are generally the same as those in the current Forest Plan; however, a number of changes and refinements are proposed. The summary, presented above (Final Proposed Forest Plan section), of the main changes to the current Forest Plan, reflects the proposal under Alternative 4, with the following exceptions:

- The Old-Growth Habitat LUD (and the system of large, medium, and small old-growth reserves) is applied only within four biogeographic provinces (Northern Prince of Wales Island, Kupreanof/Mitkof Islands, Dall Island, Northeast Chichagof Island) plus several individual reserves outside of these provinces

- In Value Comparison Units (VCUs) not within the four biogeographic provinces identified above, retain a minimum of 33 percent of the productive forest land in an old-growth forest condition
- The goshawk foraging habitat standard and guideline, the high-value marten habitat standard and guideline, and the proposed Legacy standard and guideline would not be implemented

Selected Outputs

Table 2-10 displays selected outputs and other measures associated with this alternative.

Table 2-9
Land Use Designations for Alternative 4[1]

Land Use Designation	Acres Allocated	Net Change from Current Forest Plan Acres[2]
Wilderness LUD Group		
Wilderness	2,637,292	0
National Monument[3]	3,278,734	0
Total for Wilderness LUD Group	**5,916,026**	**0**
Natural Setting LUD Group		
LUD II	721,002	0
Research Natural Area	26,093	0
Old Growth	393,360	(789,064)
Special Interest Area	221,176	46,712
Enacted Municipal Watershed	45,226	0
Wild, Scenic, and Recreational River	117,319	0
Remote Recreation	2,089,331	(41,724)
Semi-Remote Recreation	2,516,591	(337,634)
Total for Natural Setting LUD Group	**6,130,098**	**(1,121,714)**
Development LUD Group		
Experimental Forest	31,405	14,309
Scenic Viewshed	725,820	248,601
Modified Landscape	745,903	144,541
Timber Production	3,224,559	714,262
Total for Development LUD Group	**4,727,686**	**1,121,714**
Total National Forest System Lands	**16,773,806**	**0**

[1] When more than one LUD is applied to the same area, such as a Special Interest Area within Wilderness, only the acreage of the more restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and LUD II acres are always shown. The acreage for the Minerals LUD would be 249,570; these acres are not included in the table because the Minerals LUD is an overlay. No acreages have been calculated for the Transportation and Utility System LUD because it is a series of corridors with undefined width and imprecise locations. Totals may not exactly equal the sum of individual entries due to rounding.

[2] These changes from current Forest Plan acres are the differences from the decision made in the 1997 Tongass Forest Plan Revision ROD, as amended, which is represented by Alternative 5.

[3] The majority of the National Monument acres are wilderness; only 166,942 acres are non-wilderness.

Figure 2-4
Wilderness, Natural Setting, and Development LUDs on the Tongass National Forest under Alternative 4

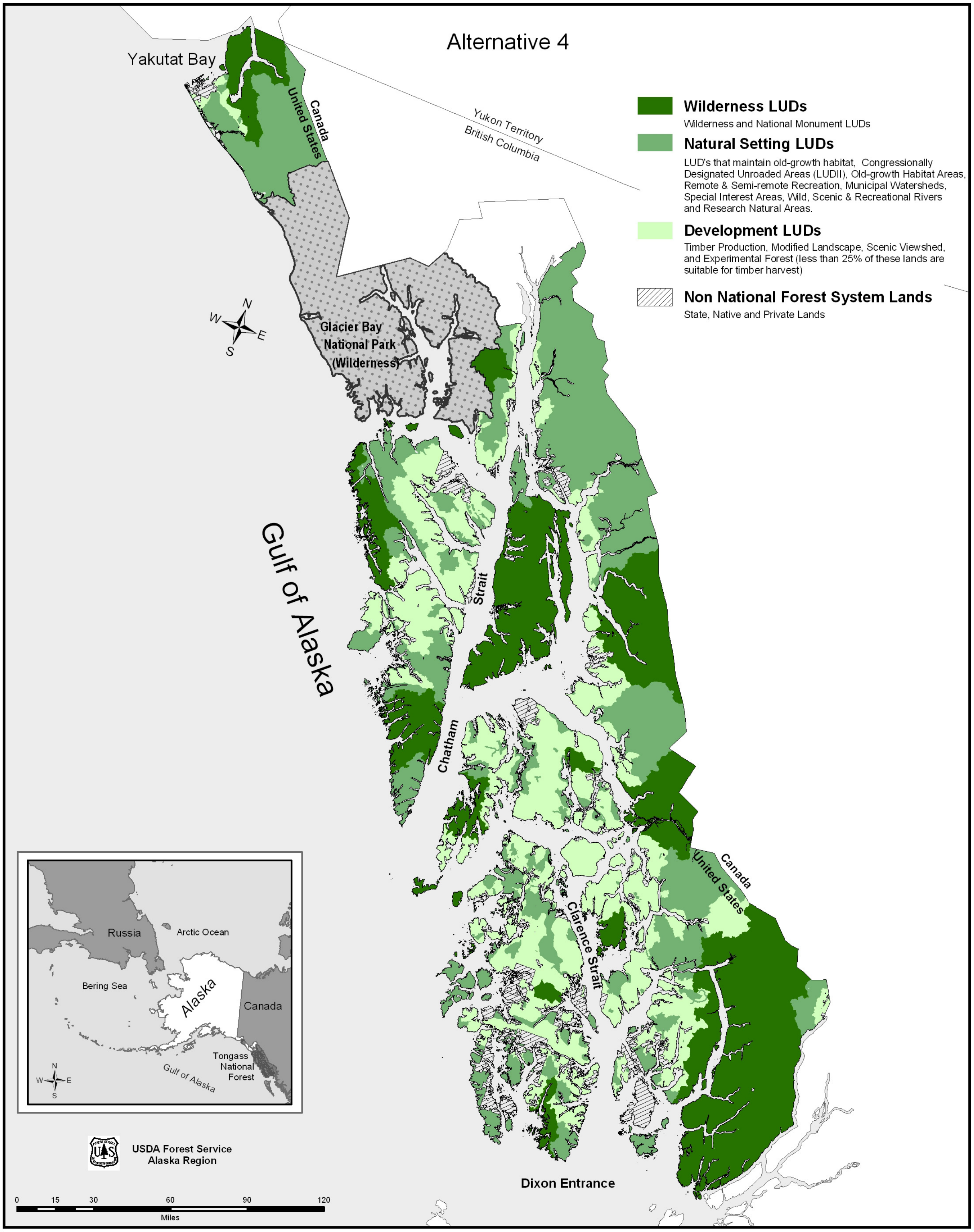


Table 2-10
Selected Outputs and Measures Associated with Alternative 4[1]

Resource/Category	Output/Measure
Percent in Wilderness LUD Group	35%
Percent in Natural Setting LUD Group	37%
Percent in Development LUD Group	28%
Amount of Development LUDs in Inventoried Roadless Areas (millions of acres)	3.4
Percent of Current Productive Old growth Protected in Reserves (Wilderness/Nat. Mon. and Natural Setting LUDs)	60%
Productive Old growth after 100+ Years (millions of acres)	4.3
Estimated Forest Land Suitable for Timber Production (acres)[2]	999,000
Scheduled Suitable Forest Land (acres)[2]	874,000
Allowable Sale Quantity or ASQ (millions of board feet)[3]	
1st Decade ASQ	312
2nd Decade ASQ	360
Maximum New Road Construction after 100+ Years (miles)	4,890
Maximum Average Annual Timber Harvest during 1st Decade, based on the ASQ (acres)	11,647
Potential Short-term Effects on Timber Industry[4]	
Effect on Timber Volume Under Contract	None
Effect on NEPA-cleared Volume	None
Effect on Timber Volume in Preparation	None
Percent of Identified Mineral Tracts and Undiscovered Mineral Areas in Open LUDs with Higher Development Costs	
Percent of Identified Mineral Tracts	20%
Percent of Undiscovered Mineral Areas	35%
Recreation Opportunity Spectrum Classes after 150 Years (millions of acres)	
Primitive and Semi-Primitive Non-Motorized	11.3
Semi-Primitive Motorized	1.2
Roaded Natural and Roaded Modified	4.3

1 Totals may not add exactly due to rounding.
2 Estimated forest land suitable for timber production represents the mapped suitable forest land minus the estimated portion that is unsuitable, but not mapped as such. The scheduled suitable forest land is the portion of the estimated suitable forest land that is scheduled for harvest by ASQ modeling.
3 ASQ volumes expressed as annual averages and include sawlog plus utility.
4 This evaluation provides an indication of potential effects; actual effects would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales are cancelled or exempted as part of the decision.

Alternative 5

Framework

This is the No Action alternative. It represents a continuation of the current Forest Plan and would result in a mix of National Forest uses and activities. Timber would be managed in an area more extensive than under Alternative 3, but less extensive than under Alternative 4. The vast majority of current roadless areas would remain in a natural condition; however, the majority of roadless areas that contain substantial POG, outside of wilderness, would be partially developed. A total of 3.6 million acres of the Tongass would be in development LUDs and 13.2 million acres would be in non-development LUDs. This alternative is the same as the current Forest Plan (Alternative 11 from the 1997 FEIS plus amendments).

Desired Conditions

The vast majority of the currently undisturbed areas of the Forest remain in a natural state and most existing roadless areas remain roadless. Old growth conditions prevail on forest lands within roadless areas. A predictable and sustainable supply of forest products contribute to a limited integrated timber industry in Southeast Alaska, probably based in Ketchikan, Prince of Wales Island, Wrangell, and Hoonah. There would be sufficient volume under this alternative to support the existing sawmills. There would also be sufficient volume to support one or more veneer plants or an MDF or other chip-related operation, but probably not both. A mixture of old growth, recently harvested areas, and various ages of young growth occurs within roaded areas. Recreation, tourism, and subsistence opportunities occur in natural setting types, but roaded opportunities are considerably expanded from current conditions.

Land Use Designations

If Alternative 5 is selected, the LUD allocation acres shown in Table 2-11 would result. Figure 2-5 shows the distribution of LUDs across the Tongass under Alternative 5 according to three LUD groups (see Table 2-11 for definitions of the LUD groups). A complete LUD map is provided as the Alternative 5 map in the *Map Section* of the CD version of this EIS or in the *Map Packet* accompanying the EIS hard copy.

Standards and Guidelines

Under Alternative 5, the standards and guidelines identified in the current Forest Plan would be adopted. These represent the 1997 Forest Plan with amendments (USDA Forest Service 1997b).

Selected Outputs

Table 2-12 displays selected outputs and other measures associated with this alternative.

Table 2-11
Land Use Designations for Alternative 5[1]

Land Use Designation	Acres Allocated	Net Change from Current Forest Plan Acres[2]
Wilderness LUD Group		
Wilderness	2,637,292	0
National Monument[3]	3,278,734	0
Total for Wilderness LUD Group	**5,916,026**	**0**
Natural Setting LUD Group		
LUD II	721,002	0
Research Natural Area	26,093	0
Old Growth	1,182,424	0
Special Interest Area	174,463	0
Enacted Municipal Watershed	45,226	0
Wild, Scenic, and Recreational River	117,319	0
Remote Recreation	2,131,055	0
Semi-Remote Recreation	2,854,225	0
Total for Natural Setting LUD Group	**7,251,808**	**0**
Development LUD Group		
Experimental Forest	17,095	0
Scenic Viewshed	477,219	0
Modified Landscape	601,362	0
Timber Production	2,510,298	0
Total for Development LUD Group	**3,605,974**	**0**
Total National Forest System Lands	**16,773,808**	**0**

[1] When more than one LUD is applied to the same area, such as a Special Interest Area within Wilderness, only the acreage of the more restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and LUD II acres are always shown. The acreage for the Minerals LUD would be 170,514; these acres are not included in the table because the Minerals LUD is an overlay. No acreages have been calculated for the Transportation and Utility System LUD because it is a series of corridors with undefined width and imprecise locations. Totals may not exactly equal the sum of individual entries due to rounding.

[2] These changes from current Forest Plan acres are the differences from the decisions made in the 1997 Tongass Forest Plan Revision ROD, as amended, which is represented by Alternative 5.

[3] The majority of the National Monument acres are wilderness; only 166,942 acres are non-wilderness.

Figure 2-5
Wilderness, Natural Setting, and Development LUDs on the Tongass National Forest under Alternative 5

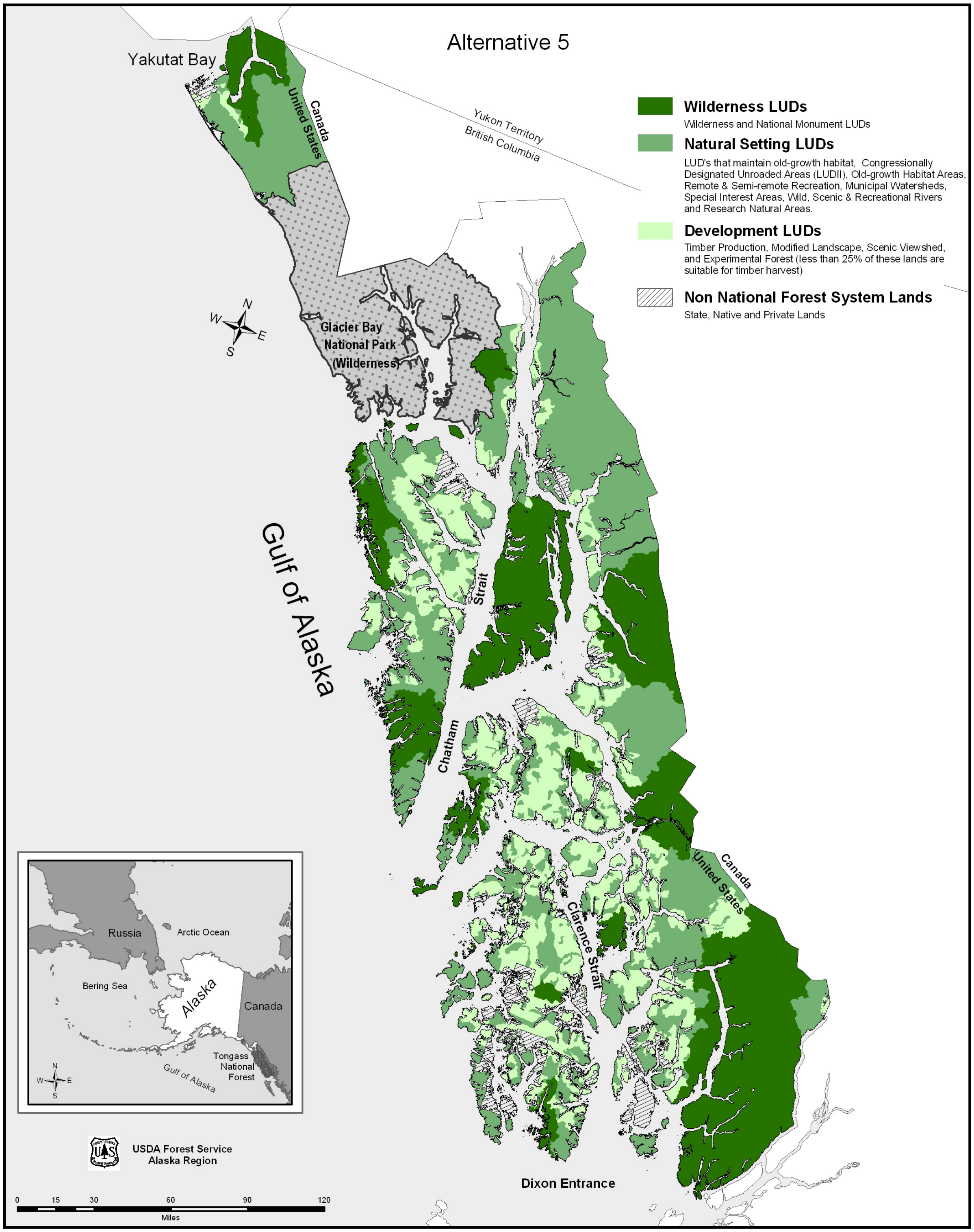


Table 2-12
Selected Outputs and Measures Associated with Alternative 5[1]

Resource/Category	Output/Measure
Percent in Wilderness LUD Group	35%
Percent in Natural Setting LUD Group	43%
Percent in Development LUD Group	21%
Amount of Development LUDs in Inventoried Roadless Areas (millions of acres)	2.4
Percent of Current Productive Old Growth Protected in Reserves (Wilderness/Nat. Mon. and Natural Setting LUDs)	71%
Productive Old Growth after 100+ Years (millions of acres)	4.5
Estimated Forest Land Suitable for Timber Production (acres)[2]	757,000
Scheduled Suitable Forest Land (acres)[2]	702,000
Allowable Sale Quantity or ASQ (millions of board feet)[3]	
1st Decade ASQ	267
2nd Decade ASQ	267
Maximum New Road Construction after 100+ Years (miles)	3,874
Maximum Average Annual Timber Harvest during 1st Decade, based on the ASQ (acres)	10,308
Potential Short-term Effects on Timber Industry[4]	
Effect on Timber Volume Under Contract	None
Effect on NEPA-cleared Volume	None
Effect on Timber Volume in Preparation	None
Percent of Identified Mineral Tracts and Undiscovered Mineral Areas in Open LUDs with Higher Development Costs	
Percent of Identified Mineral Tracts	29%
Percent of Undiscovered Mineral Areas	41%
Recreation Opportunity Spectrum Classes after 150 Years (millions of acres)	
Primitive and Semi-Primitive Non-Motorized	11.9
Semi-Primitive Motorized	1.3
Roaded Natural and Roaded Modified	3.6

1 Totals may not add exactly due to rounding.

2 Estimated forest land suitable for timber production represents the mapped suitable forest land minus the estimated portion that is unsuitable, but not mapped as such. The scheduled suitable forest land is the portion of the estimated suitable forest land that is scheduled for harvest by ASQ modeling. Slight differences in suitable acres between Alternative 5 (shown above) and Alternative 11 of the 1997 Final EIS are caused by: 1) changes in ownership, 2) changes in LUDs, and 3) the use of different estimation methods.

3 ASQ volumes expressed as annual averages and include sawlog plus utility.

4 This evaluation provides an indication of potential effects; actual effects would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales are cancelled or exempted as part of the decision.

Alternative 6

Framework

This is the Proposed Action alternative. It is very similar to the Alternative 5 (No Action) alternative in terms of LUD allocations; however, it includes extensive refinements to the boundaries of the small Old-Growth Reserves (based on a recently completed interagency evaluation), new Geologic Special Interest Areas, a new Experimental Forest, the conversion of a large area of Remote Recreation LUD north of Juneau to Semi-Remote Recreation, and other minor LUD refinements. Timber would be managed in an area more extensive than under Alternative 3, but less extensive than under Alternative 4. The vast majority of current roadless areas would remain in a natural condition; however, the majority of roadless areas that contain substantial POG, outside of wilderness, would be partially developed. A total of 3.5 million acres of the Tongass would be in development LUDs and 13.3 million acres would be in non-development LUDs. Specific LUD changes under this alternative would include the addition and modification of a number of Geologic Special Interest Areas, recommendations to change the Young Bay Experimental Forest to Semi-remote Recreation and the Cowee-Davies Creek watersheds from Scenic Viewshed to Experimental Forest, and converting a large area of Remote Recreation LUD north of Juneau to Semi-Remote Recreation. It also would include extensive refinements to the boundaries of the small Old-Growth Reserves, based on a recently completed interagency evaluation.

This alternative is similar to Alternative 11 of the 1997 FEIS.

Desired Conditions

The vast majority of the currently undisturbed areas of the Forest remain in a natural state and most existing roadless areas remain roadless. Old growth conditions prevail on forest lands within roadless areas. A predictable and sustainable supply of forest products contribute to a limited integrated timber industry in Southeast Alaska, probably based in Ketchikan, Prince of Wales Island, Wrangell, and Hoonah. There would be sufficient volume under this alternative to support the existing sawmills. There would also be sufficient volume to support one or more veneer plants or an MDF or other chip-related operation, but probably not both. Populations of wildlife dependent on old-growth and/or unroaded habitats have a moderately high likelihood of being maintained as viable and well-distributed across the Tongass. A mixture of old growth, recently harvested areas, and various ages of young growth occurs within roaded areas. Recreation, tourism, and subsistence opportunities occur in natural setting types, but roaded opportunities are considerably expanded from current conditions.

Land Use Designations

If Alternative 6 is selected, the LUD allocation acres shown in Table 2-13 would result. Figure 2-6 shows the distribution of LUDs across the Tongass under Alternative 6 according to three LUD groups (see Table 2-13 for definitions of the LUD groups). A complete LUD map is provided as the Alternative 6 map in the *Map Section* of the CD version of this EIS or in the *Map Packet* accompanying the EIS hard copy.

Management Prescriptions and Standards and Guidelines

Under Alternative 6, the management prescriptions and standards and guidelines identified in the Final Proposed Forest Plan would be adopted. These are generally the same as the management prescriptions and standards and guidelines in the current Forest Plan; however, a number of changes and refinements are proposed. A summary of the main changes to the current Forest Plan is provided above in the section titled “Final Proposed Forest Plan.”

Selected Outputs

Table 2-14 displays selected outputs and other measures associated with this alternative.

Table 2-13
Land Use Designations for Alternative 6[1]

Land Use Designation	Acres Allocated	Net Change from Current Forest Plan Acres[2]
Wilderness LUD Group		
Wilderness	2,637,292	0
National Monument[3]	3,278,734	0
Total for Wilderness LUD Group	**5,916,026**	**0**
Natural Setting LUD Group		
LUD II	721,002	0
Research Natural Area	26,093	0
Old Growth[4]	1,221,173	38,749
Special Interest Area[4]	221,176	46,712
Enacted Municipal Watershed	45,226	0
Wild, Scenic, and Recreational River	117,319	0
Remote Recreation	2,033,665	(97,390)
Semi-Remote Recreation	3,014,704	160,479
Total for Natural Setting LUD Group	**7,400,359**	**148,551**
Development LUD Group		
Experimental Forest	31,405	14,309
Scenic Viewshed	442,101	(35,118)
Modified Landscape	590,338	(11,024)
Timber Production	2,393,576	(116,721)
Total for Development LUD Group	**3,457,420**	**(148,551)**
Total National Forest System Lands	**16,773,806**	**0**

[1] When more than one LUD is applied to the same area, such as a Special Interest Area within Wilderness, only the acreage of the more restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and LUD II acres are always shown. The acreage for the Minerals LUD would be 249,570; these acres are not included in the table because the Minerals LUD is an overlay. No acreages have been calculated for the Transportation and Utility System LUD because it is a series of corridors with undefined width and imprecise locations. Totals may not exactly equal the sum of individual entries due to rounding.

[2] These changes from current Forest Plan acres are the differences from the decision made in the 1997 Tongass Forest Plan Revision ROD, as amended, which is represented by Alternative 5.

[3] The majority of the National Monument acres are wilderness; only 166,942 acres are non-wilderness.

[4] Small old-growth reserves and Special Interest Area LUDs increased relative to Alternative 5; however, they overlap extensively, especially on Heceta, Kosciusko, and northeast Chichagof Islands, and the acreages where they overlap were counted with Special Interest Areas.

Figure 2-6
Wilderness, Natural Setting, and Development LUDs on the Tongass National Forest under Alternative 6

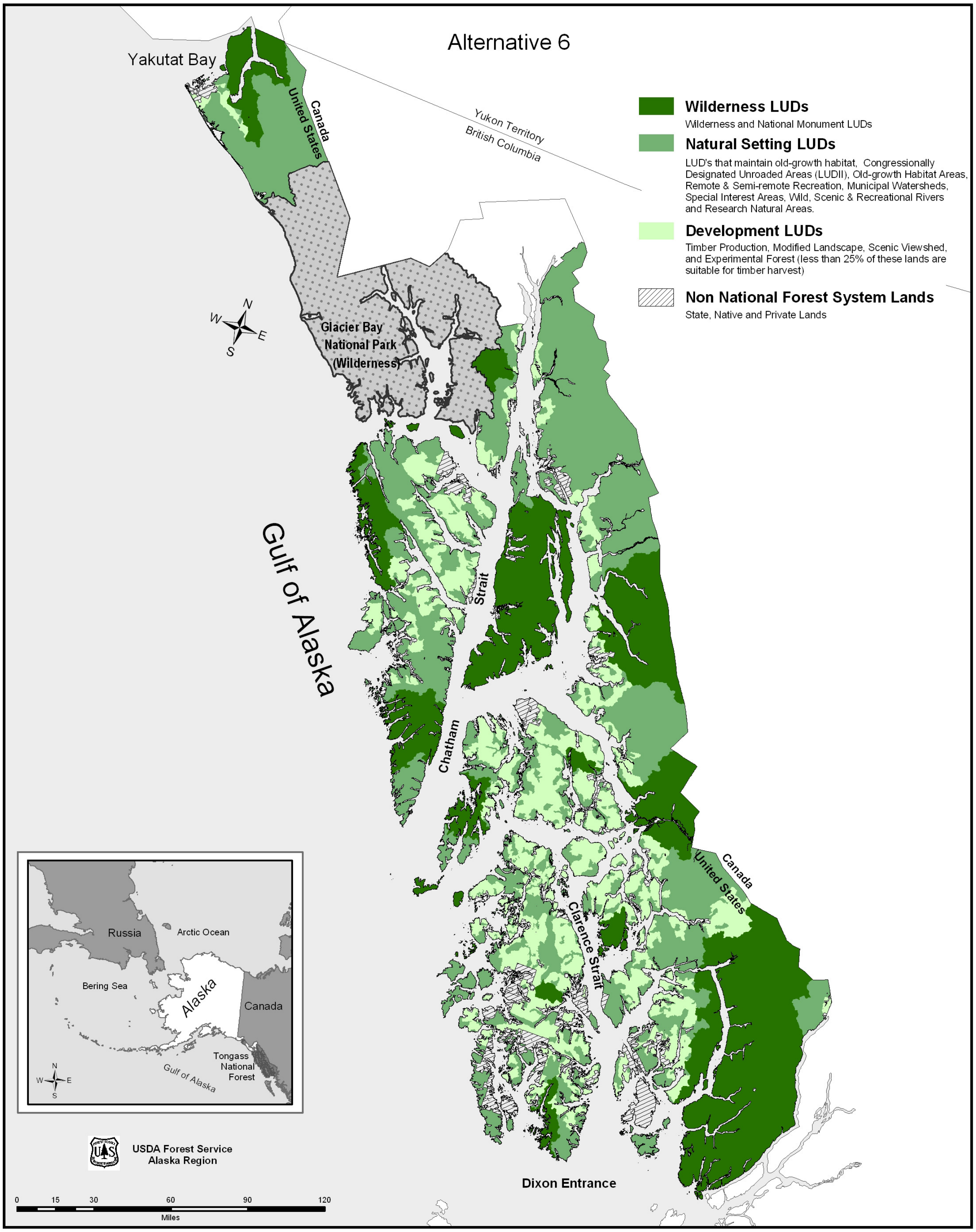


Table 2-14
Selected Outputs and Measures Associated with Alternative 6[1]

Resource/Category	Output/Measure
Percent in Wilderness LUD Group	35%
Percent in Natural Setting LUD Group	44%
Percent in Development LUD Group	21%
Amount of Development LUDs in Inventoried Roadless Areas (millions of acres)	2.3
Percent of Current Productive Old Growth Protected in Reserves (Wilderness/Nat. Mon. and Natural Setting LUDs)	72%
Productive Old Growth after 100+ Years (millions of acres)	4.5
Estimated Forest Land Suitable for Timber Production (acres)[2]	775,000
Scheduled Suitable Forest Land (acres)[2]	689,000
Allowable Sale Quantity or ASQ (millions of board feet)[3]	
1st Decade ASQ	267
2nd Decade ASQ	267
Maximum New Road Construction after 100+ Years (miles)	3,744
Maximum Average Annual Timber Harvest during 1st Decade, based on the ASQ (acres)	9,806
Potential Short-term Effects on Timber Industry[4]	
Effect on Timber Volume Under Contract	None
Effect on NEPA-cleared Volume	None
Effect on Timber Volume in Preparation	None
Percent of Identified Mineral Tracts and Undiscovered Mineral Areas in Open LUDs with Higher Development Costs	
Percent of Identified Mineral Tracts	25%
Percent of Undiscovered Mineral Areas	41%
Recreation Opportunity Spectrum Classes after 150 Years (millions of acres)	
Primitive and Semi-Primitive Non-Motorized	12.0
Semi-Primitive Motorized	1.3
Roaded Natural and Roaded Modified	3.5

1 Totals may not add exactly due to rounding.
2 Estimated forest land suitable for timber production represents the mapped suitable forest land minus the estimated portion that is unsuitable, but not mapped as such. The scheduled suitable forest land is the portion of the estimated suitable forest land that is scheduled for harvest by ASQ modeling.
3 ASQ volumes expressed as annual averages and include sawlog plus utility.
4 This evaluation provides an indication of potential effects; actual effects would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales are cancelled or exempted as part of the decision.

Alternative 7

Framework

Under Alternative 7, forest management would provide a mix of National Forest uses and activities, but would give much additional emphasis to timber management, relative to the current Forest Plan. Timber would be managed on a considerably expanded land base compared with the current Forest Plan. The vast majority of current roadless areas would remain in a natural condition; however, the majority of roadless areas that contain substantial POG outside of Wilderness, would be fully developed. A total of 5.0 million acres of the Tongass would be in development LUDs and 11.7 million acres would be in non-development LUDs. Almost all areas identified as development LUDs in Alternative 5 would also be development LUDs in this alternative, in addition to other areas. Specific LUD changes under this alternative would include the addition and modification of a number of Geologic Special Interest Areas and recommendations to change the Young Bay Experimental Forest to Semi-remote Recreation and the Cowee-Davies Creek watersheds from Scenic Viewshed to Experimental Forest.

This alternative is similar to Alternative 2 of the 1997 FEIS.

Desired Conditions

The vast majority of the currently undisturbed areas of the Forest remain in a natural state and most existing roadless areas remain roadless. However, all of the roadless areas to be developed under the current Forest Plan are developed along with additional roadless areas. Old growth conditions prevail on forest lands within roadless areas. The Tongass produces a predictable and sustainable supply of forest products that completely satisfies the demand from a high integrated timber industry in Southeast Alaska, probably based in Ketchikan, Prince of Wales Island, Wrangell, Hoonah, and other communities. Timber from private and state lands is not required to satisfy timber demand. A mixture of old growth, recently harvested areas, and various ages of young growth occurs within roaded areas. Recreation, tourism, and subsistence opportunities occur in natural setting types, but roaded opportunities are substantially expanded from current conditions.

Land Use Designations

If Alternative 7 is selected, the LUD allocation acres shown in Table 2-15 would result. Figure 2-7 shows the distribution of LUDs across the Tongass under Alternative 7 according to three LUD groups (see Table 2-15 for definitions of the LUD groups). A complete LUD map is provided as the Alternative 7 map in the *Map Section* of the CD version of this EIS or in the *Map Packet* accompanying the EIS hard copy.

Management Prescriptions and Standards and Guidelines

Under Alternative 7, the standards and guidelines identified in the current Forest Plan would be adopted, with the exceptions noted below. The current Forest Plan represents the 1997 Forest Plan with amendments (USDA Forest Service 1997b). The exceptions include:

- The Beach and Estuary Fringe buffer is changed to 500 feet. along the beach fringe and 1,000 feet. around estuaries.
- The Riparian Standards and Guidelines are modified so that buffers are not required along Class III streams.
- The Old-Growth Habitat LUD and its management prescription is not used and is deleted.
- The goshawk foraging habitat standard and guideline, the high-value marten habitat standard and guideline, and the proposed Legacy standard and guideline would not be implemented.
- The goshawk nesting standard and guideline would not be implemented.

Selected Outputs

Table 2-16 displays selected outputs and other measures associated with this alternative.

Table 2-15
Land Use Designations for Alternative 7[1]

Land Use Designation	Acres Allocated	Net Change from Current Forest Plan Acres[2]
Wilderness LUD Group		
Wilderness	2,637,292	0
National Monument[3]	3,278,734	0
Total for Wilderness LUD Group	**5,916,026**	**0**
Natural Setting LUD Group		
LUD II	721,002	0
Research Natural Area	26,093	0
Old Growth	0	(1,182,424)
Special Interest Area	221,176	46,712
Enacted Municipal Watershed	45,226	0
Wild, Scenic, and Recreational River	117,319	0
Remote Recreation	2,088,185	(42,870)
Semi-Remote Recreation	2,589,082	(265,143)
Total for Natural Setting LUD Group	**5,808,083**	**(1,433,725)**
Development LUD Group		
Experimental Forest	31,405	14,310
Scenic Viewshed	781,705	304,486
Modified Landscape	840,342	238,980
Timber Production	3,396,243	885,946
Total for Development LUD Group	**5,049,695**	**1,443,725**
Total National Forest System Lands	**16,773,804**	**0**

1 When more than one LUD is applied to the same area, such as a Special Interest Area within Wilderness, only the acreage of the more restrictive LUD is included, except that total Wilderness, Wilderness National Monument, and LUD II acres are always shown. The acreage for the Minerals LUD would be 249,570; these acres are not included in the table because the Minerals LUD is an overlay. No acreages have been calculated for the Transportation and Utility System LUD because it is a series of corridors with undefined width and imprecise locations. Totals may not exactly equal the sum of individual entries due to rounding.

2 These changes from current Forest Plan acres are the differences from the decision made in the 1997 Tongass Forest Plan Revision ROD, as amended, which is represented by Alternative 5.

3 The majority of the National Monument acres are wilderness; only 166,942 acres are non-wilderness.

Figure 2-7
Wilderness, Natural Setting, and Development LUDs on the Tongass National Forest under Alternative 7

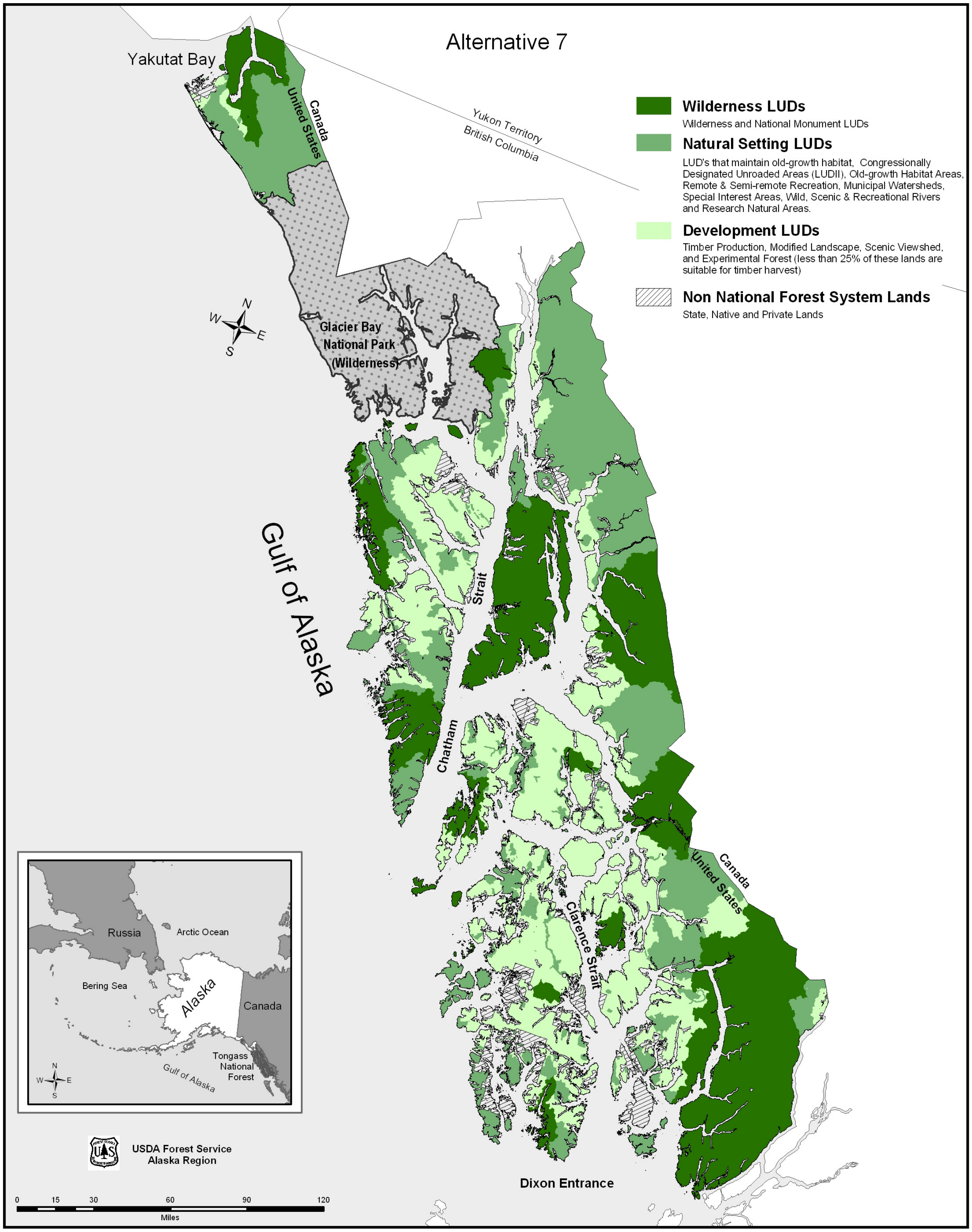


Table 2-16
Selected Outputs and Measures Associated with Alternative 7[1]

Resource/Category	Output/Measure
Percent in Wilderness LUD Group	35%
Percent in Natural Setting LUD Group	35%
Percent in Development LUD Group	30%
Amount of Development LUDs in Inventoried Roadless Areas (millions of acres)	3.7
Percent of Current Productive Old Growth Protected in Reserves (Wilderness/Nat. Mon. and Natural Setting LUDs)	57%
Productive Old Growth after 100+ Years (millions of acres)	4.1
Estimated Forest Land Suitable for Timber Production (acres)[2]	1,174,000
Scheduled Suitable Forest Land (acres)[2]	1,088,000
Allowable Sale Quantity or ASQ (millions of board feet)[3]	
1st Decade ASQ	421
2nd Decade ASQ	421
Maximum New Road Construction after 100+ Years (miles)	5,825
Maximum Average Annual Timber Harvest during 1st Decade, based on the ASQ (acres)	15,827
Potential Short-term Effects on Timber Industry[4]	
Effect on Timber Volume Under Contract	None
Effect on NEPA-cleared Volume	None
Effect on Timber Volume in Preparation	None
Percent of Identified Mineral Tracts and Undiscovered Mineral Areas in Open LUDs with Higher Development Costs	
Percent of Identified Mineral Tracts	18%
Percent of Undiscovered Mineral Areas	33%
Recreation Opportunity Spectrum Classes after 150 Years (millions of acres)	
Primitive and Semi-Primitive Non-Motorized	11.1
Semi-Primitive Motorized	1.2
Roaded Natural and Roaded Modified	4.5

[1] Totals may not add exactly due to rounding.
[2] Estimated forest land suitable for timber production represents the mapped suitable forest land minus the estimated portion that is unsuitable, but not mapped as such. The scheduled suitable forest land is the portion of the estimated suitable forest land that is scheduled for harvest by ASQ modeling.
[3] ASQ volumes expressed as annual averages and include sawlog plus utility.
[4] This evaluation provides an indication of potential effects; actual effects would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales are cancelled or exempted as part of the decision.

Comparison of the Alternatives

This section briefly compares the environmental consequences of the seven alternatives with respect to the key issues described in Chapter 1. This comparison is based on the effects analysis presented in Chapter 3.

Prior to presenting the effects comparison, four tables and a figure are displayed to help the reader compare the differences among the alternatives. Table 2-17 and Figure 2-8 summarize the LUD allocations of the alternatives using LUD Group combinations. The four LUD Groups combine the individual LUDs in terms of similarities in management and/or potential effects as described in the *Introduction* to Chapter 3. The other components that help define each alternative beyond LUD allocations are summarized in Table 2-18.

Table 2-19 displays some of the key indicators or measures that are used to quantitatively compare the alternatives relative to the key issues. In addition, Table 2-20, located at the end of this chapter, represents a "Summary of Effects Matrix." This table allows the reader to compare the effects of the alternatives on essentially all resource areas simultaneously, so that a cumulative picture of the net effects can be obtained. This table presents many quantitative measures, but it uses qualitative comparisons where quantitative measures are not feasible. In this regard, it may be used to help consider the net public benefits associated with each alternative.

Key Issue 1 – Protection of high value roadless areas from road development and timber harvest activity on the Tongass National Forest is of local and national importance, particularly for wildlife and biodiversity, recreation, and tourism.

The Tongass includes very large undeveloped land areas, with several portions of the Forest consisting of contiguous roadless areas that exceed one million acres (and are often many times larger than that) and represent large, unfragmented blocks of wildlife habitat. This scale of roadless lands is not available elsewhere in the National Forest System, except on the Chugach National Forest.

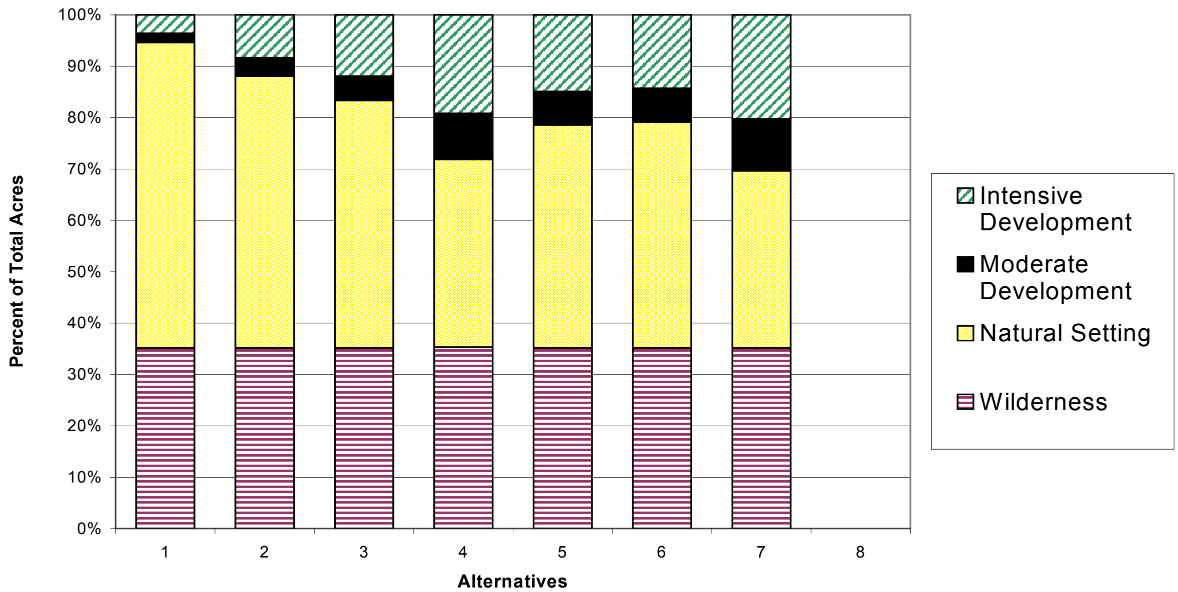
Roadless areas are considered important because of their wildlife habitat and recreation values and their importance for tourism. They are also important because of the passive use values and ecosystem services values they provide. Passive use values represent the value that individuals assign to a resource independent of their use of that resource and typically include existence, option, and bequest values.

Table 2-17
Land Use Designation Group Comparison by Alternative (million acres)[1]

Alternative	Wilderness[2]	Natural Setting	Moderate Development	Intensive Development
1	5.9	10.0	0.3	0.6
2	5.9	8.9	0.6	1.4
3	5.9	8.1	0.8	2.0
4	5.9	6.1	1.5	3.2
5	5.9	7.3	1.1	2.5
6	5.9	7.4	1.1	2.4
7	5.9	5.8	1.7	3.4

[1] LUD Group combinations are described in the *Introduction* to Chapter 3 (Table 3.1-1).
[2] Wilderness LUD group includes 166.942 acres of Nonwilderness National Monument.
Note: Roadless area acreages are correlated with, but not the same as the LUD Group acreages. For example, some roads exist within portions of some Natural Setting LUDs and no roads exist in many areas of development LUDs.

Figure 2-8
Land Use Designation Group Comparison by Alternative (percent)



Direct Effects on Roadless Areas

The Tongass National Forest is about 91 percent roadless, including wilderness. Only small areas where communities are developing, or where road construction and timber harvest have occurred, are "developed" to any noticeable degree. Developed areas and small unroaded areas (not included in inventoried roadless areas) cover about 1.51 million acres, or about 9 percent of the Tongass, wilderness covers about 5.75 million acres, or about 34 percent, and inventoried roadless areas (outside of wilderness) cover about 9.51 million acres, or about 57 percent.

Alternative 1 is designed to avoid inventoried roadless areas. Because of this, after 100 years or more (and full development of these LUD areas) 91 percent of the Tongass and 85 percent of Southeast Alaska (all Alaska lands southeast of Yakutat Bay) would still be in roadless or wilderness.

Alternatives 2 and 3 would progressively enter more roadless areas with 0.8 million acres and 1.7 million acres of development LUDs in roadless areas, respectively. Alternative 2 would ultimately result in 87 percent of the Tongass and 82 percent of Southeast Alaska in roadless or wilderness and Alternative 3 would result in 83 percent and 79 percent.

Next in progression into roadless areas, Alternatives 5 and 6 would include 2.4 and 2.3 million acres of development LUDs in roadless, respectively. Alternative 5 would ultimately result in 80 percent of the Tongass and 76 percent of Southeast Alaska being in roadless or wilderness. These percentages would be 81 and 77 for Alternative 6.

Finally, Alternatives 4 and 7 both enter roadless areas to a higher degree. Alternative 4 would have 3.4 million acres of development LUDs in roadless and Alternative 7 would have 3.7 million. After 100 years or more of implementation, Alternative 4 would result in 76 percent of the Tongass and 73 percent of Southeast Alaska and Alternative 7 would result in 75 percent of the Tongass and 72 percent of Southeast Alaska continuing as roadless or in wilderness.

Distribution of Roadless Areas

Significant acreages of roadless areas would remain in all biogeographic provinces under all alternatives; however, some would maintain a higher percentage than others. Under Alternatives 1 and 2, none of the 21 biogeographic provinces within the Tongass boundary would contain less than 50 percent of their areas in Non-development LUDs. Alternative 1 would have 17 of the 21 provinces containing 90 percent or more acreage in non-development LUDs and Alternative 2 would have 13 provinces.

Table 2-18
Alternative Components

Component	Alternative						
	1	2	3	4	5	6	7
Alternative Base[1]	2003 – Alt 8	None	2003 – Alt 5	1997 – Alt 6	1997 – Alt 11	1997 – Alt 11	1997 – Alt 2
Old-Growth Reserve Strategy[2]	All, plus refined Small OGRs	All, plus refined Small OGRs	All, plus refined Small OGRs	4 Biogeo. Provinces	All	All, plus refined Small OGRs	None
OG Retention/VCU	None	None	None	33%	None	None	None
Beach & Estuary Fringe Buffer	Beach = 1,000' Estry.= 1,000'	Beach = 1,000' Estry.= 1,000'	Beach = 1,000' Estry.= 1,000'	Beach = 1,000' Estry.= 1,000'	Beach = 1,000' Estry.= 1,000'	Beach = 1,000' Estry.= 1,000'	Beach = 500' Estry.= 1,000'
Riparian S&Gs	Same as 1997 Forest Plan	Same as 1997 Forest Plan	Same as 1997 Forest Plan	Same as 1997 Forest Plan	Same as 1997 Forest Plan	Same as 1997 Forest Plan	Same as '97 Plan, but no Class III buffers
1997 Goshawk & Marten S&Gs	No	No	No	No	Yes	No	No
New Forest-wide Legacy S&G	Yes	Yes	Yes	No	No	Yes	No
Goshawk Nest S&Gs	Apply Revised Version	Apply Revised Version	Apply Revised Version	Apply Revised Version	Apply Original Version	Apply Revised Version	Apply General Raptor S&Gs Only
Modified Small Old-Growth Reserve Boundaries	Yes	Yes	Yes	No	No	Yes	No
Experimental Forest Replacement	Yes	Yes	Yes	Yes	No	Yes	Yes
Additional/Modified Geologic Special Interest Areas	Yes	Yes	Yes	Yes	No	Yes	Yes
Other S&G Changes in Proposed Forest Plan	Yes	Yes	Yes	Yes	No	Yes	No

[1] Identifies the previous Forest Plan NEPA document and the specific alternative that the current alternative is largely based on (1997 = the 1997 FEIS; 2003 = 2003 SEIS). However, many changes have been made.
[2] This component refers to the use of the system of old-growth habitat reserves to address wildlife viability. Such a system is in addition to reserves that already exist, such as within Wilderness or Legislated LUD II areas.

Definitions
Reserves:
All = Large, Medium, and Small reserves identified in the current Forest Plan
4 Biogeo. Provinces = N. POW, Kupreanof/Mitkof, Dall Island, NE Chichagof, and individual reserves (Myers Chuck, Lake Eva, Wright Lake).
S&Gs = Standards and Guidelines
VCU = Value Comparison Unit (roughly a watershed)

Table 2-19
Comparison of Alternatives

Resource/Category	Unit of Measure	Alternative 1	2	3	4	5	6	7
Key Issue 1 – Long-term Protection of High-value Roadless Areas								
Inventoried Roadless Areas in development LUDs (acres and percent of all roadless areas)	Millions of Acres	0.0	0.8	1.7	3.4	2.4	2.3	3.7
	Percent	0	9	18	36	26	24	39
Amount of Timber Harvest in current Inventoried Roadless Areas after 100+ years	Thousands of Acres	0	89	186	498	316	307	583
Minimum Percent of Tongass in Inventoried Roadless Areas after 100+ years (assumes 75% of development LUD areas and 0% of non-development LUD areas become roaded)	Percent	57	53	49	41	46	46	40
Percent of Tongass in Wilderness (including Wilderness National Monument)	Percent	34	34	34	34	34	34	34
Percent of Tongass in Wilderness and Inventoried Roadless Areas after 100+ years	Percent	91	87	83	76	80	81	75
Percent of Southeast Alaska in Wilderness and Inventoried Roadless Areas after 100+ years (assumes all non-NFS lands become roaded, except for Glacier Bay NP and 50% of non-NFS lands in the Haines/Skagway area)	Percent	85	82	79	73	76	77	72
Number of the 21 Biogeographic Provinces with Less than 50% of Tongass Lands in Non-development LUDs	Count	0	0	2	5	3	3	5
Key Issue 2—Provision of Sufficient Timber to Meet Market Demand								
Long-Term Effects (Second Decade On)								
Percent Change in Suitable Acres	Percent							
ASQ (average annual)	MMBF	49	151	205	360	267	267	421
NIC I Component of the ASQ	MMBF	49	143	187	314	239	236	370
Ability to Meet the Timber Demand Scenarios in 2022								
Scenario 1—Limited Lumber Industry	Yes/No	No	Yes	Yes	Yes	Yes	Yes	Yes
Scenario 2—Expanded Lumber Industry	Yes/No	No	No	Yes	Yes	Yes	Yes	Yes
Scenario 3—Medium Integrated Industry	Yes/No	No	No	Yes	Yes	Yes	Yes	Yes
Scenario 4—High Integrated Industry	Yes/No	No	No	No	Yes	No	No	Yes
Annual Harvest as a Percent of Processing Capacity								
Active Installed Processing Capacity (261 MMBF)	Percent	9	27	36	60	46	45	71
Total Installed Processing Capacity (361 MMBF)	Percent	7	20	26	43	33	33	51

Table 2-19 (continued)
Comparison of Alternatives

Resource/Category	Unit of Measure	Alternative 1	2	3	4	5	6	7
Key Issue 2—Provision of Sufficient Timber to Meet Market Demand (continued)								
Direct Employment								
Logging	Job-Years	365	583	680	880	803	801	1,098
Sawmills	Job-Years	129	336	428	616	544	542	823
Total	Job-Years	**494**	**919**	**1,108**	**1,496**	**1,346**	**1,343**	**1,922**
Total Net Change from Alternative 5 (No Action)	Percent	-63	-32	-18	11	0	0	43
Direct Income								
Logging	$ million	15.4	24.6	28.7	37.2	33.9	33.8	46.4
Sawmills	$ million	4.1	10.6	13.6	19.5	17.2	17.2	26.1
Total	$ million	**19.5**	**35.3**	**42.3**	**56.7**	**51.1**	**51.0**	**72.5**
Potential Short-Term Effects (2007 to 2009) [1]								
Effect on Timber Volume Under Contract	Percent	High	None	None	None	None	None	None
Effect on NEPA-Cleared Timber Volume	Percent	Low	Low	None	None	None	None	None
Effect on Timber Volume in Preparation	Percent	Low	Very Low	Very Low	None	None	None	None
Key Issue 3 – Protection of Wildlife Habitat and Biodiversity								
Harvest of Productive Old Growth								
Maximum Harvest of Productive Old Growth on NFS Lands after 100+ years	Thousands of Acres	86	215	313	656	463	445	807
Minimum Percent of Original Productive Old Growth Remaining on NFS Lands after 100+ years	Percent	90	88	86	79	83	83	77
Minimum Percent of Original Productive Old Growth Remaining on All Lands in SE Alaska after 100+ years	Percent	82	80	78	73	76	76	71
Road Development								
Maximum New Road Miles Developed on NFS lands after 100+ years (4,942 miles of existing roads)	Miles	774	2,079	2,799	4,890	3,874	3,744	5,825
Percent of WAAs with Total Road Density on NFS Lands greater than 1.0 mile/sq.mile after 100+ years (currently 8% of 188 WAAs)	Percent	11	16	18	23	19	18	25
Number of WAAs with Total Road Density on All Lands (Inside Forest Boundary) greater than 1.0 mile/sq.mile after 100+ years (currently 14% of 191 WAAs)	Percent	20	23	24	28	26	25	31

[1] This evaluation provides an indication of potential effects; actual effects would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales are cancelled or exempted as part of the decision.

Table 2-19 (continued)
Comparison of Alternatives

Resource/Category	Unit of Measure	Alternative 1	2	3	4	5	6	7
Key Issue 3 – Protection of Wildlife Habitat and Biodiversity (continued)								
Representation of Old Growth Forests								
Number of Biogeographic Provinces with 75% or more of the Original Productive Old Growth Remaining after 100+ years – All Lands in SE Alaska (currently 22 out of 23)*	Count	19	18	16	12	13	13	11
Number of Biogeographic Provinces with less than 50% of the Original Productive Old Growth Remaining after 100+ years – All Lands in SE Alaska (currently 0 out of 23)*	Count	0	0	0	1	0	0	1
Number of Biogeographic Provinces with more than 50% of the Original Large-tree Productive Old Growth Remaining after 100+ years – All Lands in SE Alaska (currently 4 out of 23)	Count	16	16	16	14	16	16	13
Conservation Strategy and Landscape Connectivity								
Landscape connectivity: Number of critical pinch-points with negative effects	Count	0	1	1	3	1	1	4
Abundance and distribution of high quality old-growth forest blocks in OGRs and other Non-development LUDs after 100+ years	Qualitative	Good to Excellent	Good to Excellent	Good to Very Good	Poor to Good	Good to Very Good	Good to Very Good	Poor
Species-Specific Effects								
Goshawks – Likelihood of maintaining viable, well-distributed populations after 100+ years	Rating	Very High	Very High	Very High	Moderately High	High	High	Moderate
Marten – Likelihood of maintaining viable, well-distributed populations after 100+ years	Rating	Very High	High	High	Moderate	Moderate	Moderate	Moderate
Wolf – Likelihood of maintaining viable, well-distributed populations after 100+ years	Rating	Very High	Very High	High	High	High	High	Moderately High
Brown Bear – Likelihood of maintaining viable, well-distributed populations after 100+ years	Rating	Very High	High	High	Moderately High	High	High	Moderately High
Endemic Mammals – Likelihood of maintaining viable, well-distributed populations for all endemics after 100+ years	Rating	Moderate	Moderate	Moderate	Moderately Low	Moderate	Moderate	Very Low
Deer habitat capability on NFS Lands after 100+ years in Terms of Percent of Original (1954) Habitat Capability (88% currently)	Percent	86	84	83	79	81	82	77

* 21 Biogeographic Provinces inside the Forest Boundary plus 2 outside (Chilkat River Complex and Glacier Bay/Fairweather Range)

Alternative 3 would have two biogeographic provinces and Alternatives 5 and 6 would have three provinces with less than 50 percent their acreage in non-development LUDs. The lowest percentage would be for the Etolin Island and Vicinity province with 43 percent under Alternative 3 and for the Kupreanof/Mitkof Island province with 36 percent under Alternative 5 and 39 percent under Alternative 6. Alternative 3 would have 9 of the 21 provinces and Alternative 5 and 6 would have 6 of the 21 provinces with 90 percent or more of their acreage in non-development LUDs.

Alternatives 4 and 7 would each result in five biogeographic provinces with less than 50 percent in non-development LUDs. The lowest percentage would be for the Etolin Island and Vicinity province with 20 percent under Alternative 4 and for the Kupreanof/Mitkof Island province with 18 percent under Alternative 7. Alternatives 4 and 7 would have 6 of the 21 provinces containing 90 percent or more of their acreage in non-development LUDs.

Key Issue 2 – The Tongass National Forest needs to provide a sufficient timber supply to meet the market demand and help maintain a vibrant economy in Southeast Alaska.

Timber from the Tongass National Forest is the main source of raw materials for the region's wood products industry.

Demand may be thought of as the different amounts of a product buyers are willing to purchase at different prices. Demand is not a single number, but instead a series of price-quantity relationships. The same is true of supply. It is the combination of supply and demand that determines the quantity and price of goods produced and consumed.

Accurately projecting future demand is difficult. Market demand for Southeast Alaska timber and wood products depends upon numerous difficult to predict factors, including changes in technology, growth and exchange rates in key markets, changes in consumer tastes and preferences, as well as developments in other producing regions whose products compete with those of Alaska.

The average timber sale on the Tongass includes spruce, hemlock, and cedar and results in a variety of log grades and species. In most forested conditions, the tree species, tree sizes and tree quality are all mixed together. When a timber sale is purchased by a sawmill owner, they are usually required to purchase all of the volume in that sale regardless of the composition. At present, none of the purchasers are set up to efficiently process all grade and species from such sales, nor is the local industry set up to process all of the components of the timber sales. In the absence of a facility to use utility and lower grade logs, a timber sale must be sustained solely on the profits made from the higher grade sawlogs, even though the operator must harvest and pay for the lower grade logs.

It should be noted that the Alaska Regional Forester (Region 10) signed a new policy in March 2007 that approved limited interstate shipments of unprocessed Sitka spruce and western hemlock. This policy is expected to increase the utilization of timber harvested on the Tongass and improve overall timber sale economics by providing a market for smaller diameter and low grade material that cannot be processed profitably by sawmills in Southeast Alaska.

The wood products analysis prepared for this EIS is divided into long- and short-term effects. The long-term effects analysis evaluates the alternatives with respect to a) the projections developed by the Pacific Northwest Research Station of the Forest Service, and b) current production levels, installed capacity, and the minimum volumes required by various processing facilities. These benchmarks are used to evaluate the long-term effects of the alternatives. Long-term effects are assessed based on the ASQ projected under each alternative.

The short-term effects analysis discusses three key components of the "timber pipeline": volume under contract, NEPA-cleared volume (i.e., sales that have approved NEPA documents but have not yet been sold), and timber volume in preparation (i.e., proposed sales that are currently being evaluated under the NEPA process).

Long-Term Effects

PNW Projections. The Forest Service commissioned the Pacific Northwest Research Station to determine the maximum amount of timber product volume that could be sold over time (planning cycle market demand) and to develop a series of demand estimates as the industry grew to meet this output level. This resulted in a "derived demand" analysis that projected various demand figures for four scenarios based upon differing assumptions about future markets and future processing facilities in Southeast Alaska (Brackley et al. 2006). These future visions of the Southeast Alaska wood products industry are hypothetical and presented here to illustrate the type of developments that might take place in cases where different volumes are made available for harvest. The transition from one scenario to the next involves new private investment and market development. A key factor in attracting new investment is whether or not a supply of timber "shelf volume" is available for purchase.

Alternatives 1 through 4 were designed to correspond with Scenarios 1 through 4, respectively, while also responding to other concerns. The discrepancy between the second decade ASQs for Alternatives 1 and 2 and projected demand for 2022 under Scenarios 1 and 2 reflects these other concerns. These scenarios are briefly summarized in the following paragraphs, along with the ability of the alternatives to meet each scenario in 2022.

Scenario 1 – Limited Lumber Production. This scenario approximates the status of the timber industry in Southeast Alaska at the time that the Brackley et al. study was completed. Total derived demand is projected to be 68 MMBF in 2022 under this scenario. It is likely that this volume would be primarily logs from more economical (NIC I) lands.

Alternative 1, with a projected total output of 49 MMBF, could not provide sufficient volume to meet this scenario as currently modeled.

Alternatives 2, 3, 4, 5, 6, and 7 could all provide sufficient volume to meet this scenario in 2022.

Scenario 2 – Expanded Lumber Production. This scenario also projects that only higher value logs are processed, with limited new investments in the existing mills in Southeast Alaska. Total derived demand is projected to be 187 MMBF in 2022 under this scenario. As in Scenario 1, it is likely that this volume would be primarily higher value logs from the more economical (NIC I) lands.

Alternatives 1 and 2, with projected total outputs of 49 MMBF and 151 MMBF, respectively, could not provide sufficient volume to meet this scenario.

Alternatives 3, 4, 5, 6, and 7 could all provide sufficient volume to meet this scenario.

Scenario 3 – Medium Integrated Industry. This scenario builds on Scenario 2 and would establish processing capacity to fully utilize sawlogs and low grade and utility logs from federal and state timber sales. Under this scenario the current sawlog milling capacity would operate efficiently and new processing capacity would be developed to utilize the material that has formerly been left in the woods or exported. Total derived demand is projected to be 204 MMBF in 2022 under this scenario.

> Alternatives 1 and 2 with projected total outputs of 49 MMBF and 151 MMBF, respectively, could not provide sufficient volume to meet this scenario.
>
> Alternatives 3, 4, 5, 6, and 7 could provide sufficient volume to meet this scenario.

Scenario 4 – High Integrated Industry. This scenario builds on Scenario 3 and provides an estimate of the upper market level for the foreseeable future. In order for this situation to be realized, new investments in processing capacity would need to be made and additional market shares established. Total derived demand is projected to be 342 MMBF in 2022 under this scenario.

> Alternatives 1, 2, 3, 5 and 6 with projected total outputs of 49 MMBF, 151 MMBF, 205 MMBF, 267 MMBF, and 267 MMBF respectively, could not provide sufficient volume to meet this scenario.
>
> Alternatives 4 and 7 could provide sufficient volume to meet this scenario.

The ability of the seven alternatives to supply enough timber to satisfy the projected demand for timber under each scenario is summarized in Table S-1.

Current Production Levels, Installed Capacity, and Minimum Volumes Required by Various Processing Facilities. The existing mills in Southeast Alaska had an estimated active installed processing capacity of 261 MMBF in 2006 and a total processing capacity of 361 MMBF. The estimated NIC I components of the harvest volumes projected under each alternative range from 9 percent of the active installed processing capacity under Alternative 1 to 71 percent under Alternative 7. The NIC I volume projected under Alternative 5 (No Action) represents about 46 percent of the existing active processing capacity. The projected NIC I components represent smaller shares of the total installed capacity, ranging from 7 percent under Alternative 1 to 51 percent under Alternative 7.

Two of the future demand scenarios evaluated by Brackley et al. (2006a) involve an integrated industry. These scenarios are based on the assumption that as stable volumes get higher, the industry will develop in an integrated fashion, with operations and production that utilize materials that are inefficient or excess to one another's production. The potential components of an integrated industry could include sawmills, a veneer plant, and a medium density fiberboard (MDF) or bioenergy facility, among others. The different facilities would process different types of log. Sawmills would generally process higher quality material (high grade sawlogs), with the other types of facility processing lower quality material (low grade sawlogs and utility logs).

Based on the projected harvest volumes, only Alternatives 4 and 7 would provide sufficient volume to support an integrated industry that consisted of the existing sawmills, a veneer plant, and an MDF or Bioenergy facility. Under Alternative 5 (No Action), there would be sufficient volume to support the existing sawmills. There would also be sufficient volume to support one or more veneer plants or an MDF or other chip-related operation, but not both.

A number of timber projections were reviewed as part of this analysis. Based on this review, the Forest Service identified a potential upper planning cycle demand of

360 MMBF from all sources. Only Alternative 7 includes sufficient volume to meet this level of demand only from NFS acres.

Direct Employment and Income. Direct sawmill and logging employment estimates are presented in job-years, which represent the equivalent of one year's employment. This potential employment would not necessarily occur all in one year and estimated job totals do not directly translate into estimated numbers of affected workers. These estimates assume a linear relationship between harvest and employment levels, with a one percent change in harvest resulting in a one percent change in employment. In reality, changes in volume will have a lagged response in employment, but the assumed linear relationship is an approximation that can be used to compare alternatives.

Based on projected harvest volumes, average annual direct wood products employment would range from 494 annualized jobs under Alternative 1 to 1,922 jobs under Alternative 7. Approximately 274 of these annualized jobs would be associated with non-Tongass harvest under each alternative. Viewed in relation to Alternative 5 (No Action), projected direct employment would range from a 63 percent decrease under Alternative 1 to an increase of approximately 43 percent under Alternative 7.

Projected annual direct income, which is calculated based on the projected number of jobs, would range from $19.5 million under Alternative 1 to $72.5 million under Alternative 7. These totals also include income that would be generated by non-Tongass harvest.

Short-Term Effects

The following discussion provides an indication of potential short-term effects. Actual effects would depend on the volumes in each pool when the decision is implemented. In the case of the volume under contract, potential impacts would also depend on whether potentially affected sales were cancelled or exempted as part of the decision.

Volume under Contract. Alternative 1 would maintain the majority of the Inventoried Roadless Areas on the Tongass in a natural condition and would not allow timber harvest in those areas. Alternative 1 would affect 52 percent (54 MMBF) of the volume under contract as of August 2006 (104 MMBF). The volume currently under contract would not be affected by any of the other alternatives.

NEPA-Cleared Volume. Alternative 1 would affect 56 percent (255 MMBF) of the current NEPA-cleared volume as of August 2006 (454 MMBF). It should be noted that not all this volume is considered economic under current market conditions. Alternative 2 would affect 44 percent or 198 MMBF of this volume, which represents the volume that has passed through the NEPA process and is scheduled to be available for sale in the near future. None of the other alternatives would affect this volume.

Timber Volume in Preparation. Alternative 1 would affect 56 percent (298 MMBF) of the timber volume in preparation as of September 2006 (536 MMBF). Alternatives 2 and 3 would each affect approximately 7 percent or 40 MMBF of this volume. Alternatives 4, 5, 6, and 7 would not affect this volume.

Key Issue 3 – Protection of the wildlife habitat and biodiversity of the Tongass National Forest is of local and national significance and is affected by road development and timber harvest activities.

The Tongass National Forest supports a unique and important assemblage of wildlife including the largest population of brown bears and breeding bald eagles in the world, species of high importance for subsistence (e.g., Sitka black-tailed deer), an extensive array of endemic mammals and other species, and a large number of species that are at least partially dependent on old-growth habitats (e.g., marten and goshawk). Populations of many of these species and the biodiversity of Southeast Alaska are affected by timber harvest and the development of roads.

Old-Growth Harvest

The amount of harvest of POG is a key indicator of effects on many species, including goshawks, marten, endemic mammals, and deer (to some degree). The range of old-growth harvest is broad among the alternatives. Alternative 1 has the lowest maximum harvest of POG at 86,000 acres, while Alternative 7 has the highest maximum at 807,000 acres. After 100 years or so, a minimum of 90 percent of all POG on NFS lands would remain under Alternative 1 and 77 percent would remain under Alternative 7. Percentages for all of Southeast Alaska, including non-NFS lands, would be 82 percent for Alternative 1 and 71 percent for Alternative 7. The other five alternatives would rank between Alternatives 1 and 7; their order from lowest to highest harvest would have Alternative 2 at the low end progressing to Alternative 3, then 6, then 5, and then 4.

Road Development

The Tongass currently has 4,941 miles of existing roads (including closed and non-system roads). This total includes 2,619 miles of open roads, plus 913 miles of closed roads that are in storage and 1,409 miles of non-system roads. Road construction can negatively affect wildlife by eliminating habitats and by permitting increased access, which can result in increased harvests and human-large predator interactions.

Under Alternative 1, an estimated maximum of 774 new road miles would be developed over 100 years. For Alternatives 2 and 3 the estimated maximum new road construction would be 2,079 and 2,799 miles, respectively. The majority of these road miles would be closed after harvest activities are completed, and reopened at the next entry. The maximum road miles to be constructed under Alternatives 5 and 6 would be 3,874 and 3,744, respectively. Alternative 4 would construct a maximum of 4,890 miles of new road and Alternative 7 would construct a maximum of 5,825 miles of new road.

A better indicator of road effects on wildlife is the road density within Wildlife Analysis Areas (WAA). On Tongass NFS lands, 8 percent of the WAAs that make up the Tongass have a road density greater than 1.0 mile per square mile under existing conditions. Road density would increase in many areas after full implementation of the alternatives. Under Alternative 1, the density would increase so that a maximum of 11 percent of the WAAs would have a density greater than 1.0 mile per square mile. Alternatives 2, 3, and 6 would have a maximum of 16 tp 18 percent, Alternative 5 would have a maximum of 19 percent, and Alternatives 4 and 7 would have 23 to 25 percent. These percentages would increase further when cumulative road development, including future road development on non-NFS lands, is considered. The percentage of WAAs with road density on all lands (including non-NFS lands) greater than 1.0 mile per square mile would be 20 percent for

Alternative 1, 23 to 26 percent for Alternatives 2, 3, 5, and 6, and 28 to 31 percent for Alternatives 4 and 7.

Representation of Old-Growth Forests

The percentage of POG remaining in each biogeographic province and in each ecological subsection is an indication of the degree to which all potentially valuable ecological communities remain fully represented.

After 100 years of Alternative 1 implementation, 19 of the 23 biogeographic provinces covering Southeast Alaska would have 75 percent or more of their POG remaining and none would have less than 50 percent (minimum value = 55 percent). For large-tree POG, 16 out of 23 provinces would have at least 50 percent of the original amount remaining (minimum value = 32%).

At the other end of the spectrum, after 100 years of implementation of Alternatives 4 or 7, 11 to 12 of the 23 biogeographic provinces would have 75 percent or more of their POG remaining and one would have less than 50 percent (minimum value = 44 percent for Alternative 7). Considering large-tree POG, 13 to 14 of the provinces would have at least 50 percent of the original amount remaining (minimum value = 29 percent under Alternative 7).

The other four alternatives (Alternatives 2, 3, 5, and 6) would all have values within these ranges; they would have 13 to 18 of the 23 biogeographic provinces covering Southeast Alaska with 75 percent or more of their POG remaining. None of these alternatives would have any biogeographic provinces with less than 50 percent of their POG. Each of them would also have 16 out of 23 provinces with least 50 percent of the original large-tree POG remaining (minimum value = 31%).

Conservation Strategy and Landscape Connectivity

An adequate amount and distribution of high quality old-growth blocks with good landscape connectivity is fundamental to the “coarse filter” aspect of the Old-Growth Forest Conservation Strategy and is important for the maintenance of viable, well-distributed populations of many species of wildlife. Because of the spacing of old-growth reserves and other non-development LUDs, Alternatives 1 and 2 would result in a good to excellent distribution of high quality old-growth blocks over the long term, and would have little to no effects on landscape “pinch-points.” Alternatives 3, 5, and 6 would have good to very good spacing of old-growth reserves and other non-development LUDs and would similarly effect only one “pinch-point.”

Under Alternative 4, the long-term result would be a good distribution of high quality old-growth blocks in the four biogeographic provinces with old-growth reserves, but a poor to fair distribution in the other provinces over the long term. The old-growth retention requirement would mitigate this to some degree, but would not necessarily result in blocks or large patches of POG being retained. This alternative would also negatively affect three critical landscape “pinch-points.”

Alternative 7 would result in a poor distribution of high quality old-growth blocks over the long term throughout most of the Tongass because of the lack of old-growth reserves, the lack of an old-growth retention requirement, and the high acreage of development LUDs. It would negatively affect four critical landscape “pinch-points” and result in a lower degree of landscape connectivity due to narrower beach buffers.

Species-Specific Effects

Expert panel viability assessments were conducted for key species to rate the alternatives considered in the 1997 Forest Plan Revision EIS. These ratings were transferred to the alternatives in this EIS, based on the four alternatives that are similar between EISs (i.e., 1997-Alternative 6 is similar to 2007-Alternative 4, 1997-Alternative 11 is similar to 2007-Alternatives 5 and 6, and 1997-Alternative 2 is similar to 2007-Alternative 7), and based on harvest acreage similarities. The ratings were also transferred into a relative qualitative description of the likelihood of maintaining viable, well-distributed populations so that the alternatives could more easily be compared.

Under Alternative 1, the likelihood of maintaining viable, well-distributed populations on the Tongass after 100 years is estimated to be very high for the goshawk, marten, wolf, and brown bear, and moderate for endemic mammals. Alternative 2 would rate almost as high. Under Alternative 3, this likelihood is estimated to be very high for the goshawk; high for the marten, wolf, and brown bear; and moderate for endemic mammals.

Alternatives 5 and 6 would have similar ratings. The likelihood of maintaining viable, well-distributed populations on the Tongass after 100 years is estimated to be high for the goshawk, wolf and brown bear; and moderate for the marten and endemic mammals.

Alternatives 4 and 7 rate the lowest among the alternatives. For Alternative 4, the likelihood of maintaining viable, well distributed populations on the Tongass after 100 years is estimated to be high for the wolf; moderately high for the goshawk and brown bear; moderate for the marten; and moderately low for endemic mammals. For Alternative 7, the likelihood is estimated to be moderately high for the wolf and brown bear; moderate for the goshawk and marten; and very low for endemic mammals.

Deer habitat capability expressed in terms of percent of 1954 values can be used to identify the amount of habitat change over time (current habitat capability = 88 percent of 1954 value, based on the deer model). After 100 years of Forest Plan implementation, the percentage for Alternative 1 could drop as low as 86 percent, 84 percent under Alternative 2, 83 percent under Alternative 3, 82 percent under Alternative 6, 81 percent under Alternative 5, 79 percent under Alternative 4, and 77 percent under Alternative 7. These percentages could be increased somewhat with more intensive management of young-growth forests.

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Table 2-20
Summary of Effects Matrix

Value/Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
PHYSICAL AND BIOLOGICAL ENVIRONMENT							
Karst							
Karst Resources: Forest Plan S&Gs fully protect high vulnerability karst lands and other karst areas also have S&Gs for protection. However, some effects may occur as a result of timber harvest and road construction. The relative effects on karst resources are proportional to the amount of karst lands in the mapped suitable forest land base.	Maximum harvest after 100+ years on karst lands is 12,000 acres of old growth and 17,000 acres of young growth. Implementation of S&Gs and site-specific mitigation measures will mitigate potential effects.	Maximum harvest after 100+ years on karst lands is 18,000 acres of old growth and 43,000 acres of young growth. Implementation of S&Gs and site-specific mitigation measures will mitigate potential effects.	Maximum harvest after 100+ years on karst lands is 20,000 acres of old growth and 46,000 acres of young growth. Implementation of S&Gs and site-specific mitigation measures will mitigate potential effects.	Maximum harvest after 100+ years on karst lands is 33,000 acres of old growth and 53,000 acres of young growth. Implementation of S&Gs and site-specific mitigation measures will mitigate potential effects.	Maximum harvest after 100+ years on karst lands is 25,000 acres of old growth and 52,000 acres of young growth. Implementation of S&Gs and site-specific mitigation measures will mitigate potential effects.	Maximum harvest after 100+ years on karst lands is 23,000 acres of old growth and 50,000 acres of young growth. Implementation of S&Gs and site-specific mitigation measures will mitigate potential effects.	Maximum harvest after 100+ years on karst lands is 44,000 acres of old growth and 59,000 acres of young growth. Implementation of S&Gs and site-specific mitigation measures will mitigate potential effects.
Soils							
Soil Productivity, Erosion, and Mass Wasting: Changes in soil productivity are proportional to the extent of road development, with road development removing land from productive status. Soil erosion and mass wasting potential is also proportional to the extent of road development, as well as the amount of harvest on steep slopes.	Cumulative acres covered by road surfaces on NFS lands are estimated to increase by a maximum of 2,300 after 100 yrs. Amount of additional harvest on slopes ≥ 67% would be a maximum of 2,400 acres after 100 yrs.	Cumulative acres covered by road surfaces on NFS lands are estimated to increase by a maximum of 6,200 after 100 yrs. Amount of additional harvest on slopes ≥ 67% would be a maximum of 8,200 acres after 100 yrs.	Cumulative acres covered by road surfaces on NFS lands are estimated to increase by a maximum of 8,400 after 100 yrs. Amount of additional harvest on slopes ≥ 67% would be a maximum of 12,400 acres after 100 yrs.	Cumulative acres covered by road surfaces on NFS lands are estimated to increase by a maximum of 14,700 after 100 yrs. Amount of additional harvest on slopes ≥ 67% would be a maximum of 21,600 acres after 100 yrs.	Cumulative acres covered by road surfaces on NFS lands are estimated to increase by a maximum of 11,600 after 100 yrs. Amount of additional harvest on slopes ≥ 67% would be a maximum of 17,400 acres after 100 yrs.	Cumulative acres covered by road surfaces on NFS lands are estimated to increase by a maximum of 11,200 after 100 yrs. Amount of additional harvest on slopes ≥ 67% would be a maximum of 16,600 acres after 100 yrs.	Cumulative acres covered by road surfaces on NFS lands are estimated to increase by a maximum of 17,500 after 100 yrs. Amount of additional harvest on slopes ≥ 67% would be a maximum of 30,000 acres after 100 yrs.
Water and Wetlands							
Stream Flows: Effects on stream flows are expected to vary by watershed and are difficult to predict, but are expected to be small. Any effects that do occur are expected to be proportional to the extent of road development and harvest.	See cumulative acres covered by road surfaces under Soils, road development under Fish, and old-growth forest harvest under Biodiversity and Plants.	See cumulative acres covered by road surfaces under Soils, road development under Fish, and old-growth forest harvest under Biodiversity and Plants.	See cumulative acres covered by road surfaces under Soils, road development under Fish, and old-growth forest harvest under Biodiversity and Plants.	See cumulative acres covered by road surfaces under Soils, road development under Fish, and old-growth forest harvest under Biodiversity and Plants.	See cumulative acres covered by road surfaces under Soils, road development under Fish, and old-growth forest harvest under Biodiversity and Plants.	See cumulative acres covered by road surfaces under Soils, road development under Fish, and old-growth forest harvest under Biodiversity and Plants.	See cumulative acres covered by road surfaces under Soils, road development under Fish, and old-growth forest harvest under Biodiversity and Plants.
Wetlands: Effects of timber harvest and road construction are proportional to the extent of road development and harvest.	See cumulative acres covered by road surfaces under Soils, road development under Fish, and old-growth forest harvest under Biodiversity and Plants.	See cumulative acres covered by road surfaces under Soils, road development under Fish, and old-growth forest harvest under Biodiversity and Plants.	See cumulative acres covered by road surfaces under Soils, road development under Fish, and old-growth forest harvest under Biodiversity and Plants.	See cumulative acres covered by road surfaces under Soils, road development under Fish, and old-growth forest harvest under Biodiversity and Plants.	See cumulative acres covered by road surfaces under Soils, road development under Fish, and old-growth forest harvest under Biodiversity and Plants.	See cumulative acres covered by road surfaces under Soils, road development under Fish, and old-growth forest harvest under Biodiversity and Plants.	See cumulative acres covered by road surfaces under Soils, road development under Fish, and old-growth forest harvest under Biodiversity and Plants.
Public Water Supplies: The supply and quality of water produced by municipal watersheds.	No change in municipal watershed LUD.	No change in municipal watershed LUD.	No change in municipal watershed LUD.	No change in municipal watershed LUD.	No change in municipal watershed LUD.	No change in municipal watershed LUD.	No change in municipal watershed LUD.
Fish							
Fish Passage: Effects of road-stream crossings on fish passage are proportional to the length of roads constructed. However, Forest Plan S&Gs and monitoring are expected to reduce this impact to low levels for all alternatives over the long term.	Cumulative road development on NFS lands is expected to increase by a maximum of 774 miles after 100 yrs. This represents a 16% increase over existing conditions.	Cumulative road development on NFS lands is expected to increase by a maximum of 2,079 miles after 100 yrs. This represents a 42% increase over existing conditions.	Cumulative road development on NFS lands is expected to increase by a maximum of 2,799 miles after 100 yrs. This represents a 57% increase over existing conditions.	Cumulative road development on NFS lands is expected to increase by a maximum of 4,890 miles after 100 yrs. This represents a 99% increase over existing conditions.	Cumulative road development on NFS lands is expected to increase by a maximum of 3,874 miles after 100 yrs. This represents a 78% increase over existing conditions.	Cumulative road development on NFS lands is expected to increase by a maximum of 3,744 miles after 100 yrs. This represents a 76% increase over existing conditions.	Cumulative road development on NFS lands is expected to increase by a maximum of 5,825 miles after 100 yrs. This represents a 118% increase over existing conditions.
Fish Habitat: Effects on fish habitat can be measured by the amount of road development, road density, and timber harvest activity. However, Forest Plan S&Gs associated with riparian areas, wetlands, beach and estuary fringe, etc., are expected to reduce these effects to nonsignificant levels.	After 100 yrs, average road density would be a maximum of 0.22 mi/sq mi with 96% of VCUs having a density < 2 mi/sq mi. on NFS lands. Cumulative average road density on NFS and non-NFS lands combined would be a maximum of 0.42 mi/sq mi with 90% of VCUs having a density < 2 mi/sq mi. Also see road development under Fish Passage and harvest acres under Biodiversity.	After 100 yrs, average road density would be a maximum of 0.27 mi/sq mi with 94% of VCUs having a density < 2 mi/sq mi. on NFS lands. Cumulative average road density on NFS and non-NFS lands combined would be a maximum of 0.47 mi/sq mi with 88% of VCUs having a density < 2 mi/sq mi. Also see road development under Fish Passage and harvest acres under Biodiversity.	After 100 yrs, average road density would be a maximum of 0.30 mi/sq mi with 93% of VCUs having a density < 2 mi/sq mi. on NFS lands. Cumulative average road density on NFS and non-NFS lands combined would be a maximum of 0.49 mi/sq mi with 88% of VCUs having a density < 2 mi/sq mi. Also see road development under Fish Passage and harvest acres under Biodiversity.	After 100 yrs, average road density would be a maximum of 0.38 mi/sq mi with 92% of VCUs having a density < 2 mi/sq mi. on NFS lands. Cumulative average road density on NFS and non-NFS lands combined would be a maximum of 0.57 mi/sq mi with 86% of VCUs having a density < 2 mi/sq mi. Also see road development under Fish Passage and harvest acres under Biodiversity.	After 100 yrs, average road density would be a maximum of 0.34 mi/sq mi with 92% of VCUs having a density < 2 mi/sq mi. on NFS lands. Cumulative average road density on NFS and non-NFS lands combined would be a maximum of 0.53 mi/sq mi with 87% of VCUs having a density < 2 mi/sq mi. Also see road development under Fish Passage and harvest acres under Biodiversity.	After 100 yrs, average road density would be a maximum of 0.33 mi/sq mi with 93% of VCUs having a density < 2 mi/sq mi. on NFS lands. Cumulative average road density on NFS and non-NFS lands combined would be a maximum of 0.52 mi/sq mi with 87% of VCUs having a density < 2 mi/sq mi. Also see road development under Fish Passage and harvest acres under Biodiversity.	After 100 yrs, average road density would be a maximum of 0.41 mi/sq mi with 90% of VCUs having a density < 2 mi/sq mi. on NFS lands. Cumulative average road density on NFS and non-NFS lands combined would be a maximum of 0.60 mi/sq mi with 84% of VCUs having a density < 2 mi/sq mi. Also see road development under Fish Passage and harvest acres under Biodiversity.
Biodiversity and Plants							
Old-Growth Forest Harvest: Because of the importance of old-growth forests to the biodiversity of Southeast Alaska and because it is the habitat that is affected the most on both NFS and non-NFS lands, a measure of effects on biodiversity and plants is the maximum amount of productive old growth (POG) harvest.	A maximum of 86,000 acres of POG would be harvested on NFS lands after 100 yrs. Assuming all of these acres were harvested, approximately 90% of original POG on NFS lands and 82% of original POG on all lands in SE Alaska would remain (past and future harvest on non-NFS lands is included).	A maximum of 215,000 acres of POG would be harvested on NFS lands after 100 yrs. Assuming all of these acres were harvested, approximately 88% of original POG on NFS lands and 80% of original POG on all lands in SE Alaska would remain (past and future harvest on non-NFS lands is included).	A maximum of 313,000 acres of POG would be harvested on NFS lands after 100 yrs. Assuming all of these acres were harvested, approximately 86% of original POG on NFS lands and 78% of original POG on all lands in SE Alaska would remain (past and future harvest on non-NFS lands is included).	A maximum of 656,000 acres of POG would be harvested on NFS lands after 100 yrs. Assuming all of these acres were harvested, approximately 79% of original POG on NFS lands and 73% of original POG on all lands in SE Alaska would remain (past and future harvest on non-NFS lands is included).	A maximum of 463,000 acres of POG would be harvested on NFS lands after 100 yrs. Assuming all of these acres were harvested, approximately 83% of original POG on NFS lands and 76% of original POG on all lands in SE Alaska would remain (past and future harvest on non-NFS lands is included).	A maximum of 445,000 acres of POG would be harvested on NFS lands after 100 yrs. Assuming all of these acres were harvested, approximately 83% of original POG on NFS lands and 76% of original POG on all lands in SE Alaska would remain (past and future harvest on non-NFS lands is included).	A maximum of 807,000 acres of POG would be harvested on NFS lands after 100 yrs. Assuming all of these acres were harvested, approximately 77% of original POG on NFS lands and 71% of original POG on all lands in SE Alaska would remain (past and future harvest on non-NFS lands is included).
Old-Growth Distribution and Representation: The percentage of POG and large-tree POG remaining in each biogeographic province for all of Southeast Alaska (including non-NFS lands) is an indication of the degree to which all potentially valuable ecological communities remain fully represented.	After 100 yrs, 19 of the 23 biogeographic provinces would have 75% or more of their POG remaining and none would have less than 50% (minimum value = 55%). For large-tree POG, 16 of the 23 would have at least 50% remaining and none would have less than 30% (minimum value = 32%).	After 100 yrs, 18 of the 23 biogeographic provinces would have 75% or more of their POG remaining and none would have less than 50% (minimum value = 54%). For large-tree POG, 16 of the 23 would have at least 50% remaining and none would have less than 30% (minimum value = 32%).	After 100 yrs, 16 of the 23 biogeographic provinces would have 75% or more of their POG remaining and none would have less than 50% (minimum value = 52%). For large-tree POG, 16 of the 23 would have at least 50% remaining and none would have less than 30% (minimum value = 32%).	After 100 yrs, 12 of the 23 biogeographic provinces would have 75% or more of their POG remaining and 1 would have less than 50% (minimum value = 49%). For large-tree POG, 14 of the 23 would have at least 50% remaining and none would have less than 30% (minimum value = 31%).	After 100 yrs, 13 of the 23 biogeographic provinces would have 75% or more of their POG remaining and none would have less than 50% (minimum value = 51%). For large-tree POG, 16 of the 23 would have at least 50% remaining and none would have less than 30% (minimum value = 31%).	After 100 yrs, 13 of the 23 biogeographic provinces would have 75% or more of their POG remaining and none would have less than 50% (minimum value = 51%). For large-tree POG, 16 of the 23 would have at least 50% remaining and none would have less than 30% (minimum value = 31%).	After 100 yrs, 11 of the 23 biogeographic provinces would have 75% or more of their POG remaining and 1 would have less than 50% (minimum value = 44%). For large-tree POG, 13 of the 23 would have at least 50% remaining and 1 would have less than 30% (minimum value = 29%).
Wildlife							
Conservation Strategy and Landscape Connectivity: An adequate amount and distribution of high quality old-growth blocks with good landscape connectivity is fundamental to the "coarse filter" aspect of the Old-Growth Forest Conservation Strategy and is important for the maintenance of viable, well-distributed populations of many species of wildlife	This alternative would result in a good to excellent distribution of high quality old-growth blocks over the long term, and would not have a major effect on landscape "pinch-points." In addition to more non-development LUDs, it would improve the protection of high quality old growth due to refinements in small old-growth reserve boundaries, relative to Alternative 5.	This alternative would result in a good to excellent distribution of high quality old-growth blocks over the long term, and would have some effect on one critical landscape "pinch-point." In addition to more non-development LUDs, it would improve the protection of high quality old growth due to refinements in small old-growth reserve boundaries, relative to Alternative 5.	This alternative would result in a good to very good distribution of high quality old-growth blocks over the long term, and would have some effect on one critical landscape "pinch-point." In addition to more non-development LUDs, it would improve the protection of high quality old growth due to refinements in small old-growth reserve boundaries, relative to Alternative 5.	This alternative would result in a good distribution of high quality old-growth blocks in the four biogeographic provinces with old-growth reserves, but a poor to fair distribution in the other provinces over the long term. It would negatively affect three critical landscape "pinch-points."	This alternative would result in a good to very good distribution of high quality old-growth blocks over the long term, and would have some effect on one critical landscape "pinch-point" on Prince of Wales Island.	This alternative would result in a good to very good distribution of high quality old-growth blocks over the long term, with improvements over Alternative 5 due to refinements in the small old-growth reserve boundaries. It would have some effect on one critical landscape "pinch-point" on Prince of Wales Island.	This alternative would result in a poor distribution of high quality old-growth blocks over the long term because of the lack of old-growth reserves, the lack of an old-growth retention requirement, and the high acreage of development LUDs. It would negatively affect 4 critical landscape "pinch-points" and result in a lower degree of landscape connectivity due to narrower beach buffers.
Key Species Distribution and Viability: Expert panel viability assessments were made for key species to rate the alternatives considered in the 1997 Forest Plan Revision EIS. These ratings can be transferred to the alternatives in this EIS, based on the four alternatives that are similar between EISs and harvest acreage similarities.	The likelihood of maintaining viable, well distributed populations on the Tongass after 100 years is estimated to be very high for the goshawk, marten, wolf, and brown bear, and moderate for endemic mammals.	The likelihood of maintaining viable, well distributed populations on the Tongass after 100 years is estimated to be very high for the goshawk and wolf; high for the marten and brown bear; and moderate for endemic mammals.	The likelihood of maintaining viable, well distributed populations on the Tongass after 100 years is estimated to be very high for the goshawk; high for the marten, wolf, and brown bear; and moderate for endemic mammals.	The likelihood of maintaining viable, well distributed populations on the Tongass after 100 years is estimated to be high for the wolf; moderately high for the goshawk and brown bear; moderate for the marten; and moderately low for endemic mammals.	The likelihood of maintaining viable, well distributed populations on the Tongass after 100 years is estimated to be high for the goshawk, wolf, and brown bear; and moderate for the marten and endemic mammals.	The likelihood of maintaining viable, well distributed populations on the Tongass after 100 years is estimated to be high for the goshawk, wolf, and brown bear; and moderate for the marten and endemic mammals.	The likelihood of maintaining viable, well distributed populations on the Tongass after 100 years is estimated to be moderately high for the wolf and brown bear; moderate for the goshawk and marten; and very low for endemic mammals.
Deer Habitat: Deer habitat capability expressed in terms of percent of 1954 values can be used to identify the amount of habitat change over time (current habitat capability = 88% of 1954 value, based on the deer model).	After 100 years, deer habitat capability would be a minimum of 86% of 1954 value on NFS lands. This value has the potential to be increased with young-growth management.	After 100 years, deer habitat capability would be a minimum of 84% of 1954 value on NFS lands. This value has the potential to be increased with young-growth management.	After 100 years, deer habitat capability would be a minimum of 83% of 1954 value on NFS lands. This value has the potential to be increased with young-growth management.	After 100 years, deer habitat capability would be a minimum of 79% of 1954 value on NFS lands. This value has the potential to be increased with young-growth management.	After 100 years, deer habitat capability would be a minimum of 81% of 1954 value on NFS lands. This value has the potential to be increased with young-growth management.	After 100 years, deer habitat capability would be a minimum of 82% of 1954 value on NFS lands. This value has the potential to be increased with young-growth management.	After 100 years, deer habitat capability would be a minimum of 77% of 1954 value on NFS lands. This value has the potential to be increased with young-growth management.

Table 2-20 (continued)
Summary of Effects Matrix

Value/Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
				HUMAN USES AND LAND MANAGEMENT			
Lands and Other Special Land Use Designations							
Lands: No significant environmental consequences from NFS land ownership administration activities under any alternatives. No land ownership adjustments are proposed under any alternatives. Potential changes to areas designated as Experimental Forest and Special Interest Area. No changes to Research Natural Areas; Wild, Scenic, or Recreational Rivers; or Municipal Watershed LUDs.	Forest Service would conduct land administration under the proposed Forest-wide standards and guidelines, which reflect minimal changes from the current (1997) Forest Plan. Recommended replacement of Young Bay Experimental Forest. Proposed designation of 23 new Special Interest Areas, with net increase of 47,000 acres.	Forest Service would conduct land administration under the proposed Forest-wide standards and guidelines, which reflect minimal changes from the current (1997) Forest Plan. Recommended replacement of Young Bay Experimental Forest. Proposed designation of 23 new Special Interest Areas, with net increase of 47,000 acres.	Forest Service would conduct land administration under the proposed Forest-wide standards and guidelines, which reflect minimal changes from the current (1997) Forest Plan. Recommended replacement of Young Bay Experimental Forest. Proposed designation of 23 new Special Interest Areas, with net increase of 47,000 acres.	Forest Service would conduct land administration under the proposed Forest-wide standards and guidelines, which reflect minimal changes from the current (1997) Forest Plan. Recommended replacement of Young Bay Experimental Forest. Proposed designation of 23 new Special Interest Areas, with net increase of 47,000 acres.	Lands would continue to be managed in accordance with the 1997 Forest Plan standards and guidelines under this alternative.	Forest Service would conduct land administration under the proposed Forest-wide standards and guidelines, which reflect minimal changes from the current (1997) Forest Plan. Recommended replacement of Young Bay Experimental Forest. Proposed designation of 23 new Special Interest Areas, with net increase of 47,000 acres.	Forest Service would conduct land administration under the proposed Forest-wide standards and guidelines, which reflect minimal changes from the current (1997) Forest Plan. Recommended replacement of Young Bay Experimental Forest. Proposed designation of 23 new Special Interest Areas, with net increase of 47,000 acres.
Transportation and Utilities							
National Forest Transportation System Roads: The level of projected timber harvest would affect the road system needed to manage the timber land base.	A maximum of 774 miles would be constructed over 100 yrs, resulting in a cumulative total of 5,716 total miles of open and closed roads at the end of this period.	A maximum of 2,079 miles would be constructed over 100 yrs, resulting in a cumulative total of 7,021 total miles of open and closed roads at the end of this period.	A maximum of 2,799 miles would be constructed over 100 yrs, resulting in a cumulative total of 7,741 total miles of open and closed roads at the end of this period.	A maximum of 4,890 miles would be constructed over 100 yrs, resulting in a cumulative total of 9,832 total miles of open and closed roads at the end of this period.	A maximum of 3,874 miles would be constructed over 100 yrs, resulting in a cumulative total of 8,816 total miles of open and closed roads at the end of this period.	A maximum of 3,744 miles would be constructed over 100 yrs, resulting in a cumulative total of 8,686 total miles of open and closed roads at the end of this period.	A maximum of 5,825 miles would be constructed over 100 yrs, resulting in a cumulative total of 10,767 total miles of open and closed roads at the end of this period.
Southeast Alaska Transportation Plan (SATP): The Forest Service signed a Memorandum of Understanding (MOU) with the State of Alaska in 2006 to provide rights-of-way for the road corridors covered by Public Law 109-59. The MOU also grants easements to the Forest Service for marine access points and LTFs listed on Map 92337.	There would be no effect on the SATP under this alternative.	There would be no effect on the SATP under this alternative.	There would be no effect on the SATP under this alternative.	There would be no effect on the SATP under this alternative.	There would be no effect on the SATP under this alternative.	There would be no effect on the SATP under this alternative.	There would be no effect on the SATP under this alternative.
Timber							
Suitable Forest Lands: Forest lands which are biologically capable of producing commercial wood products without irreversibly harming resources, have a reasonable assurance of adequate reforestation, and for which there is management direction that timber production is appropriate.	312,000 acres are estimated to be suitable; 144,000 acres of these are scheduled suitable lands.	545,000 acres are estimated to be suitable; 394,000 acres of these are scheduled suitable lands.	661,000 acres are estimated to be suitable; 514,000 acres of these are scheduled suitable lands.	999,000 acres are estimated to be suitable; 892,000 acres of these are scheduled suitable lands.	781,000 acres are estimated to be suitable; 687,000 acres of these are scheduled suitable lands.	774,000 acres are estimated to be suitable; 663,000 acres of these are scheduled suitable lands.	1,174,000 acres are estimated to be suitable; 1,070,000 acres of these are scheduled suitable lands.
Allowable Sale Quantity (ASQ): The ASQ is the maximum quantity of timber that may be scheduled from Suitable Forest lands for a 10-year period expressed as an annual average.	The ASQ for the 1st decade and after would be slightly over 49 MMBF.	The ASQ for the 1st decade and after would be 152 MMBF.	The ASQ for the 1st decade would be 185 MMBF. The ASQ for the 2nd decade and after would be 203 MMBF.	The ASQ for the 1st decade would be 312 MMBF. The ASQ for the 2nd decade and after would be 342 MMBF.	The ASQ for the next decade and after would be 267 MMBF.	The ASQ for the next decade and after would be 267 MMBF.	The ASQ for the next decade and after would be 421 MMBF.
Non-Interchangeable Component (NIC)I: NIC I is the portion of the ASQ that may be harvested using existing logging systems.	NIC I for the 1st and 2nd decades is estimated to be slightly less than 49 MMBF.	NIC I for the 1st and 2nd decades is estimated to be 144 MMBF.	NIC I for the 1st and 2nd decades is estimated to be 168 and 186 MMBF, respectively.	NIC I for the 1st and 2nd decades is estimated to be 270 and 294 MMBF, respectively.	NIC I for the 1st and 2nd decades is estimated to be 240 and 242 MMBF, respectively.	NIC I for the 1st and 2nd decades is estimated to be 237 and 236 MMBF, respectively.	NIC I for the 1st and 2nd decades is estimated to be 365 and 370 MMBF, respectively.
Existing Timber Volume Under Contract: Changing suitable land to non-development LUDs could affect timber sales that have been sold.	There is potential for a high effect on timber volume under contract; but this is dependent on the decision.	There would be no effect on the volume under contract under this alternative.	There would be no effect on the volume under contract under this alternative.	There would be no effect on the volume under contract under this alternative.	There would be no effect on the volume under contract under this alternative.	There would be no effect on the volume under contract under this alternative.	There would be no effect on the volume under contract under this alternative.
Minerals							
Mineral Resources: No modification of Forest Service management of mineral activities specific to any alternative. No change in acreage withdrawn from mineral entry, or lands assigned to Minerals LUD. Distribution of other LUD assignments by alternative could affect costs of mineral exploration, development, production or reclamation activities, which could influence level of future mineral activity,	**Identified Mineral Tracts:**	**Identified Mineral Tracts:**	**Identified Mineral Tracts:**	**Identified Mineral Tracts:**	**Identified Mineral Tracts:**	**Identified Mineral Tracts:**	**Identified Mineral Tracts:**
	Withdrawn: 25%	Withdrawn: 25%	Withdrawn: 25%	Withdrawn: 25%	Withdrawn: 25%	Withdrawn: 25%	Withdrawn: 25%
	Higher Cost Open Areas: 36%	Higher Cost Open Areas: 29%	Higher Cost Open Areas: 26%	Higher Cost Open Areas: 20%	Higher Cost Open Areas: 29%	Higher Cost Open Areas: 25%	Higher Cost Open Areas: 18%
	Undiscovered Mineral Areas:	**Undiscovered Mineral Areas:**	**Undiscovered Mineral Areas:**	**Undiscovered Mineral Areas:**	**Undiscovered Mineral Areas:**	**Undiscovered Mineral Areas:**	**Undiscovered Mineral Areas:**
	Withdrawn: 35%	Withdrawn: 35%	Withdrawn: 35%	Withdrawn: 35%	Withdrawn: 35%	Withdrawn: 35%	Withdrawn: 35%
	Higher Cost Open Areas: 57%	Higher Cost Open Areas: 51%	Higher Cost Open Areas: 45%	Higher Cost Open Areas: 35%	Higher Cost Open Areas: 41%	Higher Cost Open Areas: 41%	Higher Cost Open Areas: 33%
Recreation and Tourism							
Recreation Opportunity Spectrum: Current projections suggest that demand currently exceeds supply for Semi-Primitive Motorized settings in inventoried recreation places. The alternatives affect the supply of different recreation settings over time. The percentages shown here are for 150 years after implementation.	Primitive: 61%	Primitive: 61%	Primitive: 59%	Primitive: 55%	Primitive: 57%	Primitive: 57%	Primitive: 54%
	Semi-Primitive Non-Motorized: 18%	Semi-Primitive Non-Motorized: 16%	Semi-Primitive Non-Motorized: 15%	Semi-Primitive Non-Motorized: 13%	Semi-Primitive Non-Motorized: 14%	Semi-Primitive Non-Motorized: 14%	Semi-Primitive Non-Motorized: 12%
	Semi-Primitive Motorized: 8%	Semi-Primitive Motorized: 8%	Semi-Primitive Motorized: 8%	Semi-Primitive Motorized: 7%	Semi-Primitive Motorized: 8%	Semi-Primitive Motorized: 8%	Semi-Primitive Motorized: 7%
	Roaded Natural: 2%	Roaded Natural: 2%	Roaded Natural: 3%	Roaded Natural: 3%	Roaded Natural: 3%	Roaded Natural: 3%	Roaded Natural: 3%
	Roaded Modified: 10%	Roaded Modified: 13%	Roaded Modified: 16%	Roaded Modified: 23%	Roaded Modified: 19%	Roaded Modified: 18%	Roaded Modified: 23%
Home Range Recreation Places: Home range recreation places are those inventoried recreation places within an approximate 20-mile radius from one or more communities. The alternatives affect the LUD groups that these places would be managed under. The percentages shown here are percent of total home range recreation place acres by alternative.	Wilderness: 22%	Wilderness: 22%	Wilderness: 22%	Wilderness: 22%	Wilderness: 22%	Wilderness: 22%	Wilderness: 22%
	Natural Setting: 67%	Natural Setting: 58%	Natural Setting: 53%	Natural Setting: 37%	Natural Setting: 48%	Natural Setting: 49%	Natural Setting: 33%
	Moderate Development: 5%	Moderate Development: 9%	Moderate Development: 12%	Moderate Development: 19%	Moderate Development: 14%	Moderate Development: 13%	Moderate Development: 21%
	Intensive Development: 6%	Intensive Development: 10%	Intensive Development: 13%	Intensive Development: 21%	Intensive Development: 15%	Intensive Development: 15%	Intensive Development: 23%
Recreation Places Important for Tourism: The alternatives affect the LUD groups that recreation places that are important for tourism would be managed under. The percentages shown here are percent of total home range recreation place acres by alternative.	Wilderness: 46%	Wilderness: 46%	Wilderness: 46%	Wilderness: 46%	Wilderness: 46%	Wilderness: 46%	Wilderness: 46%
	Natural Setting: 51%	Natural Setting: 47%	Natural Setting: 43%	Natural Setting: 34%	Natural Setting: 40%	Natural Setting: 40%	Natural Setting: 33%
	Moderate Development: 2%	Moderate Development: 4%	Moderate Development: 5%	Moderate Development: 10%	Moderate Development: 7%	Moderate Development: 6%	Moderate Development: 11%
	Intensive Development: 1%	Intensive Development: 3%	Intensive Development: 6%	Intensive Development: 10%	Intensive Development: 7%	Intensive Development: 7%	Intensive Development: 10%
Scenery							
Scenic Integrity Objectives (SIOs): SIOs define the degree to which the natural landscape can be altered. Visual priority routes and use areas were used to identify seen and seldom seen areas and to map the appropriate SIO.	Visual priority routes and use areas would be protected. Approximately 62% of the Forest would be managed under the High SIO and 4% under Low and Very Low.	Visual priority routes and use areas would be protected. Approximately 62% of the Forest would be managed under the High SIO and 9% under Low and Very Low.	Visual priority routes and use areas would be protected. Approximately 61% of the Forest would be managed under the High SIO and 14% under the Low and Very Low.	Visual priority routes and use areas would be protected. Approximately 56% of the Forest would be managed under the High SIO and 23% under Low and Very Low.	Visual priority routes and use areas would be protected. Approximately 61% of the Forest would be managed under the High SIO and 18% under Low and Very Low.	Visual priority routes and use areas would be protected. Approximately 60% of the Forest would be managed under the High SIO and 17% under Low and Very Low.	Visual priority routes and use areas would be protected. Approximately 54% of the Forest would be managed under the High SIO and 25% under Low and Very Low.

Table 2-20 (continued)
Summary of Effects Matrix

Value/Resource	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Subsistence							
Abundance and Distribution: The majority of subsistence resources (fish and marine invertebrates) would not be affected. However, analysis suggests that deer habitat capabilities in portions of the Tongass may not be adequate to sustain current/future harvest levels under any of the alternatives. The possibility of a significant restriction in harvest resulting from changes in abundance and distribution is assessed in relation to Alternative 5 (No Action).	The possibility of a significant restriction would be lower relative to Alternative 5 (No Action) because of a 77% reduction in development LUD acreage under this alternative.	The possibility of a significant restriction would be lower relative to Alternative 5 (No Action) because of a 46% reduction in development LUD acreage under this alternative.	The possibility of a significant restriction would be slightly lower relative to Alternative 5 (No Action) because of a 22% reduction in development LUD acreage under this alternative.	The possibility of a significant restriction would be higher relative to Alternative 5 (No Action) because of a 31% increase in development LUD acreage under this alternative.	The possibility of a significant restriction, resulting from a change in abundance or distribution, would be the same under this alternative as under Alternative 11 in the 1997 Forest Plan FEIS.	The possibility of a significant restriction, resulting from a change in abundance or distribution, would be the same under this alternative as under Alternative 11 in the 1997 Forest Plan FEIS.	The possibility of a significant restriction would be higher relative to Alternative 5 (No Action) because of a 40% increase in development LUD acreage under this alternative.
Competition: The subsistence analysis concluded that there could be a significant possibility of a significant restriction of subsistence use through increased competition. The possibility of a significant restriction in harvest resulting from a change in competition is assessed in relation to Alternative 5 (No Action).	The possibility of a significant restriction, resulting from a change in competition, would be lower relative to Alternative 5 (No Action) because of a 80% reduction in proposed new road construction under this alternative.	The possibility of a significant restriction, resulting from a change in competition, would be lower relative to Alternative 5 (No Action) because of a 46% reduction in proposed new road construction under this alternative.	The possibility of a significant restriction, resulting from a change in competition, would be lower relative to Alternative 5 (No Action) because of a 28% reduction in proposed new road construction under this alternative.	The possibility of a significant restriction, resulting from a change in competition, would be higher relative to Alternative 5 (No Action) because of a 26% increase in proposed new road construction under this alternative.	The possibility of a significant restriction, resulting from a change in competition, would be the same under this alternative as under Alternative 11 in the 1997 Forest Plan FEIS.	The possibility of a significant restriction, resulting from a change in competition, would be slightly less under this alternative as under Alternative 11 in the 1997 Forest Plan FEIS.	The possibility of a significant restriction, resulting from a change in competition, would be higher relative to Alternative 5 (No Action) because of a 50% increase in proposed new road construction under this alternative.
Heritage Resources and Sacred Sites							
Heritage Resources and Sacred Sites: Potential for effects on these resources is proportional to the amount of harvest and road construction expected to occur. However, because of inventory and tribal consultation that is required, the risk of effects is relatively low.	See road development under Fish and old-growth forest harvest under Biodiversity and Plants as measures of the amount of disturbance. However, because of required inventory and tribal consultation, the risk of effects is relatively low.	See road development under Fish and old-growth forest harvest under Biodiversity and Plants as measures of the amount of disturbance. However, because of required inventory and tribal consultation, the risk of effects is relatively low.	See road development under Fish and old-growth forest harvest under Biodiversity and Plants as measures of the amount of disturbance. However, because of required inventory and tribal consultation, the risk of effects is relatively low.	See road development under Fish and old-growth forest harvest under Biodiversity and Plants as measures of the amount of disturbance. However, because of required inventory and tribal consultation, the risk of effects is relatively low.	See road development under Fish and old-growth forest harvest under Biodiversity and Plants as measures of the amount of disturbance. However, because of required inventory and tribal consultation, the risk of effects is relatively low.	See road development under Fish and old-growth forest harvest under Biodiversity and Plants as measures of the amount of disturbance. However, because of required inventory and tribal consultation, the risk of effects is relatively low.	See road development under Fish and old-growth forest harvest under Biodiversity and Plants as measures of the amount of disturbance. However, because of required inventory and tribal consultation, the risk of effects is relatively low.
Roadless Areas							
Roadless Areas: Roadless areas within moderate and intensive development LUDs would change from roadless to developed status over time.	No acres (0%) of existing roadless areas would be identified as suitable for harvest. The only acres in development LUDs would be Experimental Forests.	0.8 million acres (9%) of the existing roadless areas would be allocated to moderate and intensive development LUDs. Approximately 89,000 acres (0.9%) would be suitable and scheduled for harvest.	1.7 million acres (18%) of the existing roadless areas would be allocated to moderate and intensive development LUDs. Approximately 186,000 acres (2.0%) would be suitable and scheduled for harvest.	3.4 million acres (36%) of the existing roadless areas would be allocated to moderate and intensive development LUDs. Approximately 498,000 acres (5.2%) would be suitable and scheduled for harvest.	2.4 million acres (26%) of the existing roadless areas would be allocated to moderate and intensive development LUDs. Approximately 316,000 acres (3.3%) would be suitable for harvest.	2.3 million acres (24%) of the existing roadless areas would be allocated to moderate and intensive development LUDs. Approximately 307,000 acres (3.2%) would be suitable for harvest.	3.7 million acres (39%) of the existing roadless areas would be allocated to moderate and intensive development LUDs. Approximately 583,000 acres (6.1%) would be suitable for harvest.
Wilderness							
Wilderness: None of the alternatives involve recommending new areas for wilderness or LUD II designation. Roadless areas within the Tongass National Forest were evaluated for recommendations as potential wilderness in the 2003 Forest Plan SEIS (USDA Forest Service 2003).	Wilderness and LUD II areas would be managed under the updated and edited version of the current Forest Plan presented as the Proposed Land and Resource Management Plan.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Wilderness and LUD II areas would be managed under the current Forest Plan.	Same as Alternative 1.	Same as Alternative 1.
ECONOMIC AND SOCIAL ENVIRONMENT							
Economic Impact Analysis							
Long-Term Wood Products Effects: Long-term employment projections are based on the NIC I Component of the ASQ and include a projected non-Tongass harvest of 109 MMBF, which is the same under all the alternatives. Projections are average annual equivalents for the next 10 years and assume full implementation. These totals do not include indirect or induced employment effects.	Projected average annual direct employment would be 365 logging jobs and 129 sawmill jobs under this alternative.	Projected average annual direct employment would be 583 logging jobs and 336 sawmill jobs under this alternative.	Projected average annual direct employment would be 680 logging jobs and 428 sawmill jobs under this alternative.	Projected average annual direct employment would be 880 logging jobs and 616 sawmill jobs under this alternative.	Projected average annual direct employment would be 803 logging jobs and 544 sawmill jobs under this alternative.	Projected average annual direct employment would be 801 logging jobs and 542 sawmill jobs under this alternative.	Projected average annual direct employment would be 1,098 logging jobs and 823 sawmill jobs under this alternative.
Recreation and Tourism: Employment projections are based on a linear projection of demand and projected supply based on changes to ROS settings (see above). Projections are average annual equivalents for the next 10 years, based on the estimated non-resident share of recreation and tourism activity. These totals do not include indirect or induced employment effects.	Projected average annual direct employment would be 4,327 jobs under this alternative.	Projected average annual direct employment would be 4,323 jobs under this alternative.	Projected average annual direct employment would be 4,321 jobs under this alternative.	Projected average annual direct employment would be 4,312 jobs under this alternative.	Projected average annual direct employment would be 4,319 jobs under this alternative.	Projected average annual direct employment would be 4,319 jobs under this alternative.	Projected average annual direct employment would be 4,310 jobs under this alternative.
Salmon Harvesting and Processing: There is not expected to be any significant change to the commercial fishing or fish processing industries over the next decade as a result of National Forest activities.	The Forest Plan Riparian and other S&Gs and monitoring are expected to reduce the effects of potential development activities on fish passage and habitat to low levels over the long-term and are not expected to have significant effects on the commercial fishing and fish processing industries.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Economic Efficiency Analysis							
Present Net Value (PNV): Economic efficiency analysis measures the costs and benefits to society associates with a given alternative. PNV figures are calculated by subtracting discounted costs from discounted benefits to yield a net value. PNV is calculated for those costs and benefits that can be assigned monetary values, in this case timber, recreation and tourism, and program management costs.	The estimated PNV for this alternative is $7,112 million.	The estimated PNV for this alternative is $6,884 million.	The estimated PNV for this alternative is $6,782 million.	The estimated PNV for this alternative is $6,472 million.	The estimated PNV for this alternative is $6,657 million.	The estimated PNV for this alternative is $6,662 million.	The estimated PNV for this alternative is $6,294 million.
Non-Use Values: Non-use values are values that individuals assign to a resource independent of their use of that resource and include existence, option, and bequest values. These types of values are typically associated with undeveloped areas. Impacts to roadless areas are summarized above.	Approximately 1.2 million acres (7%) of the Tongass would be allocated to moderate and intensive development LUDs. Approximately 435,000 acres are estimated to be suitable for harvest.	Approximately 2.0 million acres (12%) of the Tongass would be allocated to moderate and intensive development LUDs. Approximately 563,000 acres are estimated to be suitable for harvest.	Approximately 3.0 million acres (18%) of the Tongass would be allocated to moderate and intensive development LUDs. Approximately 697,000 acres are estimated to be suitable for harvest.	Approximately 4.7 million acres (28%) of the Tongass would be allocated to moderate and intensive development LUDs. Approximately 1.01 million acres are estimated to be suitable for harvest.	Approximately 3.6 million acres (22%) of the Tongass would be allocated to moderate and intensive development LUDs. Approximately 809,000 acres are estimated to be suitable for harvest.	Approximately 3.6 million acres (22%) of the Tongass would be allocated to moderate and intensive development LUDs. Approximately 806,000 acres are estimated to be suitable for harvest.	Approximately 5.0 million acres (30%) of the Tongass would be allocated to moderate and intensive development LUDs. Approximately 1.15 million acres are estimated to be suitable for harvest.

CHAPTER 3

ENVIRONMENT AND EFFECTS

Environment and Effects

Introduction

This chapter combines the affected environment and environmental consequences discussions required by the National Environmental Policy Act (NEPA) implementing regulations (40 Code of Federal Regulations [CFR] 1500-1508). The discussions are combined so that the environmental consequences (effects) of the alternatives on forest resources and the background information needed to understand these consequences are discussed together for each resource. Each resource is first described by its current condition, uses, supply, and demand, or expected use, along with an explanation of how each resource is measured and evaluated. The descriptions are limited to providing the background information necessary for understanding how the Environmental Impact Statement (EIS) alternatives may affect the resource. Methodology and scientific accuracy is discussed for most resources.

Many of the relationships established and discussed in the 1997 Tongass Forest Plan Revision Final EIS and in the 2003 Supplemental EIS (SEIS), in particular, Chapter 3 of these documents, are still valid and, therefore, are incorporated by reference in this EIS. However, this EIS uses updated relevant information to better reflect current conditions and focuses on the potential effects most relevant to the potential changes that could occur from proposed amendment to the current Tongass Forest Plan standards and guidelines and Land Use Designations (LUDs).

Analyzing Effects

Following each resource description is a discussion of the potential effects (environmental consequences) to the resource associated with implementation of each EIS alternative. All significant or potentially significant effects, including direct, indirect, and cumulative effects, are disclosed. Effects are quantified, where possible, although qualitative discussions are also included. The means by which any identified potential adverse effects will be reduced or mitigated are also described.

Environmental consequences are the effects of implementing an alternative on the physical, biological, social, and economic environment. Direct environmental effects are defined as those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time, or are spatially removed from the activity but would be significant in the foreseeable future. Cumulative effects result from the incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

Potential adverse environmental effects that cannot be avoided are discussed. Unavoidable adverse effects are those resulting from managing the land for one resource at the expense of the use or condition of other resources. Many adverse effects can be reduced or mitigated by limiting the extent or duration of effects. The current Tongass Forest Plan is designed to mitigate potential adverse effects on forest resources and uses, especially through its mix of management prescriptions and Forest-wide standards and guidelines. Mitigation measures within standards and guidelines are specified for project activities to be implemented under the current Tongass Forest Plan.

Short-term uses, and their effects, are those that occur annually or within the first 10 years of Forest Plan implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services for 50 years and beyond. Long-term and cumulative effects may be projected out 100 years or more, as needed, to fully analyze the potential consequences for particular resources.

Irreversible and irretrievable resource commitments are normally not made at the programmatic level of a Forest Plan. Irreversible commitments are decisions affecting nonrenewable resources, such as soils, minerals, plant and animal species, and heritage resources. Such commitments of resources are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or the resource has been destroyed or removed. While the application of LUDs allowing land-altering activities can indicate the potential for such commitments, the actual commitment to develop, use, or affect nonrenewable resources is made at the project level. The gradual decline in old-growth habitat may be considered an irreversible commitment.

Irretrievable commitments represent opportunities foregone for the period during which resource use or production cannot be realized. These decisions are reversible, but the production opportunities foregone are irretrievable. An example of such commitments is the allocation of LUDs that do not allow timber harvest to areas containing suitable and accessible timberlands. For the time over which such allocations are made, the opportunity to obtain timber from those areas is foregone, thus irretrievable. Irreversible and irretrievable commitments are not identified, as such, in the discussions.

For estimating the effects of alternatives at the programmatic Forest Plan level, the assumption is made that the kinds of resource management activities <u>allowed</u> under the LUDs will in fact occur to the extent necessary to achieve the goals and objectives of each alternative. The actual location, design, and extent of such activities are, however, not known at this time because that is a project-by-project decision. In many cases, the discussions refer to the <u>potential</u> for effects to occur, realizing that in many cases these are only estimates.

The effects analysis is useful in comparing and evaluating alternatives, but should not be applied per se to any specific location within the Forest. Land management plans are tools for further agency planning and guide, but do not direct future management activities. The land management plan is a strategic plan that establishes a long-term management framework for the Tongass National Forest. Within that framework, specific projects and activities will be proposed, approved, and implemented depending on specific conditions, budgets, needs, proposals, and circumstances at that time. The plan can only speculate about the projects that may be proposed and budgeted and the events that may occur that will force changes in the projects and the effects of these projects. Thus, the effects presented here are comparative in nature. Specific effects that can be meaningfully measured and evaluated generally occur at the project and activity stage.

A strong effort was made throughout the current Tongass Forest Plan development process to obtain and use the best available information to evaluate and compare the effects of alternatives. NEPA implementing regulations (40 CFR 1502.22) state that when "there is incomplete or unavailable information, the agency shall always make clear that such information is lacking." This was done where appropriate. The NEPA requirement goes on to say that if the incomplete information "is essential to a reasoned choice among alternatives" then considerations, such as the cost of obtaining it, apply. The 1997 Tongass Forest Plan Revision Final EIS, the 2003 SEIS, and this EIS, along with their planning records, will provide the Forest Supervisor and Regional Forester with the "essential" information needed to make a reasoned choice among alternatives.

Cumulative Effects

As noted above, cumulative effects result from the incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. For this analysis, the region or study area considered for cumulative effects varied according to the resource being assessed.

For most aquatic or watershed-related resources, the area within the proclaimed Forest boundary (approximately 17.87 million acres, including 1.09 million acres of non-National Forest System [NFS] lands) was used, as defined by the Value Comparison Unit (VCU) map (see below for more detail on VCUs and see the VCU map on the CD version of this EIS). VCUs generally correspond with watersheds so basing the analysis of cumulative effects on watershed boundaries is most relevant to aquatic and watershed-related resources.

For wildlife and other terrestrial resources, all of Southeast Alaska from Yakutat Bay southeast to the southeastern end of Alaska (approximately 21.56 million acres, including 4.79 million acres of non-NFS lands) was used as the study area, although some analyses were based on the area within the Forest boundary, depending on the availability and quality of available information. The Southeast Alaska area includes all of Glacier Bay National Park and the State, Bureau of Land Management, and other lands in the vicinity of Haines and Skagway. Often Wildlife Analysis Areas (WAAs) were used to summarize information within these study areas (see below for more detail on WAAs and see the WAA map on the CD version of this EIS). In addition, biogeographic provinces and ecological subsections (see descriptions below) were also used to summarize cumulative effects information for wildlife and other terrestrial resources.

For social and economic, recreation, and related human uses, all of Southeast Alaska and beyond, were given consideration for cumulative effects, especially regarding economic, market, and other factors.

Cumulative effects analyses are presented throughout the effects sections. Many times, direct and indirect effects are presented in the context of past, present and future actions. For example, many of the analyses address past harvest and road construction on NFS lands along with future NFS harvest and road construction. These are cumulative effects analyses because they deal with past, present, and reasonably foreseeable actions on NFS lands. These are typically presented under Direct and Indirect Effects because it is logical to discuss the harvest and road construction plans along with the past harvest and road construction on the lands where the proposed action will take place. However, there are specific cumulative effects sections that reference these analyses and present additional analyses that take into account past, present, and future harvest and road construction on non-NFS lands when added to the NFS land harvest and road construction.

Generally, for the physical and biological resources, the actions considered in assessing cumulative effects included the following:

- Past, present, and future timber harvest and road construction on NFS lands;

- Past, present, and future timber harvest on adjacent private, state, and Native corporation lands. (These usually represent more intensive harvest and road development than for NFS lands; however, consideration was given to the Alaska Forest Resources and Practices Act which is designed primarily to protect fish habitat and water quality and promote rapid reforestation);
- Existing mining at Greens Creek on Admiralty Island and other existing sites, as well as possible future sites, including the proposed Kensington Mine at Berners Bay north of Juneau;
- Electrical intertie and other utility corridor construction, including the Swan Lake-Lake Tyee Transmission Intertie project;
- Regional transportation development as defined by the State Transportation Plan;
- Growth in the cruise ship and guiding industries and general outdoor recreation. Development of fishing and other lodges;
- Human settlements – expansion of cities like Juneau and Ketchikan. Also, recreational cabin development and land auctions by the State; and
- Existing and limited future hydroelectric developments (e.g., Angoon hydroelectric project).

Geographic Information System Database and Quantification for this EIS

The Forest Service developed a computerized geographic information system (GIS) database for the revision of the Tongass Forest Plan, and that system continues to be improved upon and used. This system makes it possible to conduct spatial analysis of alternatives and effects, and to rapidly display resource information in map format. The GIS is a very large database, containing information on many of the resources of the Forest. Much of the data consist of map “layers,” each representing a particular resource or attribute (such as forest type, soil type, or recreation places). Numerical data can also be stored, displayed, and analyzed. Computer technology and capability continues to improve and the Forest GIS program, especially at the project level, reflects such growth. Additional information, as well as improved information, is now available for many resource areas. This EIS takes advantage of the new technology capability and information. This EIS validated and updated various GIS layers used in the 1997 Forest Plan Revision Final EIS and the 2003 SEIS. This existing condition information is what has been used as a baseline for the EIS and Alternative 5, No Action.

The baseline numbers used in Alternative 5 do not always match the numbers for Alternative 11 of the 1997 Forest Plan Revision Final EIS, which is the 1997 alternative that is most like the current Forest Plan. This is primarily because of ongoing management of the Tongass National Forest. Examples include changes in land ownership, changes in resource conditions resulting from timber harvest and road construction, and nonsignificant amendments to the 1997 Forest Plan Revision Final EIS. In addition, the use of newer computer mapping and measurement techniques that are more accurate than earlier methods also affects the numbers. In general, the relative differences among the 1997 Forest Plan Revision Final EIS-generated numbers, the 2003 SEIS-generated numbers, and the baseline numbers used in this EIS are small, and do not affect the analysis relationships among these documents.

It should be noted that in some cases where the acreages are measured that depend on overlaying of multiple coverages, the acreage measurements for individual categories sometimes need to be adjusted to account for the fact that coverages do not always line up exactly in places where they should (e.g., along property boundaries, saltwater shorelines, lake edges). Very slight misalignment of the coverages can result in polygon slivers between the coverages, which can produce acreage differences initially. These differences can amount to tens or hundreds of acres or more, especially because we are dealing with such a large area (i.e., 17 million acres). However, on a percentage basis, these slivers and the adjustments that are necessary are insignificant.

It should also be noted that the figures presented are generally rounded to the nearest whole acre, whole mile, or whole percent. No attempt has been made to adjust the numbers to force the sums of rounded numbers to equal the expected totals. Therefore, the sum of rounded individual numbers will often be one digit higher or lower than the expected sum. The sums that are presented are the sums of the unrounded numbers.

Land Use Designation Groupings

For many resources, the effects and the differences in effects among the alternatives are best identified through the LUD allocations. While each LUD has a different purpose and management emphasis, many are similar in the kinds of effects they would potentially create. Based on this concept, and in order to simplify the identification of effects, the LUDs have been grouped into four categories: Wilderness, Natural Setting, Moderate Development, and Intensive Development. For some analyses, the LUDs are grouped into two categories: Wilderness and Natural Setting LUDs make up the non-development LUDs and Moderate and Intensive Development LUDs make up the development LUD category. Note that the Minerals and Transportation and Utility System LUDs are overlay LUDs and are managed according to the underlying LUD until such time that development is approved, if at all. Therefore, acreages in this EIS generally reflect the underlying LUD acreages. Table 3.1-1 displays these LUD groupings.

Land Divisions

The land area of the Tongass National Forest has been divided in several different ways to describe the different resources and how they are affected by Forest Plan alternatives. These divisions vary by resource because the relationship of each resource to geographic conditions and zones also varies. Several of these divisions are described briefly here.

Geographic Provinces

These are seven large land areas that are distinguished by differences in ecological processes. They are defined by a combination of climatic and geographic features. Geographic provinces are used in the evaluation of Research Natural Areas and Wild and Scenic Rivers. See the *Research Natural Areas* section of the 1997 Forest Plan Revision Final EIS for a description of each province.

Biogeographic Provinces

Biogeographic provinces are areas within which certain kinds of plants and animals tend to occur together. They are defined by a combination of similarity in species, patterns of distribution of species, and natural characteristics or barriers. Twenty-one biogeographic provinces occur on the Tongass. They are used in the *Biodiversity* and *Wildlife* sections and described in the *Biodiversity* section of this chapter.

Table 3.1-1
Land Use Designation Groupings Used to Discuss Effects

LUD Group	Land Use Designation
Non-development LUDs	
Wilderness LUD Group	Wilderness Wilderness National Monument Nonwilderness National Monument
Natural Setting LUD Group	LUD II Remote Recreation Semi-Remote Recreation Old-Growth Habitat Enacted Municipal Watershed Research Natural Area[1] Special Interest Area[1] Wild River[1] Scenic River Recreational River
Development LUDs	
Moderate Development LUD Group	Experimental Forest Scenic Viewshed Modified Landscape
Intensive Development LUD Group	Timber production
Overlay LUDs[2]	
Overlay LUD Group	Minerals Transportation and Utility Systems

[1] These three LUDs function as overlay LUDs (see footnote 2) when they occur within Wilderness, Wilderness National Monument, or LUD II areas.
[2] The Minerals and Transportation and Utility Systems (TUS) LUDs are overlay LUDs. Areas allocated to these LUDs are managed according to the underlying LUD until such time that mineral or transportation or utility development is approved, if at all. Generally, acreages in this EIS do not include the Minerals or TUS LUDs, but rather the underlying LUD.

Ecological Sections and Subsections

Ecological sections and subsections are two classification levels within a hierarchical system for subdividing ecosystems according to the National Hierarchical Framework of Ecological Units (see *Biodiversity* section of this chapter).

The framework consists of eight nested mapping levels that serve a variety of purposes. Within the hierarchy, ecological sections characterize medium to large ecosystems (on the order of 1,000 square miles) and ecological subsections characterize mid-sized ecosystems (10 to 1,000 square miles). Fourteen ecological sections and 73 ecological subsections occur on the Tongass.

Value Comparison Units

Value Comparison Units (VCUs) are distinct geographic areas, roughly analogous to watersheds, each encompassing a drainage basin containing one or more large stream systems. The boundaries usually follow watershed divides. VCUs were used for the 1979 Tongass Forest Plan and have since been updated. The Forest currently has about 945 VCUs averaging 18,000 acres in size. They are used to describe the locations of specific resources on the Forest. A map of the VCUs on the Tongass is provided on the CD version of this EIS.

Wildlife Analysis Areas

Wildlife Analysis Areas (WAAs) are land divisions used by the Alaska Department of Fish and Game (ADF&G). Approximately 190 WAAs apply to the Tongass National Forest; they average slightly less than 90,000 acres in size. In general, WAA boundaries correspond with VCU boundaries and they typically include three to eight VCUs (averaging just under five). They are used in the *Subsistence* and *Wildlife* sections. A map of the WAAs on the Tongass is provided on the CD version of this EIS.

General Forest Description

A brief description of the physical, biological, and socioeconomic settings of the Tongass National Forest is presented in this section. Chapter 1 and the alternative maps include a vicinity map.

Physical Setting

The mainland and many of the islands of Southeast Alaska are mountainous, often rising abruptly from sea level to several thousand feet. Elevations of forested areas extend up to approximately 3,000 feet in the southern sections of the Tongass National Forest and up to 2,500 feet further north. The mountain valleys provide reservoirs for huge ice fields and glaciers, located primarily on the mainland.

More than 1 million years ago, all but the highest mountain peaks and some outer coastal areas in Southeast Alaska were covered by ice. The great erosional powers of these vast expanses of ice molded and shaped the landscape as the glaciers moved downhill under their own weight, carving the bedrock below them. When the ice receded and uncovered the land, the more resistant mineral-rich rocks remained, revealing a network of islands dissected by numerous streams, U-shaped valleys, and fiords. This modification by glaciers gives Southeast Alaska's landscape its unique character.

The configuration of the coastline, the warm Japanese ocean current, and the high coastal mountains provide the factors necessary to produce abundant rainfall. The annual precipitation of Southeast Alaska averages more than 100 inches throughout. Precipitation is highest in the southern areas and decreases as one moves north. At higher elevations, more than 200 inches of snow may fall annually, perpetuating the existing ice fields and glaciers. Storms and moderate to heavy precipitation occur year-round, but most commonly from September through November. The abundant moisture feeds numerous streams, rivers, and lakes that dot the landscape.

Southeast Alaska has a maritime climate, resulting from the moderating influence of the Pacific Ocean. In the summer, this provides a cooling influence, while in winter, temperatures are warmer than would be expected for these latitudes. Normal temperatures range from mid-40 degrees Fahrenheit (°F) to mid-60 °F in the summer, and from the high teens to the low-40s in the winter. During the warmer months, temperatures are highest inland and lowest along the coasts, while in the colder months, the reverse is true.

Biological Setting

The coastal forest of Southeast Alaska is part of the cool, temperate rain forest that extends along the Pacific coast from Northern California to Cook Inlet in Alaska. Most of the Forest is composed of old-growth conifers, primarily western hemlock and Sitka spruce, with a scattering of mountain hemlock, western redcedar (in the south), and Alaska yellow-cedar. Red alder is common along streams, beach fringes, and on soils recently disturbed by management activities and landslides. Black cottonwood grows on the floodplains of major rivers and recently deglaciated areas.

Blueberry, huckleberry, Sitka alder, Devil's club, and salal are common shrubs in the Forest. The Forest floor is composed of plants, such as deerheart, dogwood, single delight, and skunk cabbage. Because of the high rainfall and resulting high humidity, mosses grow in great profusion on the ground, on fallen logs, on the lower branches of trees, and in forest openings.

Grass-sedge meadows usually lie at low elevations, often along the coast. Stands of willows border many of the stream channels. Muskeg (bog plant) communities, dominated by sphagnum mosses and sedges, occur throughout the Forest.

The alpine zone usually lies above 2,500 to 3,000 feet. It occupies the area above the coastal forest and is separated from the Forest by a subalpine or transition zone. Resident plants have adapted to snowpack and wind abrasion by evolving low-growth forms. Low, mat-forming vegetation covers most of the area, with cushion-like plants occupying crevices on exposed rock outcrops and talus slopes.

The forests, shorelines, streams, and rivers of Southeast Alaska provide habitat for over 300 species of birds and mammals, including game and non-game animals, such as brown and black bear, Sitka black-tailed deer, moose, wolf, mountain goat, beaver, otter, and marten. The coastline provides ideal habitat for a large population of bald eagles, and wetlands provide nesting habitat for many waterfowl.

A highly productive marine environment includes an abundance of marine mammals, halibut, herring, and hundreds of shellfish. Both resident and anadromous fish are found within and adjacent to the Forest.

Socioeconomic Setting

Southeast Alaska's communities and individuals make up a variety of cultures. The abundant resources of the forests and waters have provided food, shelter, and livelihood for its peoples for thousands of years. The first inhabitants of the area, the Tlingit and Haida, adapted well to the coastal environment and developed a rich culture. The numerous waterways allowed for mobility, which aided in expanding trade and gathering food.

In the 1700s, Russian exploration began in Alaska. The fur trade, primarily sea otter pelts, was the main force driving colonization. When most of the sea otter populations were depleted, the fur industry declined and Russia lost interest in its North American colony. Alaska was sold to the United States in 1867.

Colonization continued under U.S. ownership, and new industries developed. In the late 1800s, commercial fish canning became an important part of the economy of Southeast Alaska. During that same period, the discovery of gold brought thousands of miners to the area, and many were followed by their families. The most important of the early gold discoveries occurred in Juneau. In the early 1900s, the Depression brought a decline in mining employment, and the impact of World War II resulted in the closures of the last remaining mines.

The timber resource was used by the earliest inhabitants in a variety of ways. The Russians harvested timber for building ships and structures, but commercial timber harvest was not developed until the 1900s. In the earlier part of the century, small timber mills operated in a few communities. During the 1950s, two large-scale pulp mills were developed in Ketchikan and Sitka, and the timber industry became a major economic component of Southeast Alaska's economy.

In the 1950s, Alaska focused its attention on statehood, and on January 3, 1959, became the 49th state of the United States. This resulted in an increase in government employment and, coupled with the growth of the timber industry, a gradual shift towards a more diversified economy, with less dependence on nonrenewable resources.

More than 70,000 people live in the towns, communities, and villages of Southeast Alaska. Most of the region's population is concentrated in a few communities, the largest being Juneau, Ketchikan, Sitka, and Petersburg. Services, state and local government, and retail trade were the largest economic sectors by employment in Southeast Alaska in 2005, accounting for 28, 21, and 12 percent of total employment, respectively. Employment in natural resource-based industries remains important in many of the region's communities. Tourism, which has increased in recent years, provides another important source of regional employment and income. Many small, rural communities continue to depend primarily on fishing, timber production, and subsistence uses.

Organization of Chapter 3

The remainder of Chapter 3 is divided into three parts. First, the resources that make up the physical and biological environment are described and the effects of the alternatives are analyzed. This part sets the stage for the next part—the evaluation of human uses and land management. Finally, both of these parts set the stage for the final part—the economic and social environment. The focus is on significant effects, with the analysis centered on the public issues related to the Forest Plan amendment.

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Physical and Biological Environment

Climate and Air

Affected Environment

Climate

The Tongass National Forest occupies a series of islands and a narrow strip of the mainland between the Pacific Ocean and the crest of the coastal mountains. The configuration of the coastline, the warm Japanese ocean current, and the high coastal mountains combine to produce a cool, wet environment. Precipitation at sea level in Southeast Alaska ranges from 30 inches per year at Skagway to 220 inches per year at Little Port Walter. Precipitation increases with elevation. It is estimated that the average annual precipitation may be as high as 400 inches on the mountains of southern Baranof Island and about 260 inches over the Juneau Icefield. Southeast Alaska has complete cloud cover approximately 85 percent of the year. Snowfall varies according to elevation and distance inland from the coast. October is generally the wettest month. May through July are, on average, the drier months. The Pacific maritime influence holds the daily and seasonal temperatures within a narrow range. Temperatures average 32 degrees Fahrenheit (°F) in the winter and 60°F in the summer. During the warmer months, temperatures are highest inland and lowest along the coasts, while in the colder months, the reverse is true. Storms and moderate to heavy precipitation occur year-round, but most commonly from September through November. The abundant moisture supports an extensive temperate rain forest and feeds numerous streams, rivers, and lakes, which in turn provide valuable fish habitat.

Climate Change

Southeast Alaska has had considerable year-to-year and decade-to-decade variability in its weather, associated with large-scale shifts in ocean temperatures, salinity levels, and ice conditions. Even with these short-term variations in weather, some longer-term trends are evident. Southeast Alaska's climate has shown a strong warming trend since the middle of the 19th century (the end of the little ice age), as has much of the northern hemisphere. This trend accelerated in the late 1970s due to cyclical shift of the Pacific decadal oscillation (Parson et al. 2001). In addition to this natural change, anthropogenic change (human-caused change) has accelerated climate changes during the last several decades (Intergovernment Panel on Climate Change [IPCC] 2007).

Changes to the climate in Southeast Alaska have already resulted in changes to ecosystem processes and services on the Tongass National Forest. The number of days with gale-force winds has more than doubled since 1950 (U.S. Global Change Research Program [USGCRP] 2003). Juday et al. (1998) state that as of their report, the increased frequency of storms had not corresponded to an increase in large-scale blowdowns in Southeast Alaska, although the authors state that they do not know if it resulted in an increase in canopy gap formation. The 2006 Forest Health report noted very little blowdown in aerial and ground surveys (USDA Forest Service and ADNR 2007)

The Muir Glacier has retreated more than 9 miles since 1941, exposing large areas of bare rock that are starting to colonize with alder and willow. Warmer summers have led to longer growing seasons for trees and other vegetation. Warmer winters have meant more insects survive the winter, triggering insect outbreaks that affected trees on over 300,000 acres of forest in Southeast Alaska (including all ownerships) during the 1990s (USGCRP 2003). The warming trend has also reduced snowpack in low-elevation areas, which may contribute to ongoing yellow-cedar decline affecting over 500,000 acres in Southeast Alaska (Hennon and Shaw 1997). Drier summers may have contributed to the number and duration of low stream flow episodes, which can adversely affect salmon, and the increase in the amount of precipitation falling as rain instead of snow since the 1970s has reduced the frequency of low- and moderate-elevation avalanches, allowing mountain hemlock to colonize some alpine areas (Parson et al. 2001).

There are several models that have attempted to predict future trends in Alaska's climate. Most models predict warmer, wetter weather for Alaska and they generally agree that rainfall will increase and snowfall will decrease at lower elevations in Southeast Alaska over the next 50 to 100 years (Bonsal and Prowse 2006). However, these models do not always agree on the extent of climate change in Southeast Alaska. For example, two models were compared in a study by Parson et al. (2001), one from the Canadian Climate Center and the other from the Hadley Center. Both predict rising temperatures and a 10 percent decrease in summer precipitation in some portions of Southeast Alaska, but the models differ in projecting the areas affected. The Canadian scenario predicts that drier summer weather will extend across all of Southeast Alaska, while the Hadley scenario predicts that these effects will be confined to the extreme southeast. Both models predict the expansion of forests into higher elevation areas, as well as increased insect problems and decreased soil moisture, due to increased evaporation during warmer, drier summer weather. These factors may lead to an increase in fire frequency and adversely affect fish. These models are not specific to Southeast Alaska; therefore, the predicted effects may not be relevant for Southeast Alaska. While the 2007 report by the Intergovernmental Panel on Climate Change (IPCC 2007) predicts higher stream runoff at the higher latitudes, as well an increase in heavy precipitation events, a decrease in glacier size, and a slight increase in tree growth, it also concludes that not all areas will be effected the same and limits forecasts to large regions, such as western North America.

A scientific panel on climate change convened by the City and Borough of Juneau (Kelly et al. 2007) has made some site-specific predictions based on a review of several models. They concluded that the Juneau area will see overall warmer and wetter weather, particularly in fall and winter. The Juneau Icefield will continue to retreat. Global sea level will continue to rise as a result of the melting of glaciers and ice sheets and the warming of ocean waters (thermal expansion). Over the next century, global sea level is projected to rise 0.3 foot to 3.0 feet. In the City and Borough of Juneau, however, the land surface is rising as a result of the loss of glacial ice (isostatic rebound), and the rate of uplift is greater than the projected rate of global sea level rise. Over the next century, the relative sea level in the Juneau area likely will decrease between 1.0 and 3.6 feet.

Carbon Sequestration

Carbon, primarily in the form of carbon dioxide, is one of the major greenhouse gases being released into the atmosphere (McPherson and Simpson 1999). The global carbon cycle involves the earth's atmosphere, fossil fuels, the oceans, and the vegetation and soils of the earth's terrestrial ecosystems. Gases that make up the earth's atmosphere, such as carbon dioxide, methane, nitrous oxide, and water molecules, trap the sun's heat, creating a natural "greenhouse effect" that makes life on earth possible (McPherson and Simpson 1999). These gases are released into, and removed from, the atmosphere by a variety of natural sources and sinks.

The Tongass National Forest, like most forests, is considered a carbon sink, storing more carbon in its systems than is released by natural processes. As such, a critical ecosystem service sustained by the forest is *carbon sequestration*, or removal of carbon dioxide from the atmosphere and keeping that carbon inactive by storing it in biomass (live and dead plant structures, primarily) and soil organic matter. D'Amore and Lynn (2002) believed that previous methods may have underestimated the amount of carbon stored in Southeast Alaska. Subsequently, Smith et al. (2004a) estimated that mature hemlock-Sitka spruce forests of the Pacific Northwest store 184.4 tons of carbon per acre. Leighty et al. (2006) estimate that the Tongass contains approximately 2.8 billion metric tons of carbon in both above and below ground living and dead material (an estimated 83,500,000 billion metric tons of carbon are stored world-wide, primarily in the oceans and marine sediment, based on United Nations estimates). Leighty et al. (2006) also estimate that between 6.4 and 17.2 million metric tons (0.2 to 0.6 percent) of stored carbon has been lost on the Tongass since timber harvest began in the early part of the 20th century. For comparison, approximately 4.5 million metric tons of carbon was released every day to produce electric power in the United States in 2005 (DOE 2006).

Generally, the capacity for a system to sequester and store carbon depends on the location, age, and species mix of the forest (Birdsey et al. 1993). Newly established forests accumulate carbon rapidly for many years, slowing as trees mature, growth slows, and decaying material accumulates. However, the cool conditions on the Tongass inhibit decomposition, drastically slowing biomass breakdown and carbon release. Decaying plant matter is incorporated into the system's soil profile, where it accumulates and may reside indefinitely. As a result, old forests generally store considerable amounts of carbon on the forest floor, approximately 70 tons per acre in hemlock-Sitka spruce ecosystems (Smith et al. 2004a). Janisch and Harmon (2002) suggest that it can take more than 200 years following timber harvest for forests to reach equilibrium, the point where carbon released from decay equals carbon stored in the system.

Interest in enhancing ecosystem carbon sequestration and storage has intensified recently, as concerns about how to mitigate climate change have increased. This question of how active ecosystem management may contribute to, or detract from, the mitigation effort is being explored, with varying results. A few studies have shown that management of some forests with certain parameters being met, such as fertilization, may result in heightened capacity for carbon sequestration and storage (Schroeder 1991, Binkley et al. 1997). A study in the eastern United States found that thinning a 50-year-old stand from below (removing the smallest trees) resulted in more stored carbon after 25 years than resulted from thinning stands from the middle or from above (Hoover and Stout 2007). A recent Pacific Northwest study (Perez-Garcia et al. 2005) concluded that the use of wood resulted in "significant atmospheric carbon reductions by displacing more fossil fuel-intensive products in housing construction." They estimate that a rotation of 80 years would sequester the most carbon. Other studies, particularly two with application to Southeast Alaskan ecosystems (Harmon et al. 1990, Leighty et al. 2006), indicate that the

Tongass would generate a net loss of carbon to the atmosphere if active harvest of old growth is pursued. Ultimately, a net loss or gain of carbon in active management situations depends on use of harvested timber, the substitute material available, the amount of carbon emitted in harvesting activities, and the amount of carbon emitted via decomposition of on-site wood waste and soil organic matter losses. If the emissions are less than the carbon stored in utilized wood, and if the system can rapidly replace losses from decomposition through tree growth, the activity may yield a net gain of stored carbon. Whether active management of old-growth forests on the Tongass results in a net gain or loss of carbon is currently unknown.

In addition to the effects of timber management, climate change may also affect carbon sequestration in Southeast Alaska. D'Amore and Lynn (2002) note that numerous studies have shown that carbon stored in soils, including peatlands, may be released to the atmosphere in the form of carbon dioxide or methane as climate warms and that dissolved carbon may be transported to streams and the ocean due to increased rainfall. If warmer, wetter conditions occur, climate change could result in additional carbon losses.

Air Quality

The air quality of Southeast Alaska and the Tongass National Forest is generally good. The prevalent airflow from the Pacific Ocean, the relatively small amount of industrial development in Southeast Alaska, the lack of large population centers, the absence of slash burning following harvest, and environmental regulations all contribute to maintaining clean air. Forest activities have historically had little direct effect on air quality on the Tongass (USDA Forest Service 1997a). However, cruise ship emissions in certain locations and trans-Pacific pollutants such as persistent semi-volatile organic pollutants and greenhouse gases are a growing concern.

Air quality and sources of air pollution on the Tongass are described in Air Quality Monitoring on the Tongass National Forest: Methods and Baselines Using Lichens (Geiser et al. 1994) and Air Quality Biomonitoring with Lichens-Tongass National Forest (Dillman 2007). The Tongass has 127 permanent lichen biomonitoring plots that can be used to detect possible trends in the elemental content of lichen tissue and changes in lichen communities over time. Lichen biomonitoring plots are distributed across the Forest, including all but one Wilderness. Lichens serve as dynamically representative samples of the environmental conditions in which they are growing. Elements and compounds in the air are absorbed by lichens along with moisture from the surrounding environment and become concentrated in the lichen tissue. Roughly 10 percent of the biomonitoring plots on the Tongass were recently re-visited, all in wilderness areas. Little or no change in the elemental content of the lichens was detected between the first monitoring effort (Geiser et al. 1994) and the recent one (a span of about 15 years). Provisional threshold levels were generated from the most pristine areas on the Tongass for 27 elements, including sulfur and nitrogen, in four target lichen species (Dillman 2007). A provisional threshold level is the level of a pollutant of interest per lichen species that can be expected at a clean air site on the Tongass (expressed in parts per million, or ppm). Nearly half of the 127 biomonitoring plots are elevated above the threshold level in one or more elements due to natural or anthropogenic sources. Natural sources include the mineral content of the local rock and soil and salt spray from the ocean (a major factor in sites near the coast). Anthropogenic sources include dust from roads (the most comment human-cause source) as well as wood stoves, fossil fuels (specifically near Juneau), and mining (specifically near the Greens Creek Mine). Monitoring plans call for lichen biomonitoring to be done on a 5 to 10 year interval to better detect pollution trends, especially for trans-Pacific sources of nitrogen.

The Tongass National Forest partnered with the National Park Service Western Airborne Contaminants Assessment Program (WACAP), which quantifies regional and trans-Pacific semi-volatile and persistent organic pollutants in lichens, vascular plants, and other organisms. Results from the WACAP samples collected from the Stikine-LeConte Wilderness are being analyzed by the National Park Service. An aerosol sampler near Petersburg was installed in 2004 as part of the Interagency Monitoring of Protected Visual Environment (IMPROVE) program. This is the only IMPROVE site in Southeast Alaska, with the next nearest station in Tuxedni Wilderness near Anchorage. Data from the IMPROVE site will be collected for 5 years to observe trends and to determine regional, state, and national significance.

Visual inspections of cruise ship emissions by rangers in Tracy Arm/Fords Terror Wilderness occur during the summer tourist season as part of an agreement with the State using U.S. Environmental Protection Agency (EPA)-approved methods. Also, the Tongass is working with the National Park Service in the Southeast Alaska Network and Forest Service Air Resource Program in Region 6 to coordinate a Southeast Alaska cruise ship emissions monitoring effort using passive air samplers in remote locations.

Juneau Air Quality

Juneau's Mendenhall Valley is the only area in Southeast Alaska that is known to have exceeded National Ambient Air Quality Standards. The EPA listed Juneau City and Borough as a non-attainment area for particulate matter less than or equal to 10 micrometers in 1990. The area is classified as Moderate for this component of air quality, with an average daily rating of 110 out of a maximum of 500. Monitoring data indicate that air quality in Juneau has met state and federal ambient air quality standards in recent years. No state or federal ambient air quality standards have been exceeded since 1997. The last time particulate matter standards were exceeded in Juneau was in 1993. The State and EPA are currently considering re-designating the Juneau area as a maintenance area, an area in transition between non-attainment and attainment (Alaska Department of Environmental Conservation [ADEC] 2007). The ADEC has conducted ambient air monitoring in other locations in Southeast Alaska. These studies indicate these areas are within national standards for the pollutants monitored.

Lichen tissues were collected on Mt. Roberts in the downtown Juneau area at five different elevations as part of the Tongass lichen biomonitoring program and in collaboration with the State. The lichen tissues analyzed were elevated above provisional threshold levels in all five plots in three or more elements including sulfur, nitrogen, and heavy metals. Lichens from the plot at 175 feet above sea level had the greatest number of elements above threshold (12), indicating that the sources are probably local and anthropogenic (Dillman 2007).

Sources of Air Pollution

There are 36 stationary sources of air pollution in Southeast Alaska that require air quality control permits. These include diesel power plants, asphalt plants, incinerators, mining facilities, and other facilities. Some of these sources operate intermittently (e.g., back-up power plants may operate during power failures or during peak demand periods, and asphalt plants may operate seasonally), and others may be operating at full capacity (e.g., Greens Creek mine).

Other sources of air pollution in Southeast Alaska include mobile sources (such as cars, trucks, boats, cruise ships, airplanes, and helicopters) and area sources (such as home furnaces, wood stoves, and open burning). Under certain weather conditions, wildfires in Canada can affect air quality and visibility (i.e., regional haze) in parts of Southeast Alaska. The State issued an air quality advisory in July of 2004 due to extensive wildfires in western Canada.

Cruise ship traffic has greatly increased in Southeast Alaska over the last several years. More than 600 cruise ship visits occurred in Juneau during 2006, with an annual average number of visits of 591 ships for the 2003 to 2006 seasons. Cruise ship emission monitoring in Juneau by ADEC indicates that ship emissions are well within federal and state standards. The Mt. Roberts biomonitoring plots contain lichens that were elevated above threshold levels in three or more elements. Possible sources of the elevated elements are urbanization of downtown Juneau, past mining activities, and cruise ship emissions.

Cruise ship traffic in Tracy Arm creates a particular concern for air quality in Wilderness. Tracy Arm/Fords Terror Wilderness received more than 1,000 cruise ship visits between 2003 and 2006. Tracy Arm is less than a mile wide (on average) and is surrounded by high mountains. Cruise ship emissions may linger above the fiord for hours. The emissions are most heavily concentrated in upper Tracy Arm, where vessels stop near the South Sawyer Glacier for 1 to 4 hours (depending on ice conditions). Ship emissions often increase because of rapid changes in engine loading necessary for the ship to maneuver through ice and turn around. The Forest Service has received an increased number of public complaints concerning air quality within the Tracy Arm-Fords Terror Wilderness. In an effort to better address the air quality concerns in the Wilderness, the Forest Service and ADEC enters into a Memorandum of Understanding each year to train Forest Service wilderness rangers to visually monitor cruise ship emissions with EPA approved standards. ADEC annually reviews the visible emission observations and takes action on any that exceed the State Marine Vessel Emission standard (18 AAC 50.070).

Two lichen biomonitoring plots were established in 2003 near the entrance of Tracy Arm, where target lichen species are found. Results indicate no elements were elevated above threshold from this area of Tracy Arm (Dillman 2007). Future efforts to monitor air quality in the wilderness may utilize passive air samplers that measure SO_2, NHO_3, NH_3, and NO_X closer to where the cruise ships linger.

Environmental Consequences

Air Quality

Direct and Indirect Effects

The expected direct effects on air quality from forest management activities are temporary and limited in nature, resulting from dust and vehicular emissions from logging operations, administrative and harvest-related use of Forest roads, mineral development, and smoke from a limited prescribed fire program. None of the alternatives includes broadcast burning of slash following harvest. Alternatives 1, 2, 3, 6, 5, 4, and 7 would result in progressively more harvest, road construction, harvest-related vehicle use, and wood processing, as well as more emissions. No significant adverse effects on air quality are anticipated from these activities under any of the alternatives.

Indirect effects on air quality can result from the use of trees harvested from the Tongass National Forest, such as in the operation of industrial processing sites and firewood burning, as well as emissions from private vehicles using Forest unpaved roads. These indirect effects on air quality can be aesthetically displeasing or have potential health risks to both humans and the Forest. EPA and ADEC have regulatory responsibility, under the Clean Air Act, for air quality related to these kinds of sources. The enforcement of the applicable regulations by these agencies is anticipated to keep any potential adverse effects within the standards for air quality; therefore, no significant indirect effects from the uses of the Tongass National Forest should occur.

Carbon Sequestration

Estimating the effects of the proposed alternatives on carbon sequestration is complex. There are many factors that affect sequestration and storage; some components of an alternative contribute to a net removal of carbon, while some components offset those gains. Further, sequestration and carbon release happen at different time scales; therefore, while an activity may result in an immediate loss of carbon, over time, the net balance may reach zero or result in a net gain of storage.

It is generally assumed that old-growth forests considered for harvest in this analysis are currently in a "steady-state," meaning no net loss or gain of carbon. These systems are simply maintaining their storage capacity. Alternatives that propose less harvest, especially Alternatives 1 and 2, would allow this process to continue throughout most of the Tongass. In addition, much of the wood in harvested areas would be left in the Forest because there is no market for low-quality logs. Much of this wood, and the carbon it contains, would remain on the site as large woody debris for a long period of time under Alternatives 1 and 2.

Alternatives that harvest more old-growth forest have the potential to either increase or decrease the amount of stored carbon, depending on the time scale of consideration, how much of the wood is removed from the Forest for utilization, how the wood is used, and how much carbon is released in cutting, yarding, transporting, and processing the wood and in soil carbon and woody debris decomposition. Alternatives 4 and 7 have the potential to harvest the most wood and would convert both the saw timber and much of the utility wood into lumber and other building materials, such as medium density fiberboard (MDF board), assuming facilities to produce MDF board are built. This material would continue to store the sequestrated carbon for a relatively long period of time (perhaps 75 years), although this storage may be offset by harvest emissions and carbon released by on-site decomposition. If, on the other hand, the low-value logs are used to fuel bio-energy plants, carbon storage would be reduced. New stands would be regenerated and, in time, commercially thinned; these thinning activities may lead to a net gain or a net release of carbon as well, depending on how the thinning is conducted, how the products are used, and how much carbon is released during harvest, transportation, and processing. Alternatives 3, 5, and 6 are expected to be intermediate in their effects relative to Alternatives 4 and 7.

All alternatives include standards and guidelines that protect soils, such as limits on harvest on steep slopes, limits on roads built across steep slopes, and on soil disturbance. These measures would help retain carbon stored as organic material in the soil. Unlike many areas of the country, broadcast burning to reduce slash is not practiced on the Tongass; therefore, much more of carbon stored on the forest floor and in the upper layers of soil is retained compared to sites that are broadcast burned.

Cumulative Effects

Cumulative effects on air quality include harvest-related emissions from state and private land, vehicle and maritime emissions, permitted uses such as community incinerators, industrial operations, cruise ship emissions, and electricity generation. If plans for hydropower production and transmission lines linking communities are implemented, such as the Swan Lake-Lake Tyee project scheduled for completion in 2010, long-term reductions in both air pollution and carbon emissions could result because many communities would no longer rely on diesel generators. The Alaskan Energy Authority estimates that the Swan Lake-Lake Tyee intertie alone would reduce carbon dioxide emissions by approximately 486,000 tons and carbon monoxide by 3,150 tons by 2046 (comment letter submitted April 30, 2007). Most of the logs harvested on private land are expected to be exported; therefore, little additional emissions are expected due to processing wood from state and private land locally. Because of the temporary and limited effects associated with timber harvest on National Forest System (NFS) lands, the alternatives are not expected to contribute significantly to cumulative effects on air quality. Air pollution from wood processing is likely to remain low, but could increase somewhat if more wood is burned to produce energy. Air pollution from forest fires in western Canada could adversely affect air quality in Southeast Alaska, as occurred in 2004.

The cumulative effects from climate change alone and in combination with other stochastic events and with timber harvest are difficult to predict. Warmer temperatures are expected to result in a loss of carbon stored in leaf litter and soil organic matter, due to increased soil respiration (Bachelet et al. 2005). Other changes are more difficult to predict. Species will respond to changing climates individually; some species and some individuals will be more sensitive and vulnerable than others (Millar et al. 2006). Effects on forests could include expansion into alpine areas, increased loss of trees from insects, disease, windthrow, and/or fire, as well as changes in stream flow and vegetation and the animal species these habitats support; however, the degree of change is uncertain. If significant changes do occur over the next several decades, they may affect the range of wildlife, fish, and plant species in Southeast Alaska, as well as human use of these resources.

Cumulative effects on carbon sequestration depend on the amount of forest land harvested, the use to which harvested wood is put, how the non-NFS land is managed, on the amount of carbon released during harvest, processing, and transporting wood products, on-site decomposition, and factors such as the amount of new hydroelectric power (replacing diesel generated power), community expansion, and cruise ship emissions. It is likely that most of the state and private commercial forest land in Southeast Alaska, except for state parks and some other state lands, would be managed for the production of forest products under any of the alternatives considered in this analysis. The maximum amount of suitable land on the Tongass that is likely to be scheduled for harvest over the next 10 years would vary from nearly 18,000 acres under Alternative 1 to nearly 160,000 acres under Alternative 7. Higher levels of harvest would only occur if additional manufacturing facilities and markets are developed and on many other factors, such as funding and staff levels. If the products resulting from harvest are primarily lumber and other building materials, there is a potential that the carbon in these products would be stored for the life of the buildings, longer if the wood is recycled or placed in landfills. If the wood is used for paper products or fuel, carbon storage would be short term. Any temporary storage of carbon in lumber products may be completely off set by carbon released during and after harvest, transportation, and processing. Whether carbon sequestration would actually increase or decrease is unknown.

Additional research and monitoring is needed to effectively manage carbon in the forests of Southeast Alaska. In particular, information is needed on how changes in climate may affect plants, insects, and fungi in Southeast Alaska. Effects may include longer growing seasons due to warmer temperatures or shorter growing seasons due to dryer summer weather. Longer growing seasons and forest expansion into alpine areas may lead to additional carbon sequestration, though this may not always be the case. Carbon incorporated into needles, leaves, twigs, cones, and herbaceous plants that decompose quickly will not sequester much carbon (Millar et al. 2006). Carbon incorporated in the boles and main roots will be sequestered for at least the life of the tree. Climate change may result in changes in fire frequency and/or severity or may speed decomposition of dead material, either of which would release additional stored carbon. As information is gathered, adaptive management strategies can be developed to respond the environmental changes.

One monitoring effort that tracks changes in vegetation is the Forest Inventory and Analysis-Forest Health Monitoring (FIA FHM) program. The existing FIA plots containing lichen and vascular plant data could be combined with Tongass air quality biomonitoring plot data to develop air pollution and climate gradient models that predict changes in lichen communities and other vegetation due to projected climate change scenarios. Annual insect and disease surveys also provide information on how climate change may be affecting forests. Stream gauges, some of which provide long-term data on stream flow, are another tool. The Tongass will work with Pacific Northwest scientists to develop other monitoring measures to alert the Forest Service to trends that may affect the health of the Forest and the species that depend on it.

No significant cumulative effects on global carbon sequestration levels are expected under any of the alternatives considered in this analysis. Leighty et al. (2006) estimate that all the carbon stored in the forests of the Tongass represents approximately one quarter of 1 percent of the stored carbon in forests world wide. Carbon stored in forests, including forest soils, represent a small portion of total global carbon storage (terrestrial, ocean, atmospheric, and fossil carbon pools). For example, the oceans store approximately 20 times as much carbon as all terrestrial systems (IOC 2007). Therefore, it is reasonable to conclude that small changes in carbon sequestration on the Tongass, whether positive or negative, would have a minor effect on atmospheric carbon levels.

While there is general agreement among scientists that the climate is warming, there is considerable uncertainty concerning the exact effects of climate change on the forests of Southeast Alaska and how best to deal with possible changes to the many resources on the Tongass. There is a risk that climate change may result in increased blowdown, increased tree mortality from insects and disease, increased fire frequency and severity, adverse effects on air quality, changes to vegetation, streams, and fish and wildlife habitat, and, therefore, on subsistence and recreation.

The rate of decline and mortality of yellow-cedar in Southeast Alaska may be increased as a result of climate change. The snowpack in low-elevation areas may continue to be reduced as a result of the warming trend, resulting in greater exposure of fine roots to freezing, especially in the southern portion of the region (see *Forest Health* section).

The current warming trend may increase the number of severe windstorms, increasing the risk of catastrophic blowdown events. Juday et al. (1998) state that as of the date of their report, the increased frequency of storms in the last few decades has not corresponded to an increase in large-scale blowdown in Southeast Alaska and the 2006 Forest Health report noted very little blowdown in aerial and ground surveys (USDA Forest Service and ADNR 2007); however, this does not rule out the risk of increased windthrow in the future as additional warming occurs.

As noted above, climate models from both the Canadian Climate Center and the Hadley Center predict rising temperatures and a 10 percent decrease in summer precipitation in portions of Southeast Alaska. Both models also predict decreased soil moisture due to increased evaporation during warmer, drier summer weather. These factors may lead to an increase in fire frequency and severity. Both of these climate models predict an increase in the mean seasonal severity rating for fires in Southeast Alaska by 2060, ranging from 10 to 30 percent, depending on the model (Dale et al. 2001). Currently, fire is not a factor in the ecology of Southeast Alaska, and an increase of 30 percent would still result in very few fires. Given the high rainfall levels in Southeast Alaska (Ketchikan had only 2 days without rain in July 2006), a 10 percent decrease in summer rainfall would still result in wet conditions in most years. However, Southeast Alaska does occasionally experience drier conditions. For example, in July 1971 there were 23 days without rain. If warmer winter weather results in higher insect populations and increased tree defoliation (as discussed above), there is a risk that increased dead material and warmer, drier weather may spawn more fires than are normal for the area. As Berman et al. (1998) state, it is difficult to predict the magnitude of area likely to be burned in a region without an historic fire record, but they estimate that most fires would be small and of low intensity, suggesting a scenario in which 5,000 acres might burn over a period of decades (an average of approximately 100 acres per year). Juday et al. (1998) also suggest that the effects of fires on resources are likely to be low.

In addition to adversely affecting wildlife habitat and releasing additional carbon into the air, fires, either in Southeast Alaska or in neighboring British Columbia, could adversely affect air quality, as fires in western Canada did in 2004. Many scientists (Neilson 2007, Millar et al. 2006) recommend keeping forest density below full stocking to reduce stress on individual trees; this in turn may reduce insect and disease mortality, which may reduce fire risk and severity. Whether this strategy would be useful (or effective) in Southeast Alaska is uncertain.

Forest losses, either from insects, diseases, or fire, could harm wildlife habitat, which in turn could adversely affect subsistence resources. Conversely, Juday et al. (1998) suggest that warmer winters will result in sustained higher populations of Sitka black-tailed deer, one of the most important subsistence resources for residents of Southeast Alaska and a major prey species for wolves. Juday et al. (1998) also postulate that warmer, drier conditions could increase stream temperatures and cause seasonal low flows, both of which could adversely affect salmon. Berman et al. (1998) estimated that a 25 percent decline in salmon stocks would result in a loss of $25 million a year (approximately $31 million in current dollars). However, Oswood et al. 1992 state that melting glaciers would result in more runoff entering streams. This could offset any decrease in summer flows due to reduced summer precipitation, at least in the short run. In time, glacial mass would be reduced and their contribution to stream flow would decrease. Oswood et al. also believe that climate change would result in changes to the nutritional levels of leaf material entering streams, but could not predict whether this would have a positive or negative effect of fish.

In summary, general agreement exists that the climate is warming and indications are that summer precipitation may decline. However, there is considerable uncertainty surrounding specific predictions and even more uncertainty regarding the effect of these changes on the extent of fire, tree mortality, blowdown, air quality, fish and wildlife, subsistence, and recreation.

Geology, Karst, and Caves

Affected Environment

Geology

The Tongass National Forest is underlain by complex geology. Southeast Alaska is located near the boundary between the Pacific and North American tectonic plates. During the past 170 million years, tectonic movements have brought massive crustal blocks from across the Pacific Ocean and lodged and welded them onto the edge of the North American plate. The resulting southeast-northwest trending rock belts, or accreted terranes, include a wide variety of geologic materials (Nowacki et al. 2001). As the Pacific and North American plates collided, the coastal mountains of Southeast Alaska were uplifted. More recently, fault movements have offset the accreted terranes, adding further geologic complexity to the region. This tectonic plate boundary forms part of the "Ring of Fire," the area around the Pacific Ocean that is high in volcanic, mountain-building, and seismic activities. Evidence of relatively recent volcanic activity exists within the Tongass National Forest. The last certain activity of the Edgecumbe volcanic field occurred between 4 and 6 thousand years ago (Alaska Volcano Observatory 2006). Many volcanic features are also found on southwestern Suemez Island, including several surface flow types, obsidian sources, volcanic vents, and unique geomorphic features.

Together these tectonic, seismic, and volcanic forces have resulted in many different geologic formations in Southeast Alaska. Within the Tongass National Forest, generalized lithologies have been delineated and include granitics, noncarbonated sedimentary, carbonate sedimentary, metasedimentary, complex sedimentary and volcanics, volcanics, and mafics/ultramafics (Nowacki et al. 2001). During the past 12.5 million years, many of these lithologies have been affected by glaciers.

Within the Tongass National Forest, recurrent ice sheets formed and spilled from the St. Elias and Coast Mountains onto adjacent surfaces (Nowacki et al. 2001). Pushing seaward, these continental ice sheets combined with smaller alpine glaciers descended from isolated island peaks. Together, the ice sheets and glaciers reworked the topography of the land by rounding mountains, scouring bedrock, depositing glacial sediments, and carving U-shaped valleys and submarine trenches. In some areas, unconsolidated sediments were left, including glacial till (ice-contact deposits), glacial outwash, and glacial marine sediments. During the last glacial maximum, ice flowed all the way to the continental shelf. As glaciers retreated worldwide, the ice sheet receded first at coastal margins, then north and eastward along major channels and valleys into the mountains. Deglaciation was rapid and largely complete by 13,500 years ago.

The group of islands and fjords that currently make up the Tongass National Forest developed after the last major glacial retreat as seawater flooded the deeply incised valleys and trenches. Since deglaciation, coastlines have shifted dramatically due to tectonic events, worldwide sea level changes, and land rebound in the absence of the glaciers' massive weight. Elevated fossil-bearing marine beaches and deltas along the coastline indicate an uplift of the land relative to the sea since the last glacial maximum.

There are multiple sites with important vertebrate and invertebrate paleontological resources throughout the Tongass, including 220 million year-old sites on Gravina Island and the islands in Keku Strait (Baichtal 2006). Many important paleontological resources have been identified in caves on the Tongass National Forest.

As a result of the geological processes in Southeast Alaska, the region's physiography is topographically complex. Broad physiographic areas in the Tongass National Forest include icefields, recently deglaciated areas, large mainland river systems, angular mountains, rounded mountains, hills, lowlands, and recent volcanic fields. These distinct areas reflect the geomorphic and glacial history of the land. Continental ice sheets flowed, scoured, and deposited materials, tectonics added blocks of distinct geology, and volcanism superimposed younger rocks.

Karst and Caves

The geology and climate of Southeast Alaska are particularly favorable for karst development. Karst is a comprehensive term that applies to the unique topography, surface and subsurface drainage systems, and landforms that develop by the action of water on soluble rock (primarily limestone and marble [carbonates] in Southeast Alaska). The dissolution of the rock results in the development of internal drainage, producing sinking streams (streams that sink into the stream bed or karst features), closed depressions, sinkholes, collapsed channels, and caves.

Karst: A type of topography, drainage system, and landform that develops in areas underlain by soluble rocks, primarily limestone and marble (carbonates). About 3 percent of the land within the Tongass boundary is underlain by karst.

There are approximately 538,000 acres of very pure carbonates within the boundaries of the Tongass National Forest. This area includes carbonate bedrock on federal, state, and private lands. Approximately 458,000 acres of karst are on National Forest System (NFS) lands.

Because of fractures in the carbonates, high annual precipitation, and peatlands adjacent to the carbonate bedrock, karst has developed, to varying extents, within all carbonate blocks. The Tongass National Forest contains the largest known concentration of dissolution caves in Alaska.

In Southeast Alaska, the karst landscape can be characterized as an ecological unit found atop carbonate bedrock in which karst features and drainage systems have developed as a result of differential solution by surface and ground waters. These acidic waters are a direct product of abundant precipitation and passage of these waters through the organic-rich forest soil and adjacent peatlands. Recharge areas may be on carbonate or adjacent noncarbonate substrates. A few characteristics of this ecological unit include mature, well-developed spruce and hemlock forests along valley floors and lower slopes, increased productivity for plant and animal communities, extremely productive aquatic communities, well-developed subsurface drainage, and the underlying unique cave resources (Baichtal and Swanston 1996). The visible karst landscape also contains "epikarst," or surface features, particularly in the alpine and sub-alpine zones. These include deep shafts and fissures, eroded rills, and spires or spikes of limestone.

Karst lands add a vertical, underground dimension to land use planning. Karst subsurface drainage networks generally operate independently of, and with more complexity than, the surface drainage systems above, and the watershed characteristics of the surface may have little or no relationship to the subsurface system. On karst lands, the many solution-widened fissures at the surface become entry points into the subsurface drainage system, where water and sediment from surface sources move vertically downward into the underground lateral systems. Sediment and water from disturbed lands or roads may enter this system at a single point and emerge unexpectedly at one or more distant springs, sometimes crossing surface watershed boundaries. Karst groundwater systems routinely transport water for several thousands of feet to receiving caves, springs, and surface streams.

Most Tongass National Forest caves pre-date the most recent glaciation, as evidenced by the presence of glacial clays, glacial sediments, wood, Pleistocene vertebrate remains, and possibly ancient ice. Speleothems (i.e., secondary mineral deposits such as stalactites, stalagmites, flowstone, and crystal growths) from El Capitan Cave, on Prince of Wales Island, have been radiometrically dated to between 107,000 and 115,000 years old, or during the last interglacial period. Speleothem dates from other caves in the Tongass National Forest range from 53,000 to 185,800 years old. The most recent glaciation modified a pre-existing karst landscape, collapsing some passages and systems, gouging into others, and filling some with sediments. The epikarst (surface karst), which is well developed in higher elevations, has been removed in places at lower elevations by glaciation. Where low-elevation epikarst is present, primarily on the outer coast of islands seaward of Prince of Wales Island, vegetation has been re-established and a forested epikarst created. With the development of forested epikarst and peatlands, and the entrance of associated acidic waters into underground tributaries, a system of enlarged caves and vertical shafts has developed.

There is a definite tie between the karst landscape and the productivity of the spruce and hemlock forests found there. Dense stands of very large diameter spruce and hemlock at lower elevations are characteristic of many karst landscapes. The major contributors are believed to be the nutrient rich soils, well-developed subsurface drainage, and dissected bedrock surface, which allows the tree roots to hold fast and become more windfirm. The old-growth forest on this low-elevation karst provides a well structured, multi-layered canopy resulting in high-quality winter habitat for many wild species. The structure of the forest provides many forbs and shrubs, which provide forage. It is possible that this forage contains, at a minimum, higher calcium levels allowing for better bone, muscle, and antler development. The combination of quality forest structure and abundant nutritional browse make the karst landscape, in general, exceedingly important habitat.

Many wildlife species, including mammals, birds, and invertebrates, find the surface karst features and the stable environment and shelter provided within the caves to be valuable habitat (Baichtal and Swanston 1996). Cave systems provide critical summer and winter roosting and hibernating habitat for bats (Baichtal and Swanston 1996). Preliminary studies suggest that aquatic habitats associated with karst landscapes may be 8 to 10 times more productive than adjacent non-karst aquatic habitats (Baichtal and Swanston 1996). Karst aquatic habitats support a greater abundance, distribution, density, and variety of invertebrate species than non-carbonate habitats, have higher growth rates for smolts and resident fish, have less variable water temperatures and flow regimes, and contain unique habitat affecting species distribution, abundance, and adaptation.

The potential cultural and paleontological significance of the caves and karst landscape is high (Baichtal and Swanston 1996). The Pleistocene paleontology of the area is primarily known from cave and rock shelter deposits, which are often intimately related to archaeological sites. The cool, stable, non-acid environments in the caves result in exceptionally good preservation of bone and organic materials. To date, significant archaeological and paleontological materials have been discovered in over 30 caves and rock shelters within the Tongass National Forest. Evidence of human habitation, the oldest dating to nearly 9,730 years before present (BP), has been discovered in several caves on Prince of Wales and nearby seaward islands. Eighteen black bears (*Ursus americanus*), one dating to approximately 39,000 years BP, and 13 brown bears (*Ursus arctos*) ranging in age from 35,363 to 7,205 years BP and now extinct on Prince of Wales Island, have been found.

Of the 458,000 acres of NFS karst lands, approximately 303,000 acres were originally productive old growth (POG). Based on GIS queries, 95,000 of these POG acres (31 percent) have been harvested, leaving 208,000 acres of existing POG on NFS karst lands. Outside of NFS lands, approximately 77,000 acres of karst have been mapped, and about 26,000 of these acres were originally POG. At least half of these non-NFS POG acres on karst have been harvested.

Aerial and on-the-ground observations are revealing the effects of past resource management on karst systems. Hydrologic evidence suggests that timber harvest increases the amount and changes the timing of peak surface flow, resulting in accelerated sediment and debris transport. Passages have flooded, which had not flooded for centuries, and many cave entrances were infilled and/or blocked by logging slash, sediment, and debris, resulting in surface flows being rerouted into different passages. In the past, runoff generated from road surfaces commonly was diverted into karst features. It is not yet fully known what cumulative effects past timber harvest have had on the epikarst landscape. In some portions of the Tongass National Forest, 70 to 80 percent of the commercial forest land within specific karst blocks has been harvested. Overall, 38 percent of original POG on karst lands below 800 feet in elevation have been harvested on the Tongass. In the North Central Prince of Wales Biogeographic Province (which includes most of Thorne Bay Ranger District and part of the Craig Ranger District), 51 percent of the original POG on karst lands below 800 feet have been harvested.

One of the five additional “emphasis areas” identified during the 1997 Tongass Forest Plan Revision was karst and cave resource management. Responding to the need for a management strategy, standards and guidelines were developed that provided for other land uses while taking into account the function and biological significance of the karst and cave resources within the landscape. This strategy was developed during the 4 years prior to completion of the 1997 Tongass Forest Plan, beginning with the recommendations of a karst and cave resource significance assessment completed by Aley et al. (1993, as cited in USDA Forest Service 1997a) and combining the most current thinking on karst management issues. The Forest began adopting a land management strategy for the karst lands similar to “hazard area mapping” or “risk assessment.” Referred to as “vulnerability mapping” or “karst vulnerability,” this strategy assesses the susceptibility of the karst resources to any land use. Vulnerability mapping utilizes the fact that some parts of a karst landscape are more sensitive than others to planned land uses. The key elements of the strategy focus on the openness of the karst system and its ability to transport water, nutrients, soil and debris, and pollutants into the underlying hydrologic systems. The strategy strives to maintain the capability of the karst landscape to regenerate a forest after harvest, to maintain the quality of the waters issuing from the karst hydrologic systems, and to protect the many resource values within the underlying cave systems as per the requirements of the Federal Cave Resources Protection Act (FCRPA).

On the low to moderate vulnerability karst lands (defined in the Karst and Cave Resources Standards and Guidelines of Chapter 4 in the Forest Plan), where mineral or glacially derived soils fully or partially cover the epikarst, forest regeneration is exceptional. In these areas, even the complete loss of soil and litter from the surface of the limestone will not prohibit the re-establishment of a forest because the displaced surface materials are retained within the epikarst channels (Harding and Ford 1993, as cited in USDA Forest Service 1997a). On highly sensitive karst lands, the epikarst channels are too deep to allow conifer seedlings to establish themselves even if the displaced soil is retained. The bottom of the channels may also be open, directly transporting sediment and debris into the karst groundwater system. Highly sensitive or vulnerable karst areas are generally found at higher elevations, have thin organic soils that are easily displaced, are on steeper slopes, or are in areas of intense karst development. Previous harvest in such areas has increased the percentage of bare rock, resulting in less-than-desirable forest regeneration.

Recent implementation and effectiveness monitoring (USDA Forest Service 2004a) found that the Karst and Cave Standards and Guidelines outlined in Forest Plan were being implemented to the fullest extent practicable. Karst resource input was provided for a number of sales, including those on the Thorne Bay Ranger District, where forested karst lands are most extensive.

Although most caves found to date on the Tongass are not suitable for recreation purposes because of frequent flooding, instability, or presence of fragile structures, the Forest Service is seeking opportunities for surface and subsurface public access and interpretation.

Karst areas in Southeast Alaska are most comparable to those of karst lands found on Vancouver Island and the Queen Charlotte Islands of British Columbia (Canada), portions of Patagonia (Chile), Tasmania, and the west coast of the South Island of New Zealand. All of these areas have very steep surface slopes and subsurface hydraulic gradients, and very high levels of rainfall. These characteristics put them among the most dynamic karst terrains on earth, evolving and changing more rapidly and abruptly than karst in more moderate settings. The Karst Panel Report (Aley et al. 1993, as cited in USDA Forest Service 1997a) found the karst lands of the Tongass National Forest to be of national and international significance for a variety of reasons. The Karst Review Panel in the summer of 2002 confirmed these findings (Griffiths et al. 2002). Both of these panels consisted of world renowned karst experts with a breadth of karst resource backgrounds and a wide variety of international exposure to karst areas and management considerations. Not only is the level of karst development and the karst hydrology and mineralogy globally significant, the paleontological and archaeological discoveries have provided information on the prehistory of Southeastern Alaska and contributed to and challenged theories of the peopling of North America.

The natives and local inhabitants of Southeast Alaska have long known of the presence of caves. The existence of well-developed cave systems was first reported in 1975 and mapping of the caves began in 1987. The existence of vast areas in which karst had developed was fully recognized in 1990. Though noted by early foresters and geologists, the relationship between high site productivity and the presence of karst landscape became apparent at about this same time. With the passing of the FCRPA in 1988, the Forest struggled with methods to protect the many caves throughout the landscape. At first, protection focused on the large, significant karst features and cave entrances. Subsequent measures tended to look at entire karst hydrologic systems.

As of 2006, the Tongass inventory includes 611 caves (plus one state cave). Of these, 290 were listed in 1996 during the initial process of identifying significant cave resources. An additional 87 caves were added in 2003. The Tongass National Forest has received another 57 nominations that are pending. The remaining 177 caves do not have nominations. Intense karst development has been identified on northern, central, and south-central Prince of Wales Island, Kosciusko Island, Dall Island, Heceta Island, Revillagigedo Island, and on the mainland southeast of Wrangell (Baichtal 2006).

Approaches to characterizing karst areas on the Tongass National Forest in recent years have included tracer dye studies to define karst watersheds and water quality parameters, physical monitoring of karst springs, and measurement of rainfall (USDA Forest Service 2004a). These efforts provided preliminary data on how karst groundwater systems and water chemistry relates to precipitation and runoff. These data will be used to establish baseline conditions, and will be compared with karst conditions monitored after implementation of management activities. In addition, Light Distancing and Ranging (LiDAR) technology has been used in ongoing inventories of karst and cave resources.

Environmental Consequences

Geology

Updates to the Forest Plan standards and guidelines would apply under all alternatives except the Alternative 5 (No Action). The standards and guidelines related to geology would be updated under the proposed Forest Plan. The focus of the revisions would be to identify and find solutions to management problems related to geologic resources, and to develop geologic resources on the Tongass National Forest. Geologic inventories would be conducted to cover bedrock geology, surficial geology, stratigraphy, hydrogeology, geomorphic features, geological hazards, karst features, caves, and paleontology, including potential for geologic formations to yield fossil resources of scientific and other values. The focus on geologic resources could result in greater protection of unique features and greater utilization of geological resources. Refer to the *Minerals* section for more information on potential effects related to mining and mineral resources.

Karst and Caves

Karst lands have separate issues and concerns compared with other landforms because karst is a three-dimensional landform with closely integrated surface and subsurface processes. Groundwater flows relatively slowly through porous rock and soil, or via fracture flow, in non-karst terrain. In karst terrain, groundwater may flow relatively quickly through complex underground systems of solution-widened conduits that vary from fissures a few inches wide to cave systems many feet wide. Potential effects to karst systems and caves and associated drainages from timber harvest and road building include changes in hydrology, infiltration rates, sediment production, debris transport, pollutants, and introduction of organics that can lead to oxygen depletion. Issues and concerns related to karst lands primarily revolve around potential changes to groundwater flow in the underground system. Any management activity that causes sediment or organic debris to build up in the subsurface conduits decreases the capacity of these conduits and makes the formation of surface streams more likely. Similarly, any management activity that increases groundwater recharge may also affect the capacity of the conduits in the underground system and make formation of surface streams more likely. Changes in the presence of surface water can produce broad ecosystem changes both above and below ground. Groundwater recharge in karst lands occurs by either discrete or diffuse recharge. Discrete recharge refers to losing or sinking streams that enter the subsurface at specific insurgence points. Diffuse recharge refers to subsurface entry of water through the forest floor and the epikarst. Losing or sinking streams can rapidly deliver sediment into subsurface passageways.

Sediment transport into karst systems also produces concern. This concern is primarily attributed to the size of past harvest blocks and the rate at which the landscape was harvested prior to the early 1990s, when the extensiveness and significance of karst terrain on the Tongass National Forest became more fully recognized. The current standards and guidelines address these concerns to a high degree.

Potential effects on karst lands from planned timber harvesting, associated road construction, and quarry development may occur; however, with careful implementation of the current or proposed standards and guidelines (as modified through ongoing monitoring and adaptive management), and site-specific mitigation measures (designed and implemented at the project level), the Forest expects to mitigate the effects of any proposed activity. Site-specific mitigation measures include protection of the high vulnerability karst areas and features, partial cutting, reduced harvest unit size, use of logging systems that achieve at least partial suspension, reductions in rate of harvest, and other changes in logging practices.

The Karst Review Panel in the summer of 2002 found that implementation of the Karst and Cave Standards and Guidelines from the current Forest Plan had ensured a high level of protection for karst resources overall (Griffiths et al. 2002). The Panel noted high standards in both the philosophy of management and the way that specific management practices were formulated and applied. Implementation of specific policies and procedures was found to be very good and in general compliance with the stated goals and objectives of the karst program. The Panel also noted the extent to which high vulnerability karst had been protected since 1997. In addition, the Panel outlined the action required to more actively manage karst landscapes covered with second-growth stands and recommended a new procedure for assessing the autogenic (precipitation on carbonate rocks) recharge component of karst units.

Implementation and effectiveness monitoring of these karst and cave standards have brought to light a few discrepancies (USDA Forest Service 2004a). Specifically, the definition of low, moderate, and high vulnerability karst lands; the application of appropriate mitigation; the approach to catchment area management; and the resolution of conflicts with riparian management standards have surfaced as topics that need clarification. These have been addressed in the proposed Forest Plan, as discussed below. In addition, continued training and involvement of karst specialists, hydrologists, soil scientists, and other resource specialists has been identified as essential to implementing the standards and guidelines.

Several elements of the Karst and Cave Standards and Guidelines would be updated under the proposed Forest Plan as part of all alternatives except Alternative 5 (No Action). Most importantly, the issues identified as unclear in the current Forest Plan would be clarified, as described with the following explanations. The four-step process to complete a karst landscape assessment would be described in detail, including specific guidance for determining low, moderate, and high vulnerability karst. Depending on level of vulnerability, some management activities would be restricted on karst lands, and mitigation measures would be specified. Catchment areas would be explained, including allogenic (precipitation on non-carbonate rocks) and autogenic (precipitation on carbonate rocks) recharge areas. The potential effects related to second growth management (including commercial thinning), salvage of windthrown timber, and mineral development on karst lands would be addressed, and restrictions detailed based on the level of karst land vulnerability. The proposed standards and guidelines would provide detailed descriptions of factors to evaluate implementing management activities on or near karst lands; however, they also would allow flexibility depending on the professional judgment of karst-trained specialists.

The Karst Review Panel in the summer of 2002 found that implementation of the Karst and Cave Standards and Guidelines from the current Forest Plan had ensured a high level of protection for karst resources overall (Griffiths et al. 2002). The Panel suggested the proposed changes to define appropriate resource management activities in areas of karst management that were unclear in the current version of the Forest Plan. The action alternatives (Alternatives 1, 2, 3, 4, 6, and 7) would incorporate some of these changes in revised standards and guidelines and through proposed designation of new geologic Special Interest Areas. These new Special Interest Areas include all identified high vulnerability karst lands that are not already protected within non-development Land Use Designations (LUDs). Refer to the *Other Special Land Use Designations* section for more information. Significant effects to karst lands and caves have been avoided during implementation of the current Forest Plan. The proposed changes would likely protect karst lands and caves to an even greater extent.

Much of the karst land within development LUDs has been designated as high vulnerability karst land and is protected by standards and guidelines or included within geologic Special Interest Areas. It is estimated that 30 percent of the other karst lands will be determined to be high vulnerability karst with ground verification in the future.

Approximately 457,765 acres of karst underlies NFS lands inside the Tongass National Forest. Under Alternative 5 (No Action), the estimated maximum future harvest on NFS karst lands would be approximately 76,459 acres, including POG and young growth on suitable karst lands (Table 3.2-1). Alternative 6 would involve slightly less area, and Alternatives 1, 2, and 3 would include fewer areas of estimated maximum future harvest on karst lands. Alternatives 4 and 7 would include the most area of karst lands open for timber harvest activities (Table 3.2-1). Based on the current Forest Plan and proposed changes, karst inventories and vulnerability assessments would be required before timber harvest could occur on suitable lands.

Table 3.2-1
Estimated Maximum Future Tongass Harvest on Karst Lands under the Alternatives

Alternative	Old Growth on Karst Lands (acres)	Young Growth on Karst Lands (acres)	Total Area (acres)
Alternative 1	11,941	17,198	29,140
Alternative 2	17,745	42,737	60,482
Alternative 3	19,813	46,358	66,170
Alternative 4	32,512	53,310	85,822
Alternative 5	24,946	51,513	76,459
Alternative 6	22,549	50,079	72,628
Alternative 7	44,121	59,287	103,408

No additional harvest is anticipated in any areas mapped as high vulnerability karst under any of the alternatives. These areas are included in the 42,873 acres of Special Interest Areas under Alternatives 1, 2, 3, 4, 6, and 7, and are not suitable for harvest under Alternative 5. The estimated maximum amount of future POG harvest that could occur on NFS karst lands would vary by alternative, ranging from 11,941 acres under Alternative 1 to 44,121 acres under Alternative 7 (Table 3.2-1).

The maximum amount of construction of new roads on karst lands would also vary by alternative, ranging from 115 miles under Alternative 1 to 329 miles under Alternative 7 (Table 3.2-2). The percentage of new roads that would be constructed on karst lands ranges from 5 or 6 percent under Alternatives 4, 5, 6, and 7 to 15 percent under Alternative 1, where fewer roads would be constructed but a larger percentage of them would be constructed on karst lands. Of these proposed new roads on karst lands, from 1 to 2 miles would occur on slopes greater than 67 percent (Table 3.2-2).

Table 3.2-2
Estimated Maximum New Road Construction on Karst Lands under the Alternatives

New Roads on Karst Lands	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Length of New Roads on Karst Lands (miles)	115	183	194	259	216	206	329
Percent of New Roads on Karst Lands	15%	9%	7%	5%	6%	5%	6%
Length of New Roads on Slopes >67% on Karst Lands (miles)	1	2	2	2	2	2	2

Cumulative Effects

There are approximately 537,588 acres (840 square miles) of karst lands within the boundaries of the Tongass National Forest. Approximately 457,765 acres (715 square miles) are on NFS lands. Of this, approximately 247,680 acres (387 square miles) are protected in Wilderness, LUD II, or other non-development LUDs under the current Forest Plan. The remaining high vulnerability karst on NFS lands are protected by standards and guidelines that include substantial no-harvest buffers.

Past timber harvest has affected the epikarst landscape on the Tongass National Forest. In some portions of the Tongass, 70 to 80 percent of the commercial forest land within specific karst blocks has been harvested. It is estimated that about 21 percent (95,479 acres) of the karst lands on NFS lands have been harvested (based on the GIS database). Approximately 133 square miles of karst land have been harvested on Prince of Wales Island alone. In addition, 575 miles of authorized or system roads have been mapped on karst lands (out of 3,532 total authorized road miles). These 575 miles include 116 miles at Maintenance Level 1 (closed), 338 miles at Maintenance Level 2 (for high-clearance off-road vehicles), and 112 miles at Maintenance Levels 3, 4, and 5 (the highest maintenance levels, maintained for passenger vehicles). It is likely that a few hundred miles of unauthorized roads also exist on karst terrain. Of the 575 miles of roads mapped on karst lands, 87 percent occur on slopes of less than 35 percent, 13 percent occur on slopes of between 35 and 67 percent, and less than 1 percent occur on slopes of greater than 67 percent.

Baichtal and Swanston (1996) observed sediment deposits and waterline marks in underground systems that suggested that past timber harvesting had increased sediment and debris transport and flooding of underground passages, many of which had not previously flooded for centuries. These timber harvests were conducted prior to the Karst and Cave Resources Standards and Guidelines implemented in the 1997 Forest Plan. As a result, they had more significant effects on karst lands than current and future harvest activities. At that time, many cave entrances were filled or blocked by logging slash, sediment, and debris. Additional runoff generated from road surfaces commonly had been diverted into karst features. They also noted strong evidence of greatly increased surface runoff on karst landscapes and adjacent surfaces after timber harvest, which increased sediment, nutrient, and debris transport capability of associated drainage networks.

Based on information from Prince Wales Island, Baichtal and Swanston (1996) noted few tree regeneration problems in low-elevation stands on karst landscapes. As a consequence, most easily accessible, low-elevation karst areas on the island had been harvested. After the initial timber harvests, harvest activities concentrated on steeper, higher elevation karst landscapes characterized by shallower, excessively well-drained soils. Baichtal and Swanston (1996) suggested that trees were smaller and regeneration problems were greater at these steep, upper elevation sites. This condition possibly resulted from shallow soils with low nutrient availability, excessive drainage of surface and soil waters into subsurface karst systems, removal of much of the shallow soil because of inadequate log suspension, and continued desiccation of the soil once the protective forest canopy was removed. After timber removal, high rainfall rapidly transported fragile soils into the well-developed epikarst.

More recent monitoring of karst lands near harvested areas (USDA Forest Service 2004a) have confirmed that current timber harvest practices have adjusted substantially to accommodate Karst and Cave Standards and Guidelines. For example, karst resource input was provided for timber sales projects throughout the Tongass.

Extensive landscape changes and ground disturbance have occurred and are likely to continue to occur on non-federal lands in Southeast Alaska. These include timber harvest and road construction, mining, recreation and tourism, growth of human settlements, transportation projects, and energy and transmission projects. Forest Service regulations requiring protection of karst resources do not apply to non-federal lands. Approximately 88,000 of the nearly 538,000 acres of karst lands within the Tongass National Forest boundary are on state or private lands. Assuming that none of the karst on state or private lands is protected, an estimated 69 to 74 percent of all the karst lands in Southeast Alaska would be protected in non-development LUD areas under the alternatives.

Transfers of karst lands from NFS lands to other land managers or private owners could also occur under any of the alternatives through land exchanges or other types of land adjustments (see the *Lands* section and Appendix C to the Final EIS). The karst forest lands on Prince of Wales and neighboring islands are among the candidate lands that have been discussed in the past. This type of future action could increase the amount of karst lands in Southeast Alaska that are not in a protected LUD. Any exchange or other type of adjustment (outside of legally required conveyances) would require NEPA analysis, most likely an EIS, which would include public involvement and would disclose any adverse effects to karst and cave resources, as well as to other resources.

Soils

Affected Environment

Soils in Southeast Alaska develop in parent materials originating from a variety of geological or vegetative sources. Parent material is the inorganic or organic matter in which soils develop, and in the Tongass National Forest includes volcanic ash; glacial deposits; hillslope, stream, and uplifted marine sediments; rock; and deposits of decomposed plant materials. Soils are commonly divided on the basis of their parent material. Both mineral and organic soils occur extensively within the Tongass National Forest, where more than 100 different soils have been identified. Soils cover 84 percent of the inventoried land surface area of the Tongass; the remainder consists of ice, exposed bedrock, and bodies of water.

From a resource management perspective, soil productivity (i.e., a soil's ability to support vegetative growth) and the potential loss of soils or off-site effects from erosion and landslides are the principle concerns. The productivity of soils directly or indirectly affects the productivity of other forest resources. Tree growth, wildlife and fish habitat quality, and recreation uses and potentials depend in part on the quality of soils. In Southeast Alaska, soil productivity, in terms of tree growth, is high on well-drained soils (e.g., on steep slopes and in karst areas) and decreases as latitude and elevation increase and as drainage becomes poorer.

Soil, or site, productivity is generally measured by the rate of biomass accumulation, and site index is commonly used to give a relative indication of this productivity. Site index is determined by the height of dominant trees at a specified age. The site index tables or curves available for use in Southeast Alaska were developed from trees in even-aged stands, not the uneven-aged or old-growth stands that predominate here; consequently, the resulting site index categories are more useful for comparison than as absolute numbers. Soil productivity also can be estimated from the characteristics of individual soil types. The principal characteristics are soil depth, drainage, acidity, and coarse fragment content. Over one-quarter of the total productive forest land in the Tongass National Forest has been mapped in the highest site index category (Category 4), which means that on average these sites will grow trees greater than 80 feet tall in 50 years (Table 3.3-1). Less than 10 percent of the Tongass falls into the lowest site index category (Category 1), which corresponds with trees less than 40 feet high in 50 years. Almost one-quarter of the productive old growth (POG) and two-thirds of the harvested young growth have been mapped as Category 4 (Table 3.3-1).

Table 3.3-1
Estimated Percent of the Productive Forestland on the Tongass by Site Index Category

Productive Forest Land Category	Site Index Category 1: Avg. Site Index = 0-40	2: Avg. Site Index = 41-60	3: Avg. Site Index = 61-80	4: Avg. Site Index > 80	Unmapped[1]	Total
Productive Old Growth	9%	14%	23%	24%	29%	**100%**
Young Growth – Harvested	4%	6%	21%	66%	2%	**100%**
Young Growth – Natural	13%	6%	16%	39%	26%	**100%**
Total Productive Forest land	9%	13%	23%	28%	26%	**100%**

[1] Unmapped areas are mostly in Wilderness or National Monument.

Soil erosion in the form of gully, sheet, and rill erosion is a minor occurrence under natural, undisturbed conditions in Southeast Alaska, because the thick surface duff layers that cover the mineral soils protect them from surface erosion. Mineral soils can be disturbed and exposed either by natural causes, such as landslides and blowdown, or management activities, such as timber harvest and road construction. Surface erosion can become active once the duff layer is removed and can remain active until revegetation occurs.

Landslides, both naturally occurring and human-caused, dominate soil movement processes on steep forest lands in Southeast Alaska (Swanston 1969, 1974). Although conducted more than 30 years ago, Swanston's papers present excellent characterizations of landslides in Southeast Alaska. Landslides deliver eroded material to streams more quickly, and in greater quantity, than surface erosion. Landslides can seriously retard soil productivity for forest regeneration on slopes by removing the soil mantle down to bedrock or glacial till. It can take 50 to 100 years for soil layers to be rebuilt on exposed bedrock in these landslide areas. Debris deposited on lower slopes and valley bottoms may improve site productivity locally because of incorporation of organic nutrients and improved drainage. Regeneration at such sites is rapid.

In the Tongass National Forest, several factors control soil stability on steep terrain. On steep forested slopes, the dominant failure type is debris avalanche (the failure of a finite mass of water-charged overburden material along a relatively flat surface). These landslides occur primarily at shallow depths (1 to 3 feet) in the soil overburden. The texture of the soil overburden is characteristically gravelly silt or gravelly silty sand; less commonly the texture might be sandy gravel (Swanston 1997). The dominant steep-slope soil types with these textural characteristics in Southeast Alaska have little or no cohesion. Organic content may exceed 30 percent locally because of the downward migration of organic particles into the mineral soil zone, which substantially increases cohesion at some sites. A qualitative system of indexing mass failure provides an indication of the relative frequency of mass failures when vegetation is cleared or the land is disturbed.

Approximately half of the Tongass is made up of lands with slopes less than 35 percent (Table 3.3-2). Approximately one-third of the Tongass ranges in slope from 35 to 67 percent, and the remaining 18 percent exceeds 67 percent slope. Only 13 and 3 percent of POG and harvested young growth exceed 67 percent slope, respectively. In general, these steep slopes pose greater risks for soil erosion through landslides.

Table 3.3-2
Estimated Percent of the Tongass National Forest, POG, and Young Growth by Slope Category

		Percent Slope Category			
	Acres	**0-35%**	**35-67%**	**>67%**	**Total**
Productive Old Growth	4,951,154	49%	38%	13%	**100%**
Young Growth – Harvested	454,725	68%	29%	3%	**100%**
Young Growth – Natural	233,844	81%	14%	4%	**100%**
Other Areas	11,134,085	49%	30%	22%	**100%**
Tongass National Forest	16,773,808	50%	32%	18%	**100%**

Landslides are thought to be an important natural process by which fish habitat structures and stream substrates are replenished (Meehan 1991, Reeves et al.1995, Wing 2000). Sediments and large woody debris, including gravels, are deposited in stream headwater areas. During high flow periods, some of that sediment and wood is transported through the stream system, although much wood may be stored in headwater channels. A recent study by Martin and Benda (2001) in the Game Creek Watershed found that only about 1 percent of the wood (by volume) from landslides reaches mainstem fish habitat. The wood is typically entrained in the upper reaches of fish habitat on alluvial fans and in transition channels. Sediments may more commonly flush through the stream system. Settled gravel can provide fish spawning habitat. Large wood that does reach mainstem aquatic habitat forms structures for hiding and resting. The frequency of delivery and quantity of the material delivered will determine the effect (either positive or negative) landslides will have on stream channels and fish habitat (Meehan 1991, Reeves et al. 1995, Wing 2000). It is generally thought that increased frequency of slides and quantity of material delivered, above the natural range of occurrence, moves the streams out of equilibrium and degrades fish habitat (Meehan 1991, Reeves et al. 1995, Wing 2000).

One inventory of landslides that occurred between 1963 and 1983 in Southeast Alaska (Swanston and Marion 1991) showed that roughly 10 percent (118) of the landslides occurred in clearcut harvest areas or were directly associated with timber harvesting, whereas roughly 90 percent (1,277) occurred in unlogged areas. On a per-acre basis, however, landslides occurred in clearcut areas about three times as frequently as in unlogged areas. Landslides in unlogged areas appear to be larger and longer than those in logged areas. Of the 1,277 landslides that occurred on unlogged areas, 37 affected fish streams (3 percent), while 7 of the 118 landslides on logged areas affected fish streams (6 percent). It is important to note that clearcut timber harvests conducted between 1963 and 1983 did not include the restrictions that were implemented during the past 15 years or would be implemented in the future. These harvests often involved logging large portions of watersheds with very large clearcuts and almost no buffers, slope restrictions, or other restrictions. One would expect to find more landslides after these earlier clearcuts than after the types of clearcuts expected under the current Forest Plan.

The Soil and Water Standards and Guidelines in the current Forest Plan are important for minimizing potential detrimental soil disturbance. According to results of 2004 soil and water implementation and effectiveness monitoring (USDA Forest Service 2004b), the Tongass National Forest is implementing the standards and guidelines for soil disturbance successfully during timber sale administration and road construction. Data collected on Prince of Wales Island and on the Wrangell and Petersburg Ranger Districts indicate that all timber harvest units, including cable, helicopter, and shovel yarding systems, are within the established Region 10 soil quality guideline of less than 15 percent soil disturbance that is considered potentially detrimental (as set forth in Forest Service Manual 2554).

The current Forest Plan takes a relatively conservative approach to avoid potential effects on soil resources. Seven specific items are listed in the proposed Forest Plan to ensure that land use activities avoid irreversible or serious and adverse effects on soil resources. These are based on research on the effects of management activities on soils in Southeast Alaska. For example, at the Forest Plan level, slope gradients of 72 percent or more are removed from the tentatively suitable timber base because of the high risk of soil mass movement and accelerated erosion of Class IV channel systems (see the *Water* section for more information regarding channel classes). At the project planning level, the Forest Supervisor or District Ranger may approve timber harvest on slopes of 72 percent or more on a case-by-case basis, after on-site analysis of slope and Class IV channel stability and an assessment of potential impacts of accelerated erosion on downslope and downstream fish habitat, other beneficial uses of water, and other resources. The threshold of 72 percent comes from the applicable research conducted in Southeast Alaska (Swanston 1997).

As another example, the effectiveness of standards and guidelines related to yarding methods were monitored in Landwehr (1993). This study involved 199 soil disturbance transects in timber harvest units on the Thorne Bay Ranger District. Mineral soil disturbance on individual transects averaged 4.6 percent. Shovel yarding averaged slightly higher levels of disturbance, 5.1 percent, as compared to cable yarding systems that averaged 4.0 percent. In the Coffman Cove area, where operators were less experienced, shovel yarding averaged 7.1 percent mineral soil disturbance. After operators in the Coffman Cove area were directed to reduce soil disturbance, conditions improved and total disturbance was reduced. Standards and guidelines for overall mineral soil disturbance were met in all the units involved in the study.

A Forest-wide inventory to identify, delineate, and digitize all landslides was initiated in 2001. Landslides are being digitized as an independent layer in GIS. As of 2004, landslide inventories have been completed for approximately 2.9 million acres of the Ketchikan, Petersburg, Sitka, and Wrangell Ranger Districts. Additional landslide inventories are being conducted. To date, the density of landslides is greater in managed stands than in unmanaged areas, which is consistent with the results of the Swanston and Marion (1991) inventory. However, the majority of past harvest activities were conducted under substantially lower protections than current-day harvest activities (see the subsection titled *Past Old-Growth Harvest* in the *Affected Environment* portion of the *Biodiversity* section). Continued emphasis is necessary during timber harvests to implement measures that minimize mass failures and landslides.

Environmental Consequences

Direct and Indirect Effects

Forest management activities can cause soil erosion and subsequent loss of site productivity through the exposure of mineral soil, alteration of subsurface drainage, and the concentration of soil and rock material at unstable sites. The management activities that have the greatest potential to affect soil erosion, including sheet, rill, gully, or mass movement erosion, are timber harvest-associated activities, such as road and log-landing construction, rock pit development, and some yarding methods. Forest-wide standards and guidelines protect all areas of the Forest to a high degree, as indicated by 2004 soil and water implementation and effectiveness monitoring (USDA Forest Service 2004b). Monitoring indicates that the Region 10 soil quality standard of less than 15 percent soil disturbance was achieved during timber harvest activities. Soil erosion and loss of productivity would be expected to be even lower if lands are converted from development LUDs to non-development LUDs, which prohibit timber harvest and most road construction.

Due to the substantial amount of vegetative groundcover remaining on harvest units during and following timber harvest, surface erosion from these areas is usually small (Martin and Kirtland 1995, Swanston 1969). The larger effect of harvest activities on soil erosion occurs as landslides. More than 300 landslides and debris flows were triggered by an October 1993 storm on basin-scale clearcuts on Prince of Wales Island (Johnson et al. 2000). Eroded soil from these landslides was transported as sediment in nearby channels. Channel bedload sediment after the 1993 events was 2 to 10 times greater and relatively finer compared with bedload transport in a channel that had last experienced a landslide and debris flow in 1961 (Gomi et al. 2004). Swanston and Marion (1991) mapped landslides in the Tongass National Forest during the 21-year period, 1963 through 1983. They noted an occurrence rate of 118 landslides per 980 square kilometers (242,163 acres) in harvested or roaded areas over 21 years. Based on this count, an average of one landslide occurred per 2,052 acres of harvest over 21 years, or one landslide per 43,092 acres (on average) per year. They found that landslides were 3.5 times more likely on harvested areas. A more recent study (Johnson et al. 2007) compared the effects from 100 percent tree removal to partial cuts (25, 50, and 75 percent removals). They focused on effects to soil saturation (groundwater levels) and found increasing soil saturation with increasing percent tree removal. Increased soil saturation likely correlates with increased potential for soil erosion through landsliding, although they did not model this possibility directly because of uncertainties in estimating loss of cohesion as a result of changes in root strength in partial cuts.

The effects of timber harvest on soil productivity are described in several papers in Slaughter and Gasborro 1988. Regeneration after clearcutting is excellent on all but a few sites in coastal Alaska, and, once established, growth rates of hemlock and spruce are relatively high (Farr and Ford, in Slaughter and Gasborro 1988). New stands contain several thousand stems per acre, and crown closure begins to take place by age 15 to 20 years. Crown closure approaches 100 percent by 25 to 30 years of age and remains so for 100 years or more. Silen (in Slaughter and Gasborro 1988) also states that more than 90 percent of clearcut areas densely restock naturally in Southeast Alaska. Precommercial thinnings aid in achieving desired stocking levels and increased growth (Pawuk, in Slaughter and Gasborro 1988). Klock (in Slaughter and Gasborro 1988) notes that soil compaction, most frequently by ground skidding operations, leads to reduced timber volume growth. The current and proposed Forest Plan includes standards and guidelines to avoid these effects.

Blowdown, or windthrow, can increase along the edges of regeneration harvest units, and this may expose mineral soil. Blowdown increases the potential for soil erosion and may increase the potential for landslides. According to a study by Kramer (2001), watersheds in the Tongass National Forest that experience more intense soil mixing from windthrow have lower levels of strongly humified soil carbon pools (e.g., lower levels of reprecipitated acid) than areas that have not experienced windthrow. The disturbed watersheds include more organic matter in a partially decomposed particulate form, which translates to less acidic carbon forms, higher ion exchange capacity, higher soil pH, and lower bulk density in the soil (Kramer et al. 2004). The disturbed soils are more aerated, better drained, and have higher nutrient status.

Soil productivity decreases from the construction of roads because land is taken "out of production" (i.e., removed, covered over, or compacted). Erosion increases from the construction of roads because of the destabilizing effect of cuts, fills, and drainage alterations, and the lack of protective vegetation cover on road surfaces and other disturbed areas.

The amount of road construction by alternative is used as a measure of both soil productivity losses and erosion potential. In one attempt to quantify road erosion, Kahklen and Hartsog (1999) developed a multiple regression analysis based on road erosion studies in the Tongass National Forest. They found that road erosion was highly variable. The primary variables that correlated with greater sediment yields were heavier traffic volumes, more rainfall, higher road gradients, and lack of road resurfacing. These and other site-specific variables are evaluated more precisely during project planning, based on the specific conditions found at the project site, and will vary based on soil parent materials, rock durability, slope, location within a watershed, mass movement hazard, and other factors. Paustian (1987) measured short-term effects of road building on soil erosion in the Kadashan watershed that resulted in increased suspended sediment yield equivalent to 2 percent of the estimated annual sediment yields. Potential increases in total estimated sediment yield over a 2-year post-road construction period ranged from 20 to 66 percent in three Kadashan study streams. Montgomery (1994) found that drainage concentration from ridgetop roads caused both landsliding and integration of the channel and road networks. Road drainage concentration increased the effective length of the channel network and strongly influenced the distribution of erosional processes in Southeast Alaska.

Standards and guidelines, Best Management Practices (BMPs), and other relevant mitigation measures are applied at the project level to minimize potential adverse effects. At the Forest Plan level, the overall difference in acres disturbed by roads is a good indication of how site-specific effects are likely to vary between alternatives. Refer to the *Water* and *Fish* sections for more detailed analyses of potential effects related due to roads. Table 3.3-3 displays the maximum acres to be covered by road surfaces after the first 15 years of Forest Plan implementation. In addition, it presents the cumulative acres of road surfaces—the total amount of land area covered by all roads after 100+ years - full implementation of the Forest Plan (assuming none of the roads is completely obliterated).

Under all but Alternatives 4 and 7, the cumulative acres of road surfaces would be equal to or less than expected under the current Forest Plan. The cumulative acres of road surfaces would be smallest under Alternatives 1, 2, and 3. Reductions in soil productivity losses and soil erosion would correlate with smaller cumulative roaded acres.

Table 3.3-3
Estimated Cumulative Acreage Covered by Road Surfaces on NFS Lands after the first 15 Years and after Full Implementation of the Forest Plan (100+ Years) by Alternative[1] (currently there are 14,823 acres covered)

Alternative	Estimated Maximum Cumulative Acres Covered by Road Surfaces after First 15 Years of Implementation	Estimated Maximum Cumulative Acres Covered by Road Surfaces after Full Implementation (100+ years)
1	15,239	17,148
2	16,155	21,063
3	16,822	23,223
4	18,050	29,495
5	17,848	26,448
6	17,713	26,058
7	18,903	32,300

[1] Acres covered by road surfaces are calculated based on an average of 3 acres per 1 mile of road.

Soil mass movements (e.g., slumps, earthflows, debris avalanches, and debris flows) constitute the most potentially damaging type of erosion. They are thought to be the major cause of accelerated erosion resulting from resource management activities. Landslides may adversely affect soil quality. They have the potential to affect aquatic habitats both positively and negatively. Landslides have a positive effect by providing new sources of woody debris and gravel. They negatively affect aquatic habitats by destroying viable eggs by smothering and bed load overturn, and by destroying habitat elements for fish (pools, riffles, log discharge, etc.). Resource management activities would be eliminated if lands were switched from development LUDs to Recommended Wilderness or LUD II, reducing the risk of soil mass movements. Under all alternatives, Forest-wide standards and guidelines limit timber harvest on slopes over 72 percent gradient, as well as on soils classified with an extreme mass movement index.

As part of the effects analysis, the average landslide frequency from the Swanston and Marion (1991) study was applied to the estimated harvest levels likely under each alternative over the first 15 years of Forest Plan implementation. The proposed Forest Plan includes standards and guidelines and mitigation measures that were not in effect during the period of the landslide study (e.g., Riparian Standards and Guidelines, the removal of extreme hazard soils from the suitable land base, and BMPs). The Swanston and Marion (1991) landslide study was based primarily on large-scale clearcut logging with almost no buffers. Fewer landslides would be expected, on average, under the current or proposed Forest Plan.

For the purposes of this comparison, the life of the Forest Plan (up to about 15 years) is used because the landslide occurrences reported by Swanston and Marion (1991) reflect long-term averages. Landslides typically are associated with storm events and large amounts of precipitation, which are highly variable from one year to another. For example, widespread landsliding in headwater tributaries following basin wide clear-cut logging on Prince of Wales Island was triggered by intense rainstorms in 1961 and 1993 (Gomi et al. 2004). The numbers in Table 3.3-4 are used to compare the long-term landslide estimates that may result from the individual harvest levels proposed under each alternative. Despite the limitations listed in the footnotes (i.e., landslide frequencies are anticipated to be lower for each alternative than those displayed in the table), Table 3.3-4 provides a means to compare the relative level of effects under each alternative.

Table 3.3-4
Estimated Maximum Increase in Landslide Frequency over the First 15 Years of Forest Plan Implementation[1]

Alternative	Projected Maximum Acres Old Growth Harvested in First 15 Years[2]	Estimated Maximum Increase in Number of Landslides over First 15 Years
1	26,600	7
2	81,610	20
3	108,764	27
4	186,410	46
5	152,329	38
6	148,210	37
7	242,168	60

[1] This table uses the landslide frequency of one landslide per 2,052 acres in harvested and roaded areas cited in Swanston and Marion (1991) and subtracts off an estimated 0.289 landslide per 2,052 acres for unharvested acreas (based on their estimate of landslides being 3.5 times more prevalent in harvested vs. unharvested areas), in order to estimate the increase due to harvest and roading. It should be noted that Swanston and Marion (1991) measured landslide frequency based on large-scale clearcutting of large portions of watersheds that occurred between 1963 and 1983. Almost no harvest buffers were implemented during that time. The standards and guidelines protective of soil resources that are included in the current and proposed Forest Plans were not implemented. As a result, the estimates represent a maximum that likely far exceeds the landslide frequency that would likely occur under current and proposed timber management.

[2] Based on the acres of old growth scheduled for harvest by the Spectrum model over the first 15 years. These numbers assume that the maximum allowable acres would be harvested during this period, an unlikely scenario. Most likely, fewer acres would be harvested, particularly in the first decade. Any harvest would comply with the Forest Plan standards and guidelines, including buffers, unstable slope restrictions, smaller opening sizes, and BMPs.

Alternatives 1, 2, and 3 would have lower landslide potentials, and Alternative 6 would have a slightly lower landslide potential than under the current Forest Plan (Alternative 5). Alternatives 4 and 7 would result in increased potential, with the trend of increasing risk by alternative shown in Table 3.3-4.

Soil conditions could improve with the proposed changes to off-highway vehicle (OHV) management under each action alternative. Reflecting new national policy, the revised Forest Plan would close the Tongass National Forest to OHV use except where designated as open based on resource concerns and other criteria; however, the designation of open roads will need to be consistent with ANILCA. This approach would likely reduce the localized damage caused by OHV routes. In limited parts of the Tongass National Forest, soil degradation from steadily increasing OHV use over the last 15 years has been documented (USDA Forest Service 2006). Recently developed OHVs have enough power and traction to displace several inches of wet soil in a single pass (USDA Forest Service, 2006, unpublished). Avoiding routes that cross saturated soils with low-bearing strength would prevent ruts, soil compaction, and other resource damages (USDA Forest Service 2006, unpublished). OHV routes on the Yakutat Forelands have changed wetlands, created chronic soil disturbance, and caused sedimentation (USDA Forest Service, 2006, unpublished). By limiting OHV users to defined areas, the revised Forest Plan would address these issues before degradation occurred, the preferable option both ecologically and financially (USDA Forest Service 2006).

Cumulative Effects

Cumulative effects to soils would include both the effects discussed above and other potential effects related to activities outside of NFS lands. The total area within the Tongass National Forest boundary, including both NFS and non-NFS lands, is about

17.8 million acres. Of this area, non-NFS lands make up approximately 6 percent (1.06 million acres). A high percentage of the productive old growth on the non-NFS lands has been or can be expected to be harvested over the next 100+ years (see *Biodiversity* section *Cumulative Effects* subsection). Other reasonably foreseeable future activities on these lands include mining, recreation and tourism, growth of human settlements, transportation projects, and energy and transmission projects. Management activities on non-NFS lands are not held to the Region 10 soil standards; however, BMPs are required under the Alaska Forest Resources and Practices Act, including detailed regulations related to providing notification prior to timber harvests and managing riparian areas. The state forester must protect riparian areas from the significant adverse effects of timber harvest activities on fish habitat and water quality. These measures are designed to avoid soil erosion and sedimentation near streams. Martin (1996) compared pre- and post-harvest basins on non-NFS lands and found short-term effectiveness of these BMPs. Martin (1997) evaluated BMP effectiveness, including those designed to reduce soil erosion to mitigate turbidity. He found BMPs minimized sediment delivery and effectively maintained turbidity at comparable non-harvest levels. Arians (2003) includes several studies that compared pre- and post-harvest basins and indicated that logging with the BMPs does not result in significant effects to soils that would result in stream sedimentation and damage to fish. Despite these BMPs, some landslides, soil erosion related to duff removal, and losses in site productivity likely have occurred and will continue to occur on non-NFS lands. However, cumulatively, non-NFS lands represent only 6 percent of all of the soil resources in Southeast Alaska within the Tongass boundary. Potential impacts to the remaining 94 percent of soil resources would be mitigated through implementation of standards and guidelines and BMPs associated with each of the alternatives. The 2005 monitoring (USDA Forest Service 2005b) found that overall soil and water BMPs were implemented and found to be effective in Tongass timber harvest and road construction activities. Based on monitoring results, no changes were recommended to Forest Plan standards and guidelines for attaining State of Alaska water quality standards. Furthermore, effects of harvest on soil resources would ultimately be considered at the project-specific levels, ensuring minimal adverse cumulative effects to soil resources.

Similarly, roads are more prevalent on non-NFS lands than on NFS lands. Projected future road miles and densities under each alternative on both NFS and non-NFS lands are shown in Tables 3.6-8 and 3.6-9 of the *Fish* section of this chapter. In addition to approximately 4,942 total road miles currently on NFS lands, an additional 3,762 miles currently exist on non-NFS lands within the Forest boundary, and most of these roads are associated with timber harvest activities. Road densities are relatively high (2.27 miles per square mile) on non-NFS lands, resulting in commitment of soil resources; however, cumulative future road densities inside the Forest boundary are considerably lower, ranging from 0.39 mile per square mile under Alternative 1 to 0.57 mile per square mile under Alternative 7 (see the *Fish* section for additional information). As described earlier under the discussion of the potential direct and indirect effects to soils from roads, at the Forest Plan level, the overall difference in roaded area is a good indication of how site-specific effects are likely to vary among alternatives. This approach also applies to cumulative effects. Standards and guidelines, BMPs, and other relevant mitigation measures are applied at the project level to minimize potential adverse effects. Under all but Alternatives 4 and 7, the cumulative acres of road surfaces would be equal to or less than under the current Forest Plan. Reductions in soil productivity losses and soil erosion would correlate with lower cumulative road densities.

Overall, the cumulative effects of considered alternative actions combined with other non-NFS lands actions would increase the potential for cumulative effects to soil resources. Potential cumulative effects of harvest, road building, and other actions would be evaluated on a project-specific basis ensuring that any adverse effects to soil resources would be reduced, moderated, mitigated, or eliminated.

Mitigation

Forest-wide standards and guidelines for the soils resource are the same in all alternatives (see the Chapter 4 of the current Forest Plan and the proposed Forest Plan), and will apply to all site-specific projects. Forest-wide standards and guidelines are followed to mitigate the effects of management activities. They are designed to minimize accelerated soil erosion and maintain long-term soil productivity. They include soil conservation practices and incorporate the applicable BMPs (see Soil and Water Handbook). Annual monitoring (described in Forest Service Manual 2554) of BMP implementation and effectiveness helps ensure that water quality goals, and standards and guidelines, are met during project implementation (see Forest Plan, Chapter 6).

Water

Affected Environment

The Tongass National Forest can be characterized by its abundance of water. The maritime climate brings precipitation nearly year-round, with the heaviest amounts occurring from September through January. Coastal low-elevation rain forests thrive in this maritime climate. Thousands of miles of shoreline and hundreds of bays and inlets characterize the marine environment of the Tongass. An important consideration for all water-related issues is the effect that changes in water flow and quality have on important aquatic resources, especially fish.

The water environment of the Forest can be described in terms of climate, streamflow regimen, water quality, floodplains, wetlands, riparian areas, watershed condition, and water use. There are literally thousands of watersheds within the 26,000 square miles that make up the Tongass National Forest. Climate is described in the *Climate and Air* section; other factors are summarized in the following subsections.

Streams, Lakes, and Flow Regimen

Streams and rivers on the Tongass produce a large volume of water per unit of land. Much of the flow originates or passes through thousands of small to large lakes. Both glacial and non-glacial river and stream systems occur on the Tongass, and runoff varies greatly between the two stream systems. Runoff from glacially fed streams usually starts in June in response to snow and ice melt, reaching peak flows in July and August. Runoff drops rapidly in October and low flows occur from December through April. Runoff from non-glacial streams tends to respond to high precipitation events; therefore, the highest flows tend to be in October and December and the lowest flows between January and March, and mid-May to August. Many factors influence how timber management activities may affect runoff, and most are site-specific. Roads and timber harvest can affect the amount and timing of the runoff. In studies conducted in the Pacific Northwest, factors, especially those relating to roads, affect runoff patterns; although, site-specific conditions including hillslope gradient, topography, soil type, and rainfall all influence the level of effect (Coe 2004).

Stream channels and lakes are categorized by class based on their fish production values. Although there are additional details (see the *Glossary* for full definitions), stream classes are generally defined as follows:

- Class I streams and lakes have anadromous or adfluvial fish or fish habitat: or, high-quality resident fish waters, or habitat above fish migration barriers known to provide reasonable enhancement opportunities for anadromous fish.

- Class II streams and lakes have resident fish or fish habitat and generally steep gradients (6 to 25 percent or higher) where no anadromous fish occur, and otherwise not meeting Class I criteria.
- Class III streams are perennial and intermittent streams that have no fish populations or fish habitat, but have sufficient flow or sediment and debris transport to directly influence downstream water quality or fish habitat capability.
- Class IV streams are intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capability to directly influence downstream water quality or fish habitat capability. Class IV streams do not have characteristics of Class I, II, or III streams, and have a bankfull width of at least 0.3 meter (1 foot).

In addition, the Tongass uses a stream channel classification system based on the Alaska Region Channel Type Classification System (Paustian et al. 1992). Streams are categorized into channel types, which are grouped into nine process groups, or combinations of similar channel types based on major differences in landform, gradient, and channel shapes (see Appendix D in the Forest Plan for a full description). These are used to assess watershed conditions, fish habitat production capabilities, and sensitivity to management activities (see the *Fish* section of this chapter for additional information). Approximately 65 percent of the stream channels on the Tongass are classified in the high gradient contained process group (Table 3.4-1).

Approximately 44,000 miles of stream have been mapped on the Forest (Table 3.4-1). There are also streams on the Forest that have not been mapped because they require ground surveys to locate. Many of these are small low-flow, high-gradient Class III and IV headwater streams, but others contain valuable aquatic habitat. Additionally, some 250,000 acres of lakes are present on the Forest lands.

Water Quality

The State of Alaska sets water quality standards for chemical, physical, and biological parameters for waters on National Forest System (NFS) lands. The Alaska Department of Environmental Conservation (ADEC) and the Forest Service have agreed that the USDA Forest Service is the agency responsible for monitoring and protecting water quality on the NFS lands of Alaska for the purpose of meeting the Clean Water Act, as amended. Best Management Practices (BMPs), as described in the Soil and Water Conservation Handbook (Forest Service Handbook 2509.22, Region 10 Amendment, July 2006), the Alaska Nonpoint Source Pollution Control Strategy, and the Alaska Water Quality Standards (18 AAC 70) together form the “Forest Service Alaska Region Water Quality Management Plan,” as agreed to in the Memorandum of Agreement dated April 6, 1992 (ADEC and USDA Forest Service 1992). With implementation of this Plan, the State of Alaska recognizes that the Forest Service BMPs are the primary means to protect water quality from nonpoint sources of pollution. In 1997, ADEC determined that the Forest Service BMPs meet or exceed the BMPs contained in the Alaska Forest Resources and Practices Act and Regulations (11 AAC 95) (Brown 1997).

Stream Temperature

Maintaining proper water temperature is critical for the health of aquatic ecosystems. Anadromous fish and other aquatic species are sensitive to water temperature with very low or high temperatures causing adverse conditions. Often in streams with salmon and trout, high water temperature is of greatest concern. Timber harvest and road construction have the potential to reduce stream shade and raise water temperatures. Forest Plan standards and guidelines minimize riparian harvest (see the subsection on Riparian Areas below) in order to maintain stream-side shade.

Table 3.4-1
Mapped Stream Miles by Process Group and Stream Class[1] for each Ranger District Group[2]

Stream Process Group	Class	Northern Ranger Districts	Central Ranger Districts	Southern Ranger Districts	Total
Alluvial Fan	I	236	47	134	**416**
	II	602	90	129	**820**
	III	82	70	101	**253**
	IV	0	1	1	**2**
Estuarine	I	44	11	8	**63**
	II	0	0	0	**0**
	III	0	0	0	**0**
	IV	0	0	0	**0**
Flood Plain	I	2,046	600	1,008	**3,653**
	II	51	119	61	**231**
	III	1	10	9	**20**
	IV	1	0	0	**1**
Glacial Outwash	I	345	212	242	**799**
	II	77	81	7	**165**
	III	61	48	10	**119**
	IV	-	0	-	**0**
High Gradient Contained	I	64	75	131	**270**
	II	2,985	712	2,115	**5,812**
	III	7,707	4,733	8,783	**21,223**
	IV	354	138	291	**783**
Large Contained	I	226	148	234	**607**
	II	15	31	19	**65**
	III	0	0	0	**0**
	IV	-	0	-	**0**
Moderate Gradient Contained	I	576	366	931	**1,873**
	II	339	180	193	**711**
	III	7	35	76	**118**
	IV	1	0	1	**3**
Moderate Gradient Mixed Control	I	755	775	1,147	**2,677**
	II	312	233	223	**768**
	III	6	13	50	**69**
	IV	5	2	5	**11**
Palustrine	I	1,338	374	549	**2,261**
	II	46	71	76	**194**
	III	4	7	31	**41**
	IV	3	1	6	**9**
Unclassified[3]	I	56	1	4	**61**
	II	43	0	0	**43**
	III	17	0	0	**17**
	IV	19	0	-	**19**
Total	**I**	**5,684**	**2,608**	**4,388**	**12,680**
	II	**4,470**	**1,517**	**2,823**	**8,810**
	III	**7,884**	**4,916**	**9,061**	**21,860**
	IV	**382**	**142**	**304**	**828**
Grand Total	**All Streams**	**18,420**	**9,182**	**16,576**	**44,178**

[1] Miles are only those currently mapped and in the GIS database excluding lake channels. Additional unmappable streams are present, but have not been located through on-the-ground surveys, especially Class 3 and 4 streams that are greatly underrepresented in the database. Numbers may not add up precisely because of rounding. See Paustian et al. 1992 for a description of the stream process groups and the glossary for a definition of stream classes.
[2] Northern Districts=Admiralty, Hoonah, Juneau, Sitka, and Yakutat; Central Districts=Petersburg and Wrangell; Southern Districts=Ketchikan-Misty Fiords, Thorne Bay, and Craig
[3] Includes areas such as ice fields, connector streams not field surveyed, braided glacial river channels, culverts, and karst
Source: GIS database, July 2006

An analysis of legacy stream temperature data collected on Prince of Wales Island was completed in 2004. From 1997 to 2002, state water quality criteria for stream temperature were exceeded during warm weather in both harvested and unharvested watersheds (Walters and Prefontaine 2005). In 2004, state water quality criteria were exceeded in all three case study watersheds, two of which are unharvested (USDA Forest Service 2004c). Konopacky Environmental (1996) also did not detect stream temperature increased that could be characterized as differing significantly between logged and unlogged watersheds. High stream temperatures in Southeast Alaska are likely to occur under natural conditions during warm, rainless weather and result in low stream flow periods regardless of watershed harvest levels or extent of past riparian harvest.

Sediment and Other Factors

Sediment is solid materials that were derived from the natural weathering of rock or from erosion of areas modified by man, such as roads, agricultural lands, or urban areas. Sediments are carried and deposited by wind, water, and ice, and may be transported as either suspended load or bedload in streams. Suspended sediment is carried within the water column, while bedload material moves via rolling or bouncing along the bottom of the stream or riverbed. Suspended sediment causes water to have a turbid or murky appearance. Under natural conditions, the great majority of suspended load and bedload transport occurs during storm runoff events.

Soil mass movements (landslides), streams cutting new channels, and bank erosion are the main natural processes creating sediment. Landslides cause large, but temporary, increases in suspended and bedload sediments. Stream and riverbed or bank erosion may contribute to sediment over long periods of time. Steep terrain and large amounts of rainfall make the soil sensitive to erosion if the organic material covering the soil is disturbed. High rainfall also makes soils sensitive to sediment production by road construction and timber harvest activities.

In Southeast Alaska, suspended sediment loads in non-glacial streams in undisturbed watersheds are very low. Concentrations of suspended sediments range from less than 10 parts per million (ppm) in the winter to occasionally over 100 ppm in the fall during storm runoff periods (Schmeige et al. 1974). Suspended sediment in glacial streams is highly dependent on the volume of water flow from snow and ice melt. At high flows, concentrations may reach from 200 to more than 600 ppm; at low flows during winter, suspended sediment concentrations seldom exceed 20 ppm (Schmeige et al. 1974).

ADEC has established numeric criteria for turbidity standards (ADEC 2006a). Turbidity in Alaska correlates with suspended sediment, although the exact relationship varies by region and stream type (Lloyd 1987, Lloyd et al. 1987) and has not been determined in Southeast Alaska. Turbidity data collected during culvert installation or road construction suggests few instances where the state criteria have been exceeded (USDA Forest Service 2004c).

Changes in any of the physical or chemical properties of water can directly affect water use by people, fish, and wildlife. Sediment input to streams and turbidity are the two water quality factors most likely to be affected by alternatives. Other factors, such as temperature and dissolved oxygen, are not expected to change appreciably by alternative and, therefore, they are not discussed further in this section.

Current road construction methods and culvert installation activities have little effects on stream turbidity. The most recent monitoring of turbidity relative to various forestry activities have found few exceedances of the state turbidity standards (USDA Forest Service 2004, Monitoring reports). Of 12 replacement culvert installations monitored in 2004, 10 always met the turbidity standard for drinking water and 11 of the sites met the standard for fish propagation within 48 hours of the construction activity. Typically water returned to less than 5 nephelometric turbidity unit (NTUs) over background shortly after construction.

Recent monitoring was conducted to determine effects of road construction (including a bridge) on meeting turbidity criteria. The study was done on Upper Shaheen Creek in 2004 using the more stringent drinking water criteria. The results are preliminary, but suggest some short-term exceedance of the 5 NTU criteria. Of 50 days of continuous monitoring (when upstream and downstream sites were both monitored) , 11 days had some exceedance; of these, 9 were short term (less than 15 minute spikes in turbidity), while the remaining 2 exceedances were up to 30 minutes. Similar results were found in 2003, when 32 and 51 of 54 monitored culvert installations met drinking water, and fish production turbidity criteria, respectively (Monitoring Report summary for 2003)

Floodplains

Executive Order 11988 directs federal agencies to provide leadership and take action on federal lands to avoid, to the extent practicable, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains. The Forest's floodplains are typically found in broad, flat, alluvial U-shaped valleys, are forested, and usually support plant communities having an overstory of Sitka spruce or Sitka spruce and western hemlock. The shrub understory is variable and may include blueberry, skunk cabbage, devil's club, salmonberry, and alder. Supporting this vegetation are well-, moderately well-, or somewhat poorly-drained, deep mineral soils with thin organic surface layers. Based on channel type characteristics, floodplains are associated with 9 percent of the 42,700 linear miles of the streams mapped on the Forest and are typically protected through identification and designation of riparian management areas and associated Riparian Standards and Guidelines.

Riparian Areas

Riparian areas include the stream channel and any stream-associated vegetation (plants dependent on a continuous source of water), and may include additional stream channel features such as floodplains and alluvial fans. Riparian ecosystems previously harvested for timber are now in various stages of secondary plant succession. With the exception of where the ground is highly disturbed, the species composition on these secondary successional riparian areas is very similar to the riparian vegetation prior to timber harvest, with Sitka spruce, red alder, and western hemlock dominating the tree canopy (USDA Forest Service 1997a). On the more disturbed sites, the vegetation is often similar to primary successional species, such as what occurs following deglaciation, with red alder the most common component.

Current management emphasis under the current Forest Plan is to maintain riparian areas in mostly natural conditions for fish and other riparian-associated resources. Management direction requires no-harvest buffers for Class I, II, and III streams with the widths depending on stream channel process groups. In addition, reasonable assurance of windfirmness must be provided for buffers, which may or may not include additional buffer width depending on site conditions. An evaluation of how well reasonable assurances of wind-firm buffers are working in high-gradient streams on the Tongass was recently conducted (Paustian et al. 2006). Additionally, recent literature was reviewed as part of this study to help assess the need for buffers on these streams (Landwehr 2006). Although field survey information is preliminary, blowdown has averaged about 5 percent in these buffers, which include standard buffers to slope break. The reasonable assurance of wind-firm buffer portion could not be determined at most of the sites. Based on the relative stability of these buffers, and considering recent literature that helps indicate the likely benefit to water and ecology of the systems from these buffers, the recommendation by these authors was to retain these wind-firm buffers as part of the standards and guidelines.

Prior to implementation of the current Forest Plan, approximately 66,000 acres of riparian productive old-growth forest were harvested, including approximately 295 acres that are now within Wilderness (USDA Forest Service 1997a). This represents about 13 percent of the original 490,000 acres of riparian productive old growth (POG) outside wilderness (USDA Forest Service 1997a). Most of this harvest, approximately 63,800 acres, took place between 1950 and 1997. This is approximately 1,329 acres per year. However, following implementation of the current Forest Plan, beginning in 1997, recent harvest in riparian areas has been much lower because it has been limited to road crossings (because no other harvest is allowed in riparian areas).

Watershed Condition

For land within the Tongass National Forest boundary, including all ownerships, 77 percent of the watersheds were classified as healthy in 1992 (i.e., having watershed functions and conditions generally in balance) (USDA Forest Service 1995a). For Tongass NFS land in 1992 (excluding other ownerships), 87 percent of the watersheds were classified as having satisfactory watershed conditions, 10 percent were classified as having declining watershed conditions, and 3 percent were classified as having unsatisfactory watershed conditions (USDA Forest Service 1995b). Watershed evaluation, has continued in recent periods. Assessments have included a GIS database evaluation that identified 25 watersheds of concern (USDA Forest Service 2001a). Follow-up on these evaluations are underway (Paustian 2005). The 1997 Forest Plan included increased protection for headwater streams and their watersheds. Standards and guidelines considered to be important for protection of watersheds by the Alaska Anadromous Fisheries Habitat Assessment (USDA Forest Service 1995a) have been implemented Forest-wide. Also, harvest and road construction have greatly decreased since the early 1990s (refer to the *Timber* section), and 94 miles of roads have been decommissioned between 1997 and 2005 (refer to the *Transportation and Utilities* section); therefore, watershed conditions (e.g., sediment input, stream temperature, fish passage) in many watersheds on the Tongass are likely to have remained stable or improved, although some ongoing impacts remain (e.g., large woody debris input, road and hillslope failures).

There has been about 28,000 acres of harvest in Riparian Management Areas across the Tongass (USDA Forest Service 2006a, Tongass Young-Growth Management Strategy, Exhibit 7). Approximately 15,000 acres of the total contain riparian young-growth stands that will potentially benefit from thinning treatments designed to promote future large wood recruitment. Sustained input of large wood is necessary to maintain stream channel functions and productive fish habitat conditions in Southeast Alaska watersheds. Storing and decommissioning of additional roads would improve habitat quality, fish passage, and water quality as they are treated.

ADEC is responsible for providing a list to the U.S. Environmental Protection Agency (EPA) of the status of water quality within the state. The state makes a determination of which state waters (e.g., streams, rivers, bays) exceed state water quality standards and are limited by point and/or non-point sources of pollution, which may require additional controls to meet state water quality standards. Waters that fit this definition are put on a list as designated under Section 303(d) of the Clean Water Act, which is published by the state and sent to EPA. State waters in this category are known as waters on the 303(d) list. The most recent list for 2004 (ADEC 2006b) includes seven water bodies in Southeast Alaska that are directly or indirectly impaired due to forest management practices. This includes two water bodies (Katlian River and Nakwasina River) listed as impaired for non-attainment of the sediment and turbidity standards due to harvest activities, including road maintenance and riparian harvest. Four locations (Hobart Bay, Schultz Cove, Thorne Bay, and Twelve Mile Arm) have marine nearshore bottom areas impaired from past log transfer facility operations. One location, Ward Cove, is indirectly affected from log processing operations as part of the local pulp mill activity that is no longer occurring. All five exceed state residue standards; Ward Cove also exceeds dissolved gas standards. However, water quality conditions at sites formerly affected by forest practices have been improving because three sites that were included on the previous 303(d) 2 years earlier were removed in the latest report. These include Cube Cove, East Port Frederick, and Klawock Inlet, which are all log transfer facilities. Additionally, part of Ward Cove has been removed due to restoration actions related to pulp mill water quality impacts.

Water Use

Key water uses on the Forest include public water supply, recreation, growth and propagation of fish, and hydroelectric power generation. The Forest supplies domestic water for 23 permanent communities, and about 55 Class A and B public water systems are located in the vicinity of the Tongass National Forest Boundary. Ketchikan, Sitka, and Petersburg have congressionally designated municipal watersheds, and another six communities have non-congressionally designated municipal watersheds. In addition, water is supplied from the Forest to fish hatcheries, industrial sites, and resorts. Hydroelectric generation continues to be used in many places throughout the Forest to provide electricity for mining, sawmills, communities, and other uses. There are six major power installations on the Tongass National Forest: the Snettisham and Gold Creek south of Juneau; Beaver Falls, Ketchikan Lakes, and Swan Lake east of Ketchikan; Lake Tyee near the Bradfield River; and Blue and Green Lakes south and east of Sitka. Additional installations and interties between installations are proposed. The *Lands* and the *Transportation and Utilities* sections of this chapter address planned hydroelectric projects.

Environmental Consequences

Direct and Indirect Effects

This section considers the effects of forest management activities on stream flows, wetlands, public and private water supplies, water quality, and cumulative effects. The effects of timber harvest and roads on fish habitat and riparian resources are discussed in the *Fish* section of this chapter. The effects of sedimentation caused by soil erosion and landslides are discussed in the *Soils* section of this chapter. The effects on potential hydroelectric projects are discussed in the *Lands* section, and the effects of log transfer facilities on the marine environment are discussed in the *Transportation and Utilities* section of this chapter.

Forest management activities affect water quality and quantity, as well as the timing of water flows through alteration of soil and watershed conditions. Most watersheds are in a state of dynamic equilibrium where changes occur naturally because of changes in weather patterns. Because of the overriding influence of climate and basin resiliency, changes in streamflow and sediment delivery resulting from management activities (e.g., timber harvest) are difficult to measure.

Water Quantity

Little is known about the effects of timber harvest and roads on stream flows in Southeast Alaska watersheds. However, many studies in the Pacific Northwest indicate roads and harvest may affect runoff timing and quantity of peak flow depending on many factors, including precipitation, soil depth, lithology, road design, hillslope gradient, and topography (Coe 2004). The potential effects of changes in stream flows within watersheds Forest-wide are expected to vary depending on the noted factors, as well as the relative amount of harvest and roads and the applicable Forest-wide standards and guidelines. The effects from changes in stream flows in a particular watershed can only be estimated during project planning, at which point the rate of entry into watersheds and locations of proposed roads and harvest units would be analyzed. The actual effects on stream flows can only be determined by site-specific monitoring.

Water Use

The Municipal Watershed Land Use Designation (LUD) is applied to 45,236 acres in 11 watersheds serving 9 incorporated cities and boroughs (Ketchikan, Petersburg, Sitka, Juneau, Wrangell, Kake, Klowock, Craig, and Hydaburg [see the amended Forest Plan, Chapter 3, Municipal Watershed under all Alternatives]). All of the alternatives would include the same protections to these watersheds. Watersheds serving unincorporated communities and other non-municipal water systems would be managed under Forest-wide standards and guidelines (see the amended Forest Plan, Chapter 4, Soil and Water). These stream locations are designated by ADEC as drinking water streams Class A or B, which include municipal and non-municipal water intakes. Other than the municipal sites, other streams could be affected by Forest Service actions that include harvest and road building in the watersheds where these streams are located. While most of the current sites have LUD designations that do not allow timber harvest under any alternative, many of the watersheds where these sites occur (Class A and B drinking water designations) have LUD designations of timber harvest. Among sites with timber harvest LUD designation in watersheds with these Class A or B designations, Alternative 1 has the least and Alternative 7 has the most. Prior to actions in any of these watersheds, the Forest Plan (Chapter 4, Soils and Water Standards) requires the Forest Service to conduct a watershed analysis and consult with ADEC as well as with owners and operators of public water systems prior to authorizing management activities that may cause pollution.

Water Quality

Riparian areas, as a component of aquatic and riparian ecosystems, would continue to be protected through use of the Riparian Standards and Guidelines under all alternatives, which protects water quality parameters such as stream turbidity, temperature, and nutrients. Protection for riparian areas would be the same under all alternatives at site levels. In addition, the application of BMPs would minimize or prevent adverse effects on water quality from the limited amount of riparian area within yarding corridors and stream road crossings, and from any non-commercial timber harvest that may occur. See the *Soils* section for further discussion on potential affects to water quality.

Cumulative Effects

One of the main cumulative factors affecting water quantity, use, and quality, in addition to actions taken on NFS lands, is ongoing and additional regional land development actions on non-NFS lands. These actions, in addition to the various effects of the considered alternatives, may have compounding effects on water conditions. While BMPs applied on NFS lands would moderate these effects, some effects on water may remain, and with the addition of other actions, may increase risk to water resources. One of the factors associated with potentially adverse effects to water are roads and associated actions such as timber harvest, culvert and bridge installation, and potential hazardous substance spills. While the effects would vary with location and type of activity, the amount of road miles is a partial indicator of cumulative effects region-wide. Table 3.4-2 shows the change in road miles on a regional basis, including non-NFS roads. Currently, there are about 4,941 total road miles (including all authorized and non-system roads) on NFS lands and an additional 3,756 miles on non-NFS lands within the Forest boundary. Many of these roads are associated with non-NFS timber harvest activities. In general, timber harvest activities on non-NFS areas are not as protective of stream riparian areas. Reduced protection of these areas has a greater risk of increasing impacts to water quality. Therefore, roads constructed on non-NFS lands may be associated with greater water quality and quantity impacts per mile of road than on NFS lands. Generally, however, the amount of roads may be an indicator of cumulative effects on water resources of the Tongass National Forest and adjacent areas; therefore, the cumulative effects to water resources would generally be proportional to overall changes in road miles. NFS road development under Alternative 1 would have the lowest contribution to cumulative effects by increasing total NFS road miles by about 16 percent over existing conditions; however, road construction on both NFS and non-NFS lands together would result in a total increase in road miles of 34 percent because non-NFS road development would likely increase substantially. Alternatives 4 and 7 would have the largest cumulative effect when including all roads, resulting in an increase in road miles equal to about 82 and 92 percent over existing conditions, respectively. The other alternatives (2, 3, 5, and 6) would result in a cumulative increase in road miles between 49 and 70 percent over existing conditions, when both NFS and non-NFS roads are included.

Table 3.4-2
Estimated Number of Road Miles on All Lands within the Tongass Forest Boundary for Each Alternative after Full Implementation of the Forest Plan (approximately 100+ years)[1]

		Alternative						
Road Categories	**Existing**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Total New Miles on NFS Lands		774	2,079	2,799	4,890	3,874	3,744	5,825
Total Miles on NFS Lands	4,941	5,715	7,020	7,740	9,831	8,815	8,685	10,766
Total Miles on Non-NFS Lands[2]	3,756	5,970	5,970	5,970	5,970	5,970	5,970	5,970
Total Miles on All Lands	**8,697**	**11,685**	**12,990**	**13,710**	**15,801**	**14,785**	**14,655**	**16,736**

[1] Assumes full implementation of Forest Plan at ASQ levels plus future non-NFS harvest. Roads on NFS lands adjusted for fall down.
[2] Assumes an increase of 2,214 road miles on non-NFS lands over 100+ years. Annette Island is included because it is surrounded by areas within the Forest boundary.

While less directly tied to water quality and quantity conditions, the amount of timber harvest may also be an indicator of cumulative effects to water conditions because of potential effects on sediment input, water temperature, stream detritus input, and flow patterns. Tree harvest areas in the Tongass National Forest are primarily characterized as POG vegetation regions. POG in 1954 accounted for about 34 percent of the land area within the Tongass National Forest boundary, which includes NFS lands as well as state and private lands. Therefore, land disturbance related to harvest is primarily limited to a small portion of the total land area. Non-POG areas include areas with small trees, muskeg, or wetlands; all regions where streams may be common; and ice fields and rocky mountainous areas where few streams may be present.

Table 3.4-3 indicates the cumulative portion of POG area that would be harvested within the Forest boundary (including all non-NFS lands) under each alternative, and the portion of all lands inside the Forest boundary that would potentially be disturbed by timber harvest. (This latter analysis represents an index of overall watershed disturbance associated with vegetation removal by timber harvest and does not consider roads outside of harvest units, urban areas, etc., which are a minor portion of the total disturbance area.) Currently, most (87 percent) of the POG acreage within the Forest boundary has not been harvested. Considering all lands inside the Forest boundary, 95 percent of the total land base has not been subjected to vegetation removal by timber harvest (Table 3.4-3). Alternative 1, including non-NFS harvest, would result in a reduction in POG area to 82 percent of the original acreage; 94 percent of all lands inside the Forest boundary would remain undisturbed by direct timber harvest. Alternatives 2, 3, 5, and 6 would result in 76 to 80 percent of the POG remaining; 92 to 93 percent of all lands would remain undisturbed by direct timber harvest after over 100 years of projected harvest. Alternatives 4 and 7 would have the greatest effect; POG would be reduced to 70 to 72 percent of the original area; 90 to 91 percent of the total land base would remain undisturbed by direct harvest. It is likely some local effects on water quality and, possibly, quantity, from all alternatives. On a Forest-wide basis, however, the overall effects would be very minor for all alternatives. As noted above for roads, lesser riparian protections on state and private lands would have a greater likelihood of causing adverse effects to water quality and quantity in watersheds on non-NFS lands, which could be compounded if NFS lands are harvested in the same watersheds. Potential cumulative effects of harvest, road building, and other actions would be evaluated at the project-specific level in order to ensure that any adverse effects to water resources would be reduced, moderated, mitigated, or eliminated.

Table 3.4-3.
Percent of Original POG Remaining on All Lands within the Tongass Forest Boundary and Percent of All Lands inside the Boundary that are Not Directly Disturbed by Timber Harvest after Full Implementation of the Forest Plan (approximately 100+ years)[1]

Alternative	Percent of All Original POG Remaining [2]	Approximate Percent of All Lands Not Disturbed by Timber Harvest [3]
Existing	87%	95%
1	82%	94%
2	80%	93%
3	78%	92%
4	72%	91%
5	76%	92%
6	76%	92%
7	70%	90%

[1] Assumes full implementation of Forest Plan at ASQ levels plus future non-NFS harvest.
[2] Original POG equals about 34 percent of all land area (17,869,000 acres) of this region.
[3] Value represents the percent of all 17,869,000 acres inside the Tongass boundary (plus Annette Island) that would be disturbed by timber harvest and is used as an index of overall watershed disturbance associated with timber harvest. It does not include the acreage of other forms of ground disturbance (e.g., roads, towns) beyond the harvest of POG.

The potential for future climate change is a factor that could affect water quality and quantity conditions on the Tongass. Some of the models developed for the region predict both changes in precipitaion and air temperature. The details of recent climate models (see the *Cumulative Effects* subsection in the *Fish* section) project slight decreases in summer rainfall (about 10 percent) and increased temperature.

Southeast Alaska is characterized by high rainfall, so small reductions have limited potential to significantly reduce stream flows. Streams, both in harvested and unharvested watersheds, have occasionally been documented with brief periods of temperature standard exceedances. Theoretically, if air temperature changes were large enough, these exceedances could become more frequent. Currently there are no 303(d) streams listed for temperature exceedance. Whether temperature changes would be large enough to cause changes to this level are unknown. However, in the short term that the amended Forest Plan will be in place before being modified again (likely 10 to 15 years), large magnitude changes in both stream flow and stream temperature are hightly unlikely. In summary, there is general agreement that the climate is warming and that summer precipitation is likely to decline. However, there is considerable uncertainty surrounding specific predictions of when and the magnitude, and even more uncertainty regarding the effect of these changes on water quantity and quality.

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Wetlands

Affected Environment

Definition and Regulatory Aspects

The U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (Corps) jointly define wetlands as "those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." Wetlands are considered to be ecologically important for the physical, biological, and chemical functions they provide. The functions include flood flow moderation, groundwater recharge and discharge, wildlife and fish habitat, and water quality protection.

The Corps' Wetlands Delineation Manual (Experimental Laboratory 1987) provides the standards for determining areas of wetlands and deepwater habitats. Land areas are defined as wetlands when soil, hydrology, and vegetation all meet the technical criteria for establishing wetlands.

For federal regulatory purposes, wetlands are considered a subclass of Special Aquatic Sites (40 Code of Federal Regulations [CFR] Section 230.3) and have been deemed Waters of the United States (33 CFR 328.3). All waters of the United States are subject to regulation through the Clean Water Act by the Corps and EPA. Sections 404 and 401 of the Clean Water Act were created specifically with the intent "to restore and maintain the chemical, physical, and biological integrity of our Nation's waters." Executive Order 11990, as amended (42 U.S.C. 4321 et. seq.), requires federal agencies "to avoid...adverse impacts associated with the destruction or modification of wetlands...wherever there is a practicable alternative" and to "include all practicable measures to minimize harm to wetlands." Further, the agencies are required to preserve and enhance the natural and beneficial values of wetlands in carrying out their responsibilities.

Wetland Classification

The classification system, as described below, is based on U.S. Fisn and Wildlife Service's (USFWS's) classification of wetlands and deepwater habitats of the United States, developed by Cowardin et al. (1979).

Palustrine wetlands include the vegetated wetlands traditionally referred to as marshes, swamps, bogs, fens, and prairies. They include all nontidal wetlands dominated by trees, shrubs, persistent emergent plants, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 percent. Palustrine wetland classes on the Tongass include emergent wetlands (including peatlands), scrub-shrub wetlands, and forested wetlands. Classes are described in the following paragraphs.

Forested class. Over half (53 percent) of the National Wetland Inventory (NWI)-mapped wetland acres on the Tongass are forested wetlands. Vegetation ranges from scrubby mixed conifer forests (greater than 20 feet high) to moderately productive mixed conifer, western, or mountain hemlock stands. Shrubs and forbs dominate the understory.

Emergent class. Approximately 25 percent of the NWI-mapped wetland acres are emergent. The emergent class is characterized by erect, rooted herbaceous plants, and mosses and lichens. Peatlands (muskegs) are included in the emergent class of wetland area on the Forest. In Southeast Alaska, all relatively open bogs that have a groundcover high in sphagnum mosses and/or sedges are called “muskegs,” and are a type of peatland.

Scrub-Shrub class. Approximately 13 percent of the NWI-mapped wetland acres are scrub-shrub. This class is the most vegetatively varied wetland class in Southeast Alaska. Plant species may include true shrubs, young trees, and tree and/or shrubs that are small or stunted because of environmental conditions. Scrub-shrub wetlands are associated with three broad wetland plant communities: scrub-shrub alder/willow, scrub-shrub evergreen/emergent, and forested scrub-shrub evergreen/emergent.

Lacustrine wetlands include all permanently flooded lakes, reservoirs, and tidal lakes with ocean-derived salinities below 0.5 parts per thousand. Approximately 5 percent of the NWI-mapped wetland acres are lacustrine.

Estuarine wetland system. Estuarine wetlands are those areas that are predominantly intertidal, and are those parts of the rivers or streams or other bodies of water having an unimpaired connection with the open sea, where the sea water is diluted with freshwater derived from land drainage. Less than 2 percent of the NWI-mapped wetland acres are estuarine.

Riverine wetland system. The riverine wetland system includes all channel-contained streams and rivers. These areas are bounded by uplands, channel banks, or palustrine wetlands dominated by trees, shrubs, emergent mosses or lichens. In braided streams, the riverine wetland system is bounded by the banks forming the outer limits of the depression within which the braiding occurs. Less than 2 percent of the NWI-mapped wetland acres are riverine.

Wetland Mapping and Distribution

On the Tongass, wetlands may be found from sea level to alpine elevations, and may include estuaries and riparian areas. Wetland acreage shown in Table 3.5-1 is from the NWI, which is available through USFWS. The NWI database wetland identification map is based on geography, visible hydrology, and vegetation as seen in high altitude imagery (USFWS 2006).

Table 3.5-1
Mapped Acres of Wetlands on the Tongass National Forest by Wetland System and Class

Wetland Systems	Wetland Classes	Acres
Palustrine	Forested	2,123,440
	Emergent (including peatlands/muskegs)	1,009,777
	Scrub-shrub	535,325
	Palustrine - undistinguished	51,675
Lacustrine		181,746
Estuarine		64,792
Riverine		46,427
Marine		9,092
Total Wetlands		**4,022,272**

Source: National Wetland Inventory database, USFWS 2006.

Environmental Consequences

Direct and Indirect Effects

The physical, biological, and chemical integrity of wetlands in the Tongass is affected mainly through timber harvest operations, which include the construction and maintenance of roads, landings, stream crossing structures, marine access points, and log transfer facilities (LTFs). The magnitude of timber harvest-related effects to wetlands depends, in part, on the intensity, location, and duration of the timber harvest activity or road construction.

Limited research studies have been conducted on the effects of timber harvest or road building on wetlands in Southeast Alaska. The research on the effects of harvest on wetland systems have been primarily focused on regeneration of trees (Julin and D'Amore 2003, Duncan 2002). Studies on road construction on wetland sites have been focused on the effects to hydrology, and only a few wetland sites were studied (Glaser 1999, Kahklen and Moll 1999, McGee 2000). Wetlands are complex natural systems and these few studies may not represent the breadth of the potential effects to wetland functioning that could occur across the Tongass National Forest. Additionally, processes in a complex natural system, such as regrowth of a forest after harvest, contain random components and are not predictable at every scale or for every location.

Silvicultural operations, such as harvesting trees, are generally exempted from Corps permitting requirements. The construction or maintenance of forest roads in support of silvicultural practices, and temporary roads for moving mining equipment, are also generally covered under this exemption for the discharge of dredged or fill material into waters of the United States. This exemption is contingent on the construction and maintenance being conducted in accordance with the Corps' Best Management Practices (BMPs) as stated in 33 CFR 323.4(a)(6). These practices have been incorporated into BMP 12.5 of the Alaska Region's BMP Handbook (Forest Service Handbook 2509.22).

In each of the seven alternatives, the Forest-wide standards and guidelines (including BMPs) would be applied to activities in and around wetlands. The standards and guidelines that apply to wetlands are the same for all alternatives. They provide direction to avoid development activities in wetlands to the extent feasible, minimize effects on wetlands, and locate and design roads to minimize effects on wetlands. Project-level analysis and planning would be used to avoid construction in wetlands, and would provide site-specific plans to minimize effects.

Tree harvesting on wetland sites would have direct effects on the sites themselves and indirect effects on adjacent or nearby wetlands. The effects would include potentially altering hydrology, changing nutrient pathways, delivering sediment (which can diminish water quality), changing plant species composition and growth, and reducing shading. Harvesting trees in wetlands is not expected to convert wetlands to uplands. However, harvest would result in a short-term reduction in hydrologic and biogeochemical wetland functions that begin to return as soon as there is tree revegetation. The habitat functions provided by forest areas may require more time and forest regrowth to return. Habitat values for many species using forested habitat are discussed in the *Wildlife* section of this chapter.

In Southeast Alaska, forested wetlands have been found to successfully regenerate and grow into dense, differentiated stands after clearcutting (Julin and D'Amore 2003, Duncan 2002). Some of the habitat functions are dependant on, or related to, characteristics of the old-growth ecosystem, which would not develop over the life of the Forest Plan (10 to 15 years).

According to a study on regeneration of forested wetlands, tree growth was slow in Histosols (wet, organic soils), but it proceeded regularly and exceeded the minimum USDA Forest Service volume-production standard for commercial timberland (Julin and D'Amore 2003). Revegetation of forested wetland sites is expected to occur in the same timeframe as other forested sites, usually within 3 to 5 years. Site quality on wetland soils, however, may be lower than on sites with better drainage, and may require additional time for trees to reach merchantable size on wetlands compared to drier sites.

Construction of roads within wetlands permanently removes the wetland area and its functions under the roadbed itself. Additionally, crossing wetlands with roads without adequate provision for cross-drainage could lead to sedimentation from road construction or changes in hydrologic patterns.

There are approximately 1,079 existing road miles on wetlands on the Tongass, including non-system roads and closed roads. This represents 22 percent of the 4,941 total road miles. Table 3.5-2 shows the road miles by wetland classification that exist on the Tongass. The majority of these roads were constructed as part of forestry activities. There have been limited research studies done on the effects of forestry roads constructed in the past on wetlands or uplands in the Tongass National Forest. The results of the wetland and upland studies on the Tongass suggest that the hydrologic effects of roads remain within a few meters of the road (Glaser 1999, Kahklen and Moll 1999, McGee 2000). The results are similar to studies done in other areas with similar climates (cool, moist, and year-round precipitation). Researchers have studied the effects of ditching on peatlands in northern climates. In northern England, they found that the measurable effects of ditches on peatland hydrology were limited to less than 3 meters from the ditches (Stewart and Lance 1991, Coulson et al. 1990).

Table 3.5-2
Existing Roads and Maximum Miles of New Roads in Wetlands by Alternative after 100+ Years[1]

	Palustrine Wetlands						
Alternatives	**Forested**	**Scrub-Shrub**	**Emergent (including peatlands/ muskegs)**	**Lacustrine Wetlands**	**Estuarine Wetlands**	**Riverine Wetlands**	**Total Wetlands**
1	192	5	29	0	0	0	226
2	492	29	86	0	0	0	608
3	683	45	121	0	0	0	849
4	1,363	97	212	0	33	0	1,680
5	1,001	72	166	0	2	0	1,240
6	972	68	163	0	0	0	1,204
7	1,674	116	238	0	61	0	2,048
Existing Roads	807	56	201	1	10	4	**1,079**

[1] Totals may not appear to sum correctly due to rounding.
Source: NWI database (USFWS 2006) and Tongass National Forest GIS database.

Reconstruction of a road for timber harvest maintains the original investment and makes it suitable and safe for the intended use. Reconstruction involves rehabilitation of the original roadbed. It can include cleaning ditches, replacing drainage structures, reinstalling bridges, and grading and shaping. Generally, reconstruction of existing roadbeds for timber harvest would not add impermeable surface to wetlands. However, some reconstruction can include upgrading a road and widening the roadbed. In the Forest-Level Roads Analysis, a few roads, specifically on Prince of Wales Island, have been recommended for upgrading and widening the roadbed (USDA Forest Service 2003c). Widening an existing roadbed in wetlands would add to the impermeable surface and increase the total effects to wetlands. The recommendations in the Forest-Level Roads Analysis would be the same for all alternatives. The estimated road miles to be reconstructed would vary by alternative, however, ranging from 925 total miles under Alternative 1 to 2,371 miles under Alternative 7. Alternatives 2 through 6 would reconstruct an estimated 1,784 to 2,100 total road miles (see Table 3.12-2 in the *Transportation and Utilities* section).

Some activities in road reconstruction have potential to affect wetland hydrology, such as replacing drainage structures or cleaning road ditches. This may have a positive or negative effect on wetland hydrology, depending on the condition of the existing road in the wetland. Road maintenance can include reconditioning the original road template, grading the road surface, cleaning roadside ditches, and removing vegetation that may encroach upon the road or block vision. In general, this would have no effect, or it could improve wetland hydrology in areas where drainage has become blocked.

The difference between alternatives in effects to wetlands generally falls within two categories: 1) short-term or long-term effects due to timber harvest, and 2) loss of wetland acres and function due to road construction. Acres of harvest and miles of roads proposed in wetlands can be used to provide comparisons between alternatives. However, actual acres of harvest in wetlands are likely to be lower, particularly in scrub-shrub and emergent wetlands, when acres are dropped in units with poor volume. Miles of road would likely be less than shown in this analysis because road layout for individual projects would avoid wetlands to the extent feasible, as required in the Forest-wide standards and guidelines. Also, there are standards and guidelines to protect beach and estuarine, riverine, and lacustrine areas. The beach and estuary fringe, an area of 1,000 feet slope distance around all identified estuaries and from all saltwater shorelines, is classified as unsuitable for timber activities and roads are discouraged. Riparian area protection varies depending on the classification of the stream. The Forest-wide standards and guidelines include a restriction on programmed timber harvest in riparian management zones and within 100 feet of Class I fish-bearing streams as well as Class II streams that flow into Class I streams. These standards and guidelines would provide further protection for wetlands that occur in estuarine, riparian, and lacustrine areas.

Tables 3.5-2 and 3.5-3 show the proposed maximum miles of road and acres for harvest under the alternatives. Alternative 5, the No-Action Alternative, would conduct harvest activities on a maximum of 123,000 acres and construct a maximum of 1,240 new miles of roads in wetlands. Alternatives 1 and 2 would maintain the most acres of undisturbed forest with less risk of adverse effects to wetlands due to harvest. Alternatives 1 and 2 include harvesting on approximately 18 and 52 percent of the wetland acreage proposed in Alternative 5, respectively. Alternatives 1 and 2 also propose constructing approximately 18 and 50 percent of the road miles in wetland proposed by Alternative 5, respectively. Alternative 3 is in the middle of the alternatives in terms of harvest acres and road construction in wetlands. It would include harvest activity on 71 percent of the acres in wetlands shown in Alternative 5 and construct 68 percent of the road miles. Alternative 6 proposes slightly less harvesting and road construction (97 percent of Alternative 5 for both). Alternatives 4 and 7 propose the highest level of harvest and road construction in wetlands. They would include approximately 36 and 65 percent more acres of harvest in wetlands than in Alternative 5, respectively, and 35 and 65 percent more miles of roads in wetlands to achieve that harvest, respectively.

Therefore, over time, Alternatives 7 and 4 would have a higher risk of direct and indirect effects to wetlands due to harvest and road work than Alternative 5, the current Forest Plan. Alternatives 1 and 2 would have the least risk of effects to wetlands. The acres of harvest and miles of road construction for Alternative 3 would be intermediate and its potential to affect wetlands would be somewhat lower than Alternative 5, while Alternative 6 would have slightly lower effects.

Table 3.5-3
Maximum Harvest Area in Mapped Wetlands by Alternative before after 100+ Years of Full Implementation[1]

Alternative	Palustrine Wetlands: Forested	Palustrine Wetlands: Scrub-Shrub	Palustrine Wetlands: Emergent (including peatlands and muskegs)	Lacustrine Wetlands	Estuarine/ Marine[2] Wetlands	Riverine Wetlands	Total Wetlands
1	19,604	399	1,921	4	0	8	**21,936**
2	55,605	2,096	5,975	15	0	47	**63,737**
3	76,066	3,397	8,452	23	2	51	**87,991**
4	144,981	7,237	14,269	60	238	86	**166,871**
5	106,507	5,333	11,179	35	11	77	**123,142**
6	103,423	5,076	10,976	37	2	68	**119,583**
7	178,142	8,644	16,048	67	448	91	**203,440**

[1] Totals may not appear to sum correctly due to rounding.
[2] Less than 50 acres mapped as marine wetlands occur in Alternatives 4 and 7 only.
Source: NWI database, USFWS 2006; Tongass National Forest GIS database.

Cumulative Effects

When considering effects to wetlands, it is important to look at both the land outside the National Forest System (NFS) lands and the cumulative effects of past, present, and reasonably foreseeable future activities. Individual wetlands provide important physical, biological, and chemical functions, and are not isolated from other resources when viewed on a larger scale. Surface and subsurface water, along with many organisms, move through the landscape. As discussed in the direct and indirect effects section, changes to or loss of functions in an individual wetland can have effects that extend beyond individual wetlands as they contribute to the overall functioning within a watershed and landscape.

Each landscape area or watershed has different physical, chemical, and biological characteristics and vegetation patterns. The significance of an addition to cumulative effects from a change in an individual wetland would depend on the amount and type of disturbance in the analysis area, wetland locations and distribution in the watersheds, the distance to other wetlands and waterbodies, and connectivity of hydrology and habitat between them. Assessing cumulative effects to wetlands will be done for individual projects for the relevant analysis area as part of the National Environmental Policy Act process in all alternatives. However, past plus expected harvest and road construction for forestry and other uses on all land ownerships can be used to compare the risk of the alternatives adding to cumulative effects.

Non-NFS lands comprise approximately 6 percent of the lands within the Tongass National Forest boundary and 22 percent of Southeast Alaska. Silviculture on non-NFS lands are generally exempt from the Corps' permitting requirements contingent on the construction and maintenance of roads being conducted in accordance with the general Corps' BMPs as stated in 33 CFR 323.4(a)(6). Timber harvesting on state, municipal, and private land is also governed by the Alaska Forest Resources and Practices Act of 1979 (AS 41.17). Alaska Forest Resources and Practices Regulations (Alaska Department of Natural Resources [ADNR] 2004) includes regulations designed to prevent adverse impacts to fish habitat and water quality from timber operations. The regulations are less extensive than the standards and guidelines that direct activities on the Forest. The state regulations provide direction to avoid and minimize road building, sedimentation, establishment of landings, and damage to vegetative cover when yarding across marshes and non-forested muskegs. The regulations also provide buffers for forested wetlands if classified as anadromous water bodies or tributaries to anadromous water bodies. Harvest and associated activities are not specifically regulated on forested wetlands that are otherwise classified.

Timber harvest can alter wetland function and type but is not expected to convert wetlands to uplands. The hydrologic and biogeochemical functions begin to return as soon as there is tree revegetation, but the habitat functions provided by forested areas may take longer and more forest regrowth to return. Some of the habitat functions are dependent on, or related to, characteristics of the old-growth ecosystem, which will not develop during the life of the Forest Plan (10 to 15 years). Therefore, the effects of a project may add to cumulative effects to wetlands or their functions, particularly habitat functions in an area. Habitat and habitat changes are discussed in greater depth in the *Biodiversity* section.

To compare the potential for cumulative effects due to harvest on wetlands, harvest was analyzed on lands of all ownerships within the Tongass Forest Boundary (plus Annette Island, which is surrounded by the Forest). There are approximately 17.87 million acres of land inside the Forest boundary. Approximately 30 percent of that land is currently in productive old growth (POG). Approximately 13 percent of the original POG on all ownerships in this area has been harvested through 2006. Thus, approximately 87 percent of POG on all ownerships is remaining. The percent of POG remaining on NFS lands is higher than for non-NFS lands (92 and 66 percent, respectively) due to the concentrated timber harvest areas on non-NFS lands. Looking at all land ownerships within the Forest boundary, the POG remaining in 100 years under full implementation of the Forest Plan would be greatest for Alternative 1, followed by Alternatives 2, 3, 6, 5, 4, and 7 in that order (Table 3.5-4). Therefore, the risk of cumulative effects to wetlands due to harvest would follow that same order.

Alteration of water flow in wetlands through increases in impervious surfaces reduces the time that water resides in wetlands or streams in a watershed and can lead to more severe flooding or more dry spells in streams. The effect of a road on an individual wetland, when added to other alterations to the hydrology in an area, could result in water flow alterations. In the Tongass, the impervious surfaces are generally forestry roads. These can be used to examine cumulative effects.

Table 3.5-4
Cumulative Percent of Original POG Remaining on All Ownerships in 2006 and Estimated Minimum Percent Remaining after 100+ Years[1] for All Lands within the Tongass Forest Boundary[2]

Remaining POG on All Ownerships in 2006 as a Percent of all Original POG	Remaining POG after 100+ Years as a Percent of Original POG						
	Alternative						
	1	2	3	4	5	6	7
87%	82%	80%	78%	72%	76%	76%	70%

[1] Assumes full implementation of Forest Plan at ASQ levels plus future non-NFS harvest.
[2] Annette Island is included because it is surrounded by areas within the Forest boundary.
Source: Tongass National Forest GIS database.

Road density is greater on the non-NFS lands within the Forest boundary than on the Tongass NFS lands due to concentrated harvest and more populated areas. Road density averages 0.19 mile per square mile on the Tongass NFS and 2.19 miles per square mile for non-NFS lands. The average for land of all ownerships is 0.31 mile per square mile; however, those are averages over a very large area and there is considerable variability. Table 3.6-9 in the *Fish* section of this chapter (percent frequency of Value Comparison Units [VCUs]) by road density categories for the Tongass and land of all ownerships) shows the large variability in road density across the Tongass. VCUs are roughly equal to a watershed.

No documentation was found regarding a threshold at which impervious surfaces interact to an extent to have a qualitatively or quantitatively different effect for wetlands in Southeast Alaska. In Washington State, a literature search to determine the best available science with which to evaluate cumulative effects of activities in wetlands revealed that there is disagreement about a specific threshold. The opinions in one report about the threshold to use, range from 10 to 20 percent impervious surfaces within a watershed. There were also scientists whose opinion was that specific thresholds were not accurate and that deterioration began immediately (Sheldon et al. 2005). The most conservative idea is that there is no accurate threshold, and that deterioration begins immediately. While cumulative effects will be analyzed during project analysis, comparisons can be made about the risk of adding to cumulative effects on wetlands associated with each alternative.

Table 3.5-5 shows the average future road density for each alternative for all ownerships. It includes forestry and other roads proposed for construction on NFS land and reasonably foreseeable roads on non-NFS lands. Alternatives 7 and 4 would result in the highest average road density. Therefore, in those alternatives, there is a greater risk of management actions adding to cumulative effects to wetlands. The average road densities for Alternatives 3, 5, and 6 are intermediate and their risk of cumulative effects would fall in the mid-range when compared to the other alternatives. Alternatives 1 and 2 would have the lowest risk of cumulative effects due to an individual project.

Table 3.5-5
Existing and Estimated Future Maximum Road Density (miles per square mile) for NFS Lands and for All Ownerships within the Forest Boundary by Alternative after 100+ Years[1]

		Alternative						
	Existing	**1**	**2**	**3**	**4**	**5**	**6**	**7**
National Forest Land	**0.19**	0.22	0.27	0.30	0.38	0.34	0.33	0.41
All Ownerships	**0.31**	0.42	0.47	0.49	0.57	0.53	0.52	0.60

[1] Assumes full implementation of Forest Plan at ASQ levels plus future non-NFS harvest. Annette Island is included because it is surrounded by areas within the Forest boundary.
Source: Tongass National Forest GIS database

Other activities also need to be considered when determining cumulative effects for past, present, and foreseeable future effects to wetlands. They include mineral extraction, transmission line projects, hydroelectric projects, transportation developments, expansion of cities, and recreational site development. Existing mining is at Greens Creek on Admiralty Island, Berner’s Bay north of Juneau, and other locations. Given the level of world pricing, an increase in exploration is expected. There are also several regional transportation projects and regional energy and transmission projects planned for construction. Each of these activities can include clearing vegetation and disturbing wetlands with construction and maintenance. Therefore, the activities have the potential to affect wetlands and their functions and would be considered during individual project analysis. The effects of these projects would be the same for each alternative.

Changes in Southeast Alaska’s climate (discussed in the *Climate and Air* section) could affect the size, type, and functions of wetlands and, therefore, could add to cumulative effects. While the models do not fully agree on the climate change predictions for Southeast Alaska, they generally predict warmer weather, with more winter rainfall, less snowfall, and a decrease in summer rain in some areas. That would likely result in lower soil moisture due to increased evaporation during warmer, dryer summer months. Also, a precipitation shift from snow to rain could lead to more water running off the landscape rather than being stored as snow. Snowmelt is an important water source for wetlands in the spring and summer.

Thus, increased evaporation and less water storage could lead to drier meadows or bogs and, possibly, fewer wetlands.

Changes in temperature could favor some plants and stress others. Longer growing seasons with warmer temperatures would likely result in faster growth. Those conditions would also favor more decomposition that could lead to changes in the organic matter in soils and bogs. Changes in climate could shift wetlands from being carbon sinks to sources of aerial and aquatic carbon due to more rapid decomposition during warmer summers. All of these factors could lead to changes in wetland types, such as shifts in vegetation from herbaceous to shrub, from shrubs to trees, or from bogs to more productive forests. However, as discussed in the *Climate and Air* section, the models do not always agree and the predictions for total precipitation in portions of Southeast Alaska differ.

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Fish

Affected Environment

Fish and the aquatic resources on the Tongass National Forest provide major subsistence, commercial, and sport fisheries, as well as support traditional and cultural values. Abundant rainfall, streams with glacial origins, and watersheds with high stream densities provide an unusual number and diversity of freshwater fish habitats. These abundant aquatic systems of the Tongass provide spawning and rearing habitats for the majority of fish produced in Southeast Alaska. Maintenance of this habitat, and associated high-quality water, is a focal point of public, state, and federal natural resource agencies, as well as user groups, Native organizations, and individuals.

Approximately 12,700 stream miles and 4,100 lakes and ponds are mapped as Class I water bodies (based on Tongass GIS data); these water bodies are considered to be anadromous or high-value resident fish habitat. Another 8,800 stream miles and 4,700 lakes and ponds are mapped as resident fish habitat. Most of the Forest's streams and rivers empty into bays or estuaries, which are important during some life stages of anadromous species, as well as for many saltwater fish species. Marine invertebrates, such as clams and crabs, are commonly found in the estuaries and nearshore marine environment of Southeast Alaska. Some marine animals, including, Dungeness (*Cancer magister*), butter clams (*Saxidomes giganteus*), and other benthic and epibenthic organisms may be affected by upland management activities, such as timber harvest, road construction, and related log transfer and storage facilities.

Subsistence, commercial, and sport fisheries are all important to the way of life for Southeast Alaskan residents. Sport fishing is a favorite activity of residents and visitors. Hatcheries, and the enhancement of wild fish, among other aquaculture projects, contribute to resource availability and abundance. The primary fish species harvested in these fisheries are shown in Table 3.6-1.

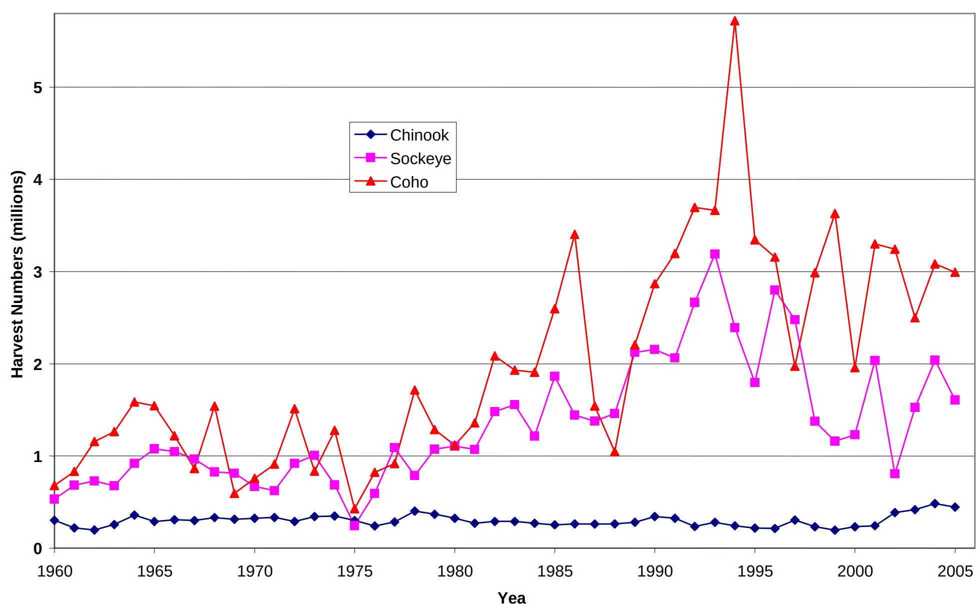
Table 3.6-1
Commonly Harvested Sport, Subsistence, and Commercial Fish

Species[1]	Sport	Subsistence	Commercial
Pink salmon (*Oncorhynchus gorbuscha*)	X	X	X
Chum salmon (*Oncorhynchus keta*)	X	X	X
Coho salmon (*Oncorhynchus kisutch*)	X	X	X
Sockeye salmon (*Oncorhynchus nerka*)	X	X	X
Chinook salmon (*Oncorhynchus tshawytscha*)	X	X	X
Cutthroat trout (*Oncorhynchus clarki*)	X	X	
Rainbow trout and steelhead (*Oncorhynchus mykiss*)	X	X	
Dolly Varden char (*Salvelinus malma*)	X	X	
Eulachon smelt (*Thaleichthys pacificus*)		X	

[1] Alternate names commonly used for the same species include pink or humpback; chum or dog; coho or silver; sockeye or red; Chinook or king; and eulachon, hooligan, or candlefish.

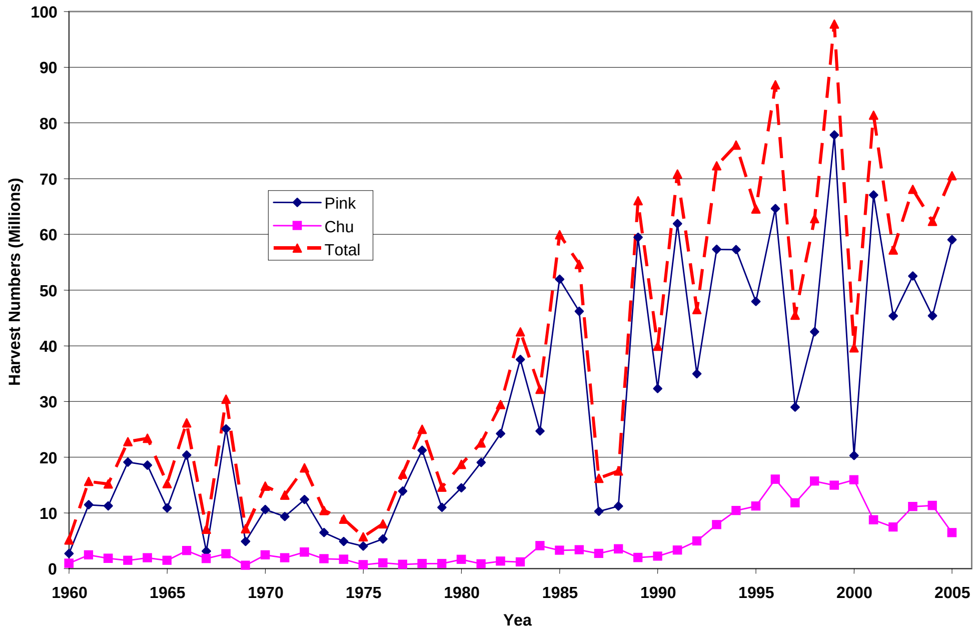
Commercial fish harvest in the waters of Southeast Alaska can fluctuate widely from year to year. For example, salmon harvest in Southeast Alaska averaged approximately 50 million fish between 1935 and 1940. It then declined steadily to less than 20 million fish in 1950. From 1950 to 1975, harvests were generally low, falling below 6 million fish in 1975 (Figures 3.6-1 and 3.6-2). Since 1975, harvest has been increasing in Southeast Alaska. Recent years where record harvest occurred for each of the main species were: Chinook (2004), sockeye (1993), coho (1994), pink (1999), and chum salmon (1996) (Bachman et al. 2005). Overall record harvest of total salmon occurred in 1999, when 98 million salmon were captured (Bachman et al. 2005). Overall, recent commercial salmon harvest (since early to mid-1990s) has remained high (Figures 3.6-1 and 3.6-2).

Figure 3.6-1
Commercial Harvest of Chinook, Sockeye and Coho Salmon in Southeast Alaska 1960 to 2005



Source: Bachman et al. 2005

Figure 3.6-2
Commercial Harvest of Pink, Chum and Total Salmon in Southeast Alaska 1960-2005



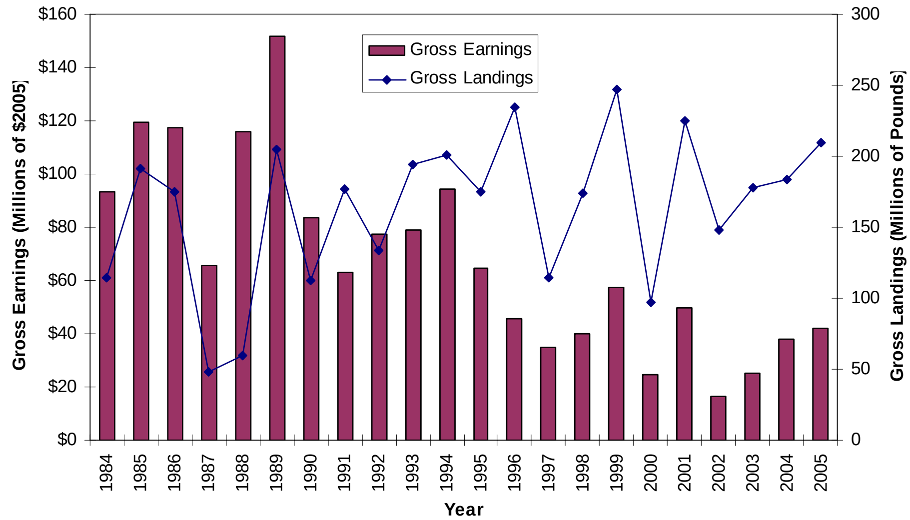
Source: Bachman et al. 2005

Based on estimated portions of each species originating from the Tongass National Forest, over 70 percent of the total harvested fish began their life in streams and lakes within the Forest boundaries. Fluctuations in commercial harvest trends are partly attributable to changes in ocean productivity. The productivity of marine waters in the Gulf of Alaska, and the survival of salmon and steelhead trout, is both highly variable and cyclic. From the mid-1970s into the mid-1990s, favorable ocean currents have resulted in high productivity and, consequently, high marine survival of salmon (USDA Forest Service 1995a). These favorable conditions have been more variable in more recent years and may not be following past cyclic patterns (Kruse 1998).

Based on the estimate of salmon produced from streams originating in the Tongass National Forest, estimated annual commercial salmon harvest (1984 to 2005) averaged over 164 million pounds, with a wholesale value (ex-vessel value) over $68 million (adjusted to 2005 dollars). The harvesting and processing of these salmon provided a substantial number of direct and indirect jobs in Southeast Alaska. In the most recent year reported, 2005, more than 210 million pounds of salmon were harvested worth more than $41 million in Southeast Alaska (Figure 3.6-3)

Hatchery production has also contributed substantially in overall fish production regionally. Hatchery production state-wide has greatly increased since 1977 with releases of more than 1 billion fish occurring annually since 1988, peaking in 2003 with more than 1.6 billion juvenile fish released state-wide (White 2006). These hatchery-released fish have contributing substantially to harvest statewide, with the number of returning fish increasing from less than 5 million in 1980 to more than 80 million statewide in both 2003 and 2005. A substantial portion of hatchery

Figure 3.6-3
Commercial Harvest and Wholesale (Exvessel) CPI Adjusted Value of Salmon Produced from the Tongass National Forest, Southeast Alaska (1984-2005)



Data Sources: Don Martin, Personal Communication, July 2006: Backman et al. 2005,http://www.cf.adfg.state.ak.us/geninfo/finfish/salmon/catchval/blusheet/94exvesl.php;http://www.cf.adfg.state.ak.us/geninfo/finfish/salmon/catchval/history/1970-2004s.php, Duffy (2004) http://www.cf.adfg.state.ak.us/geninfo/pubs/csepseak/csepseak.pdf

production and harvest occurs in Southeast Alaska with juvenile salmon releases equaling about one-third of total state release in 2005 (White 2006). Harvest of hatchery fish is a substantial portion of total salmon harvest in the Southeast Alaska region, averaging about 13 percent of the total number of commercially harvest fish (including cost recovery harvest) in recent years (1994 to 2005), or about 12 million fish annually (Alaska Department of Fish and Game [ADF&G] 2004a, White 2006). In some recent years, over 90 percent of the total commercial harvest of chum salmon, and a lesser percentage other salmon species, have resulted from enhancement projects in Southeast Alaska (ADF&G 2004a).

Approximately 85 percent of Southeast Alaska's sport fishing occurs in the vicinity of the Tongass National Forest. Sport fishing use has increased over the last four decades. For example, sport harvest of salmon in Southeast Alaska more than doubled in the last decade (from 1995 to 2004) (ADF&G 2004b). The economics of commercial and sport fishing is discussed in detail in the 1997 Tongass Forest Plan Revision Final EIS (USDA Forest Service 1997a) and updated in the *Economics and Social Environment* section of this chapter.

Fish Habitat

With more than 42,700 miles of streams and 250,000 acres of ponds and lakes (based on GIS measurements), the Forest provides abundant fish habitat. The habitat has been inventoried and classified, and estimates have been made of fish production. This section begins with a description of key habitat components, then presents a review of information on the effects of past harvest in Southeast Alaska on salmonid stocks, and finishes with a description of how fish habitat is mapped and classified on the Tongass.

Important Components of Fish Habitat

Stream Temperature and Dissolved Oxygen

Salmon and trout have optimum temperature ranges for rearing, spawning, and adult migration. Generally salmonid require cool stream temperature to thrive in most stream conditions (Bjornn and Reiser 1991). While very cool water conditions can be a limiting factor to salmon and trout survival and production, warmer temperatures are most often the more limiting condition within most of the range of Pacific salmon. However, in much of Southeast Alaska, increased summer temperature is much less of a concern than for more southerly regions due to the normal cool climatic conditions (Murphy and Milner 1997). Heating of streams also affects the amount of dissolved oxygen in the water, another important component for salmonid production and survival.

Stream temperatures are affected by solar radiation, evaporation, advection, conduction, and convection (Adams and Sullivan 1989, Brown 1983). Streams have a general tendency to warm as flow moves from upstream to downstream. The natural heating from solar radiation, increased air temperatures, and natural decreased stream flow tend to result in higher temperatures in the summer (Zwieniecki and Newton 1999). Timber harvest can have its greatest effect on stream temperature by removal of shade trees that reduce direct solar heating. Increased temperature results in reduced oxygen, but other factors such as decaying organic matter or abundance of salmon in a stream can also have large effects on dissolved oxygen concentrations (Pentec Environmental 1991, Welch et al. 1998, Spence et al. 1996).

Lack of stream shading buffers has been found to cause increases in stream temperature over 10 degrees Celcius (°C) in some small streams of the Pacific Northwest (Everest and Reeves 2007). Additionally lack of buffers can result in elevated microclimate temperatures that contribute to this heating (Spence et al. 1996, Chen 1991, Chen et al. 1992, Sullivan et al. 1990). However, effects in Southeast Alaska on stream temperature from past and resent harvest have not been of this magnitude and are often not significantly different than similar unaffected streams.

Murphy and Milner (1997) summarized the results of many of the studies on effects on stream temperature, of earlier past harvest in Southeast Alaska, when streams were typically not buffered. They noted a wide range of results. Some very small streams with timber harvest approached lethal levels (over 25°C). But most studies found no effect or only modest (e.g., 2°C) increases with stream temperatures not approaching lethal levels. These studies were all on streams that were harvested under old rules that did not require buffers. Effects on winter temperature also showed varied results in Southeast Alaska, some ranging from a slight increase, to no change, to a slight decrease in temperature in streams traversing clearcuts (Meehan et al. 1969 and Thedinga et al. 1989). Recent watershed monitoring on the Tongass (1997 to 2002) found that state water temperature standards were exceeded at similar rates in both harvested and unharvested watersheds (Walters and Prefontaine 2005). This suggests that elevated summer stream temperature is affected more by other environmental conditions than past timber and riparian harvest.

Situations where elevated temperature and low dissolved oxygen have been found to occur, and associated with fish die-offs, have been related mostly to the characteristics of stream morphology, hydrology, season, and number of fish present, not past timber harvest (Pentec 1991, Murphy 1985, Murphy and Milner 1997). Generally small basins of low elevation, low stream flow, confined intertidal conditions, with high numbers of adult fish, during warm weather periods were areas that occasionally had die-offs of adult salmon due to low oxygen (Murphy and Milner 1997).

Sediment

Sediment, includes both the coarse (gravel, cobble, bolder, bedrock) and fine (sand, silt) substrate composition in the stream channel. The relative composition affects many factors in stream production, including spawning areas and spawning success for salmon and trout, and benthic organism composition, which is an important food resource for fish. The amount of coarse sediment affects available spawning habitat and influences pool filling and bank stability (Spence et al. 1996). High levels of fines also affect pool filling, but also greatly influence survival of eggs and fry in spawning nests of salmon and trout (Chapman and McLeod 1987, Chapman 1988, Iwamoto et al. 1978, Gregory and Bisson 1997, McNeil 1964). Generally, the greater the portion of fines in spawning areas, the lower the survival of eggs and fry (McNeil 1964, Koski 1972, Chapman 1988). Increased fines in streams also reduce interstitial spaces in large substrate that are important habitat for many common cool water mountain stream aquatic insects.

Sources of sediment include input from banks, downstream movement from tributaries, and slumping and slides that enter or are near streams. The stream bed composition is a function of stream slope, roughness elements (e.g., amount and size of large woody debris [LWD]), and local adjacent geomorphic composition.

Several timber harvest related activities may affect stream substrate composition, including road construction, road drainage structures, level of use and maintenance of roads, number of stream crossings by roads, density of roads in the watershed, erosion and slumping of hill slopes following harvest, bank erosion where trees have been removed, and hydrology changes (Swanson et al. 1987, Furniss et al. 1991, Spence et al. 1996, Everest et al. 1987).

Past timber harvest practices have affected sediment levels in Southeast Alaska streams in some situations (Pentec 1990, Murphy and Milner 1997). Timber harvest in other regions have produced substantial increases in sediment and changes in composition; these are generally related to intensive timber harvest activities (Holtby and Scrivener, 1989, Cederholm et al. 1981). However, many studies of the effects of timber harvest and amount of sediment in Southeast Alaska streams have been inconclusive (Murphy and Milner 1997, Sheridan et al. 1984). Nevertheless, models developed by the Forest Service suggest that timber harvest activities, especially related to road construction, would increase fine sediment inputs to streams potentially affecting spawning success (Murphy and Milner 1997).

Large Woody Debris

LWD in stream channels includes entire trees, rootwads, and larger branches. LWD is an important component of fish habitat for good trout and salmon habitat, especially in heavily wooded regions (Swanson et al. 1976, Bisson et al. 1987, Naiman et al. 1992, Beechie and Sibley 1997, Spence et al. 1996, Murphy et al. 1986). LWD provides channel complexity, cover, and is especially important in the formation of pools (Bisson et al. 1987, Sullivan et al 1987, Benda et al. 2003). LWD has been found to form over 70 percent of all pools in a typical Alaskan valley bottom stream (Heifetz et al. 1986). The benefits of LWD in streams include critical sediment retention (Keller and Swanson 1979, Sedell et al. 1988), structural diversity (Ralph et al. 1994), gradient modification (Bilby 1979), nutrient production (Cummins 1974), and protective cover from predators. Its presence is often critical for overwinter habitat for various salmon and trout (Murphy and Milner 1997, Murphy et al. 1985, Koski et al.1984). Wood controls sediment movement downstream, minimizing the risk of debris flows in small headwater streams. In large streams, coarse sediment accumulated behind LWD often provides spawning gravels (Bilby and Bisson 1998, Montgomery et al. 2003). Newly entered LWD plays an important role in stream by providing inputs of leaf litter and needles and as it ages enhances nutrient dynamics.

Sources of LWD to streams include a variety of processes such as windthrow, wildfires, stream bank erosion, tree natural mortality, and debris slides, deep-seated mass soil movement, and input from upstream areas (Swanson and Lienkamper 1978, Benda et al 2003). Small headwater streams can provide wood to larger channels downstream (Potts and Anderson 1990, Prichard et al. 1998, Coho and Burges 1991, Benda et al 2003, Reeves et al. 2003).

Debris flows and dam-break floods during high flow occurrences can cause the transport of wood from upstream to downstream regions (Swanson and Lienkaemper, 1978). Because of the large size of much of the wood that enters streams, its ability to float during this type of event is limited to larger third- to fifth-order streams (Swanson and Lienkaemper 1978). While much less frequent than high flow events, large amounts of LWD can be added by debris torrents (Lamberti et al. 1991). The entry of LWD and coarse sediment at tributary junctions by debris torrents can form complex habitat, including pools and cover, and add spawning gravel to the main channel (Benda et al. 2003).

In streams of the Tongass, Murphy and Koski (1986) found that 40 percent of LWD in streams originated within 3 feet of the bank and 99 percent within 100 feet of stream channel. Martin et al. (1998) found similar results estimating that 94 percent of LWD entered streams in unharvested Southeast Alaska areas originated within 98 feet of the stream channel. There may be exceptions to this in certain streams. Reeves et al. (2003) found that about 65 percent of the LWD pieces in Oregon coastal streams originated in upslope areas, primarily from steep intersecting stream channel. Reeves et al. (2003) noted that similar conditions were observed in California and Washington states. The width of the stream valley and the slope of intersecting tributaires were the main factors determining the portion of wood entering from side streams.

The primary timber-related actions that may affect LWD supply to streams include buffer width along streams, stream class and channel characteristics that buffers are placed on, size of trees remaining in the buffer area, and effects on windthrow from adjacent harvest.

Murphy and Koski (1989) used a model to estimate that for moderate-sized valley bottom streams in Southeast Alaska with no buffers, LWD would decrease to about 30 percent of pre-harvest levels in about 90 years. Some studies have documented reduced LWD in Alaska clearcut streams relative to old-growth stream channels over time (Heifetz et al. 1986, Johnson et al. 1986, Murphy et al. 1986, Murphy and Milner 1997). But in the short term, LWD may be higher in clearcut areas (Lisle 1986). Limited long-term monitoring has occurred on Southeast Alaska streams to document changes. However, it was found that Maybeso Creek had a decrease in number and size of LWD, 30 years after harvest (Bryant 1980) with similar changes in Harris River (Bryant 1985, cited in Murphy and Milner 1997). However, these watersheds were intensively logged under conditions that had no buffer strips on streams; buffers were almost completely absent during timber harvest until the late 1980s. Buffer strips have greatly increased in frequency and size since then.

Buffer strip blowdown affects timing of LWD entry to streams. Several studies have shown that blowdown in buffers increases after harvest, primarily in the short term

(Pentec 1996, Martin 1996). Effects were short term, however, with rate of blowdown decreasing over time and the effects on total LWD loading to streams slight. There has been some documentation of a large increase in rootwads in a stream due to blowdown, which was considered beneficial to fish habitat (Murphy and Milner 1997). Recent monitoring of harvest areas since 2000 have found highly variable rates and amounts of windthrow adjacent to harvest units, but effects on stream LWD supply was not assessed (USDA Forest Service 2007). However, Martin and Grotefendt (2007) found that windthrow on non-NFS lands with 20-meter buffers would, on average, reduce the long-term LWD supply in Southeast Alaska forest streams by about 5 percent relative to unharvested areas (an additional 5 percent would be lost due to harvest).

Food Sources

Food sources for stream fish can originate directly within the stream or enter from the adjacent terrestrial environment or upstream aquatic environment. The main sources are from leaf and litter deposits from the adjacent riparian vegetation, algae growth and production on the stream bottom, and from returning salmon carcasses. This is ultimately the food base for smaller aquatic organisms (e.g., aquatic insects) that become food sources for stream fish. Detrital input is the main source from heavily shaded small- and medium-sized streams (Richardson 1992, Gregory et al. 1991). Larger streams in contrast derive much more of their food sources from algae production. Nutrient and organic input from returning salmon are also important (Wipfli et al. 1998). Small streams, many of which are not fish-bearing, supply nutrients that contribute substantially to larger streams (Independent Multidisciplinary Science Team 1999). When riparian trees are removed, the primary source of food is initially shifted to algae production within the stream and is derived less from leaf and needle organic matter (Murphy and Milner 1997). Overall production along many streams with canopy removal in Southeast Alaska actually increased (those where light was limiting), while in some there was no change (Murphy and Milner 1997). When second-growth areas regrow, however, production may be reduced due to shade greater than was produced by the original old growth. Small streams in Alaska have been found to also contribute substantially to larger streams through downstream transport of terrestrial and aquatic prey directly and detritus resources indirectly for fish (Wipfli 1996, Wipfli and Gregovich, Piccolo and Wipfli 2002). The type of riparian forest along these small streams affects both the amount and type of resources passed down stream. In some cases, the regrowth of alder trees along streams following harvest has resulted in higher amount of resources to downstream fish streams (Piccolo and Wipfli 2002). While changes to riparian areas will change the composition of the downstream transported food sources, the final overall effect of total removal, or complete retention of riparian vegetation on fishless streams on downstream fish streams over the long term is not clear, as actions near these small stream may have additional effects (e.g. sedimentation) on stream production (Wipfli and Gregovich 2002).

Effects of Past Forest Management Practices on Salmonid Fish Stocks

Past timber harvest practices and related actions in many regions of native Pacific salmon distribution range have been associated with declines of fish stocks (Everest and Reeves 2007). Similar reductions in stocks, however, have not been observed in Alaska (Byrant and Everest 1998). This may be partly because other human-induced disturbances (e.g. agriculture, dams, urban development), which are common in other regions, are rare in Southeast Alaska. As noted above, older forest practices (mostly prior to 1980) in the Tongass National Forest have had documented adverse effects to anadromous fish habitat conditions, including spawning habitat, rearing habitat, and migration conditions (Murphy and Milner 1997). Harvest during this timeframe accounts for about 60 percent of all timber harvest on the Tongass National Forest (see Tables 3.9-8 and 3.9-9 in the *Biodiversity* section). In one study of multiple streams in Southeast Alaska, summer fry numbers of coho salmon increased in clearcut areas, but had reduced or similar numbers of fall and winter stages of juveniles relative to old-growth systems (Murphy et al 1986). In another study, increased summer abundance of coho juveniles in clearcut areas had reduced the number of outmigrating coho smolts relative to old-growth areas (Thedinga et al. 1989). Similarly, juvenile steelhead abundance, while high in unbuffered clearcut streams in the summer, became very low in the winter as these fish moved to buffered and old-growth habitats where cover was higher (Johnson et al. 1986).

However, studies addressing potential long-term effects of timber harvest and related actions on actual numbers of fish produced are rare within the range of Pacific salmon, including Alaska (Brant and Wright in press). Brant and Wright (in press) compiled and analyzed the data from multiple juvenile fish studies in 26 streams in Southeast Alaska in an attempt to determine what long-term effects past harvest management actions have had on fish production by comparing fish abundance in managed and old-growth watershed streams. The managed watershed all had timber harvest activity prior to 1980, which generally included clearcutting of riparian trees. Partly because most studies examined were not specifically designed to address long-term effects, overall results of this analysis were limited. They examined population densities of juvenile fish from studies conducted from 1978 to 2000, including data on coho salmon, Dolly Varden char, steelhead, and cutthroat trout. Even with the variability of data, they found statistically significant differences between the managed and old-growth watersheds. Coho salmon and Dolly Varden densities were significantly lower in harvested areas, while steelhead density was greater in harvested areas. Where long-term trends were significant, they were downward in harvested areas. There were many differences in overall production among regions, differences between seasons, and morphological differences among streams that contributed to much overlap in abundance between treatment groups and the lack of clear results. Overall, this study suggests some negative effects on some populations from older harvest practices (prior to 1980). New forest practices in the Tongass National Forest are intended to prevent the habitat degradation in riparian areas and headwater streams that have contributed to these adverse effects on populations (Bryant and Wright in press).

Recent monitoring of stream fish populations, based on specific sampling designs intended to assess effects of recent timber harvest practices, is not at the stage where determinations can be made about effects of these newer practices on fish populations (USDA Forest Service 2007), but, as shown earlier (Figures 3.6-1, and 3.6-2), overall trends in Southeast Alaska commercial harvests from 1960 to 2005, including coho, pink, chum, and sockeye salmon, do not indicate specific downward trends in these populations, or specific trends that could be correlated with amounts of timber harvest activity. While many factors outside of forest management practices in Southeast Alaska (e.g., ocean conditions, weather, hatchery releases, harvest management, watershed conditions in other areas) influence these numbers, no obvious effects can be discerned from harvest data. However, the effects of these moderating factors may be too great to permit harvest data to demonstrate any effects on fish populations resulting from timber harvest in specific Southeast Alaska watersheds, particularly if they are relatively small (Bryant and Wright in press, Bryant and Everest 1998).

Stream Classification on the Tongass

Fish habitat on the Tongass is classified, for management purposes, using two classification systems (see the *Water* section of this chapter). The first is stream class, which relates primarily to presence or absence of fish, type of fish, and water quality. The second category is stream process group, which characterizes streams based on channel and drainage basin morphological conditions.

Stream Class Inventory

Streams are categorized by stream class, a classification primarily associated with fish use. Stream classes describe stream values, such as whether anadromous or resident fish inhabit a particular stream. Class I streams are anadromous and high-value resident fish streams, Class II streams are other resident fish streams, Class III streams are managed for water quality and, where appropriate, downstream aquatic resources, and Class IV are small streams that do not influence downstream water quality or fish habitat. Refer to the *Water* section for more detailed descriptions (also see the *Glossary* in the Proposed Forest Plan volume for more complete definitions.)

Channel Type Inventory

Perennial and many intermittent streams on the Forest have been inventoried for channel-type. The channel types provide a system to estimate the amount and quality of fish habitat, and can be used to predict their physical response and sensitivity to different management activities. Channel types have been categorized into distinct groups, called “stream process groups.” Process groups describe the interrelationship between watershed runoff, landform relief, geology, and glacial or tidal influences on fluvial erosion or depositional processes. They are described in Channel Type User Guide Tongass National Forest Southeast Alaska (Paustian et al. 1992). Process groups, in conjunction with stream class, are used for assigning the Riparian Standards and Guidelines. The estimated miles of stream by process group and class within the Tongass National Forest are shown in Table 3.4-1 in the *Water* section of this chapter.

Fish Habitat Enhancement

Much emphasis has been placed on the enhancement of fish habitat on the Tongass National Forest. From 1980 to 1995, the Forest Service implemented 176 fisheries habitat enhancement projects on the Tongass (USDA Forest Service 1997a).

Many of the fish habitat enhancement projects implemented on the Tongass National Forest are cooperative projects involving multiple agencies and organizations, including the Forest Service, ADF&G, Regional Aquaculture Associations, timber companies, and other non-profit hatcheries.

Types of enhancement projects have included:

- Fishways
- Falls Modification
- Spawning Channels
- Debris Removal
- Lake Fertilization

- Lake Stocking
- Stream Stocking
- Rearing Ponds
- Incubation Boxes
- Large Woody Debris (LWD) Management

In more recent years, emphasis has included a reduced array of projects across the Forest. Specific ongoing projects include the following:

- Fishways: Currently one is actively being developed at Snow Pass Creek;
- Falls Modification: One site is being evaluated at Kanalku Creek;
- Spawning Channels: One new site is being evaluated at Fish Creek;
- Lake Fertilization: Currently one lake (Redoubt) is being fertilized annually;
- Lake Fish Stocking: One pen-rearing/lake stocking site is planned for implementation in 2007 at Bakewell Lake; and
- LWD: Several LWD projects are being implemented associated with watershed restoration.

Additionally, habitat access to streams has been improved through replacement of culverts that did not meet current juvenile fish passage design criteria. About 88 percent of all stream crossings (about 80 percent of the crossings are culverts or similar structures) have been assessed as to suitability to ensure juvenile fish passage. Among the crossings assessed, about 1,200 crossings, or 37 percent of all crossings (mostly culverts), did not meet current juvenile fish passage standards (USDA Forest Service 2006b). Of those not meeting standards, more than 75 percent were on Class II streams. Habitat above the crossings with potential passage problems was estimated to equal about 0.5 percent and 3.2 percent of all Class I and Class II stream miles on the Tongass, respectively. Based on the restrictive criteria used to determine whether a culvert is suitable for juvenile fish passage, the known distribution of fish above culverts designated as not meeting passage criteria (about 85 percent of those reaches have fish populations), and the small size of most of these streams, the habitat area affected would actually be much less than the percentages imply (USDA Forest Service 2006b). However, even though the habitat area may be small, the effect on an individual stock may be important. Most of these culverts were installed prior to implementation of the 1997 Forest Plan standards and guidelines for culvert installation. A recent survey of 29 culverts installed since the 1997 standards and guidelines began to be implemented found that two (7 percent) did not meet current juvenile fish passage criteria (Dick Aho, USDA Forest Service Biologist, Personal Communications August 23, 2007). To reduce these effects, culverts are being replaced, removed, or bypassed.

Approximately 240 culverts have been replaced through 2006 to improve fish passage. The Tongass National Forest estimated that it spent $1.5 to $2.0 million a year for culvert replacement for approximately 50 sites per year through 2005 (USDA Forest Service 2006b). The culvert replacement program declined in 2006 due to funding reductions, and is projected to continue to decline in future years. However, the intention is to continue this program of culvert replacement when funding supply is reinstated as part of road maintenance funding.

Fisheries Habitat Enhancement Opportunities

The anticipated salmon production from fish habitat enhancement projects on the Tongass National Forest is calculated based on site-specific habitat conditions and an analysis of limiting factors for salmon production. The test for these habitat production estimates consists of monitoring conducted on individual projects and the subsequent feedback of the monitoring results into the project planning process.

The 1997 Tongass Land Management Plan Revision Final EIS identified 158 potential projects for initiation during the first 10 years of implementation of the Forest Plan (USDA Forest Service 1997a). The extent of implementation of these projects has been considerably less. The public continues to expect the maintenance or improvement of fish habitat values. Public interest for subsistence, commercial, and sport-harvested fish remains high.

Demand for subsistence fish is discussed in the *Subsistence* section of this chapter, while commercial and sport fish demand are reviewed in this section. Commercial fish demand is calculated based on goals set by Regional Salmon Planning Teams for annual fish production for several species. Some of the “year 2000” goals were set in 1981 in the Comprehensive Salmon Plan for Southeast Alaska, Phase I, and have not been updated. Annual common property commercial harvest usually achieved these goals for pink salmon (92 percent), coho salmon (61 percent), and sockeye salmon (58 percent), but infrequently for chum salmon (31 percent) for the period of 1991 through 2003 (ADF&G 2004a). Harvest has been highly variable during this period. National Forest habitats were estimated to contribute approximately 80 percent of the fisheries in Southeast Alaska (USDA Forest Service 1997a), although the relative contribution has decreased in more recent years due to increased hatchery production.

There has been a tenfold increase in state-wide angler participation from 1961 through 2004, with total license sales in Alaska increasing from 55,564 to 503,422 during this period (Jennings et al. 2007). Overall, the number of anglers increased in Southeast Alaska by about 40 percent between 1991 and 2004 (from about 93,000 to 130,000 angler licenses) (Howe et al. 1995, Howe et al. 2001, Jennings et al. 2006, 2007). This equates to about a 4.5 percent increase in total licenses sales in Southeast Alaska annually. However, the number of Southeast Alaska resident anglers declined slightly since 1991 (about 10 percent), while the number of non-resident anglers increased from about 58,000 to 98,000 between 1991 and 2004; a 70 percent increase. The rate of increase exceeds that for sport fishing participation in all of Alaska for this same period (1991 to 2004) with total state fishing license sales increasing about 29 percent (from about 391,000 to over 503,000) (Jennings et al. 2007).

Fish Management Indicator Species

National Forest Management Act (NFMA) regulations direct the use of Management Indicator Species (MIS) in forest planning to help display the effects of forest management. MIS are species whose population changes are believed to indicate the effects of land management activities. For the 1997 Forest Plan, pink salmon, coho salmon, Dolly Varden char, and cutthroat trout were selected as MIS. Pink salmon were selected to represent anadromous fish that are limited in their freshwater life period by spawning gravel quality and quantity; coho salmon to represent anadromous fish that are generally limited in their freshwater life period by stream and lake rearing area; Dolly Varden char because of their ubiquitous distribution in freshwater habitats; and cutthroat trout because of their dependency on small freshwater stream systems, which are most susceptible to effects from management activities. These MIS fish species, and their habitats, are described in the 1997 Forest Plan Revision Final EIS.

Threatened and Endangered Fish Species

Federally listed threatened and endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS), under authority of the Endangered Species Act (ESA) of 1973, as amended. An endangered species is defined as one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as one that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

No federally listed fish species or stocks originate from Alaska streams. However, some federally listed fish stocks may occur in marine waters within the boundary of the Tongass National Forest. These fish include the following:

Endangered species:

- Snake River sockeye salmon
- Upper Columbia River spring-run Chinook salmon
- Upper Columbia River steelhead

Threatened species:

- Snake River spring/summer Chinook salmon
- Snake River fall Chinook salmon
- Puget Sound Chinook salmon
- Lower Columbia River Chinook salmon
- Upper Willamette River Chinook salmon
- Columbia River chum salmon
- Snake River Basin steelhead
- Lower Columbia River steelhead
- Upper Willamette River steelhead
- Middle Columbia River steelhead
- Puget Sound steelhead

These listed stocks of salmon and steelhead do not spawn in Alaska, but are known to seasonally inhabit marine waters on the outside coast to the west and occasionally in inside waters of the Tongass National Forest. They may feed on fish that are dependent on coastal marine waters of the Tongass National Forest at some stages of their lives.

Pursuant to Section 7 of the ESA, a biological assessment was prepared to assess the effects of the 1997 Forest Plan revision on the endangered Snake River sockeye salmon and the threatened Snake River spring/summer Chinook salmon and Snake River fall Chinook salmon, and submitted to NMFS for review and concurrence in the Tongass Forest Plan process (Appendix J of the 1997 Tongass Forest Plan Revision EIS). This assessment has been updated to address the currently listed fish species relative to the alternatives considered in the Forest Plan amendment (Appendix F).

Essential Fish Habitat

The *Magnuson–Stevens Fishery Conservation and Management Act* mandates that agencies initiate consultation with NMFS for any activities that could affect essential fish habitat (EFH). EFH has been broadly defined by Congress for federally managed species to be "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity".

NMFS (2005) clarified what the specific definition is for EFH in Alaskan waters. EFH is the general distribution of a species described by life stage. It is generally the habitat area that includes 95 percent of that life stage, where it is known, to occur. Where distribution data is unknown, surrogate species may be assumed. Maps were presented in NMFS (2005) defining EFH for species and life stages; other than for salmon species, little EFH is present in the inside waters of Southeast Alaska. Those groundfish species that are present include some sole species life stages only. Several other species, however, have some life stages located in the marine waters offshore of Southeast Alaska and some enter outer nearshore waters. In general, EFH for marine groundfish species (e.g., rockfish, sablefish, sole, plaice, cod, pollock), are extremely limited near Tongass waters.

Salmon EFH covers freshwater, estuarine, and marine waters from the high tide level to 200 meters deep and out to the 200 nautical mile U.S. exclusion zone, depending on life stage. The freshwater EFH is defined primarily by what is present in the ADF&G's Catalogue of Waters Important for Spawning, Rearing, or Migrations of Anadromous Fishes (ADF&G 1998). Freshwater EFH for salmon in the Tongass would include all streams, lakes, ponds, and wetlands currently or historically accessible to salmon. The shallow marine waters adjacent to forest lands are considered EFH for salmon, but little of this area is EFH for most groundfish species.

Sensitive Fish Species

Sensitive species are those plant and animal species identified by the Regional Forester for which population viability is a concern on National Forest Service (NFS) lands within the region. The goal of the Forest Service Sensitive Species Program (Forest Service Manual 2670) is to ensure that species numbers and population distribution are adequate so that no federal listing will be required and no extirpation will occur on NFS lands.

The Alaska Region Sensitive Species List was updated in June 2002. There are three fish species currently designated as sensitive species in the Alaska Region.

Northern Pike

Northern pike are found in five lakes, referred to as Pike Lakes, approximately 23 miles east of Yakutat in Roadless Area 341 (Browning 1986). These lakes are shallow, with high concentrations of humic acid and peat-filled margins. The northern pike in Pike Lakes are the only naturally occurring pike in Southeast Alaska and are probably remnant populations that survived only because the most recent glacial advance missed the Pike Lakes area. Relatively little information is available on the life history and population dynamics of these pike populations. Their presence in any other regional waters would be considered as an invasive species (see the *Invasive Aquatic Species* subsection below).

Large Chum Salmon

Near Hyder on the Portland Canal, Fish Creek produces very large chum salmon, probably the largest chum salmon in North America. Several fish over 38 pounds have been weighed by biologists; fish weighing 25 pounds are common. The average size of large chum salmon is close to 20 pounds (the average chum salmon from other areas weighs around 10 pounds). A high percentage of the returning fish have spent 4 and 5 years in the ocean, accounting for the large average size. Normally, chum salmon stay at sea for 2 to 5 years (Salo 1991). Fish Creek is a low-gradient stream, dominated by high-quality spawning gravels and extensive areas of groundwater upwelling. The predominant upwelling and high-quality spawning gravels appear to be the reasons for the remarkable production levels. Populations have been stable or increasing, with a reported escapement of more than 60,000 in 1993.

Island Run King Salmon

King Salmon River and Wheeler Creek populations of king salmon are island genetic stocks. No other naturally occurring runs of island king salmon stocks are known to exist in Southeast Alaska. King Salmon River and Wheeler Creek are both within Kootznoowoo Wilderness. Information on these populations is limited, although recent escapement counts suggest the population is stable or slightly decreasing. The King Salmon River stock serves as an important king salmon transplant source for other streams and rivers.

Invasive Aquatic Species

Species are considered invasive if they are not native to an ecosystem, and if they are likely to cause harm to human health, the economy, or the environment (Executive Order 13112). Due to its remote landscape, northern climate, small human population, and few concentrated disturbed habitat areas, Alaska has relatively few invasive species compared to the rest of the United States, according to ADF&G's Alaska Aquatic Nuisance Species Management Plan (Fay 2002). However, factors such as altered disturbance patterns, constant flow of marine-based shipping and cruise ships, fishing and recreational boating traffic, and climate change may increase the prevalence of invasive aquatic species. Global climate change may create conditions suitable for new invasives, as well as range expansions, by altering geographic range limits and making habitats no longer as suitable for existing native species.

Invasive aquatic species can affect native species by eating them, competing with them, hybridizing with them, disrupting or destroying their habitat, or introducing pathogens or parasites that sicken or kill them (Schrader and Hennon 2005). In addition to natural range extension, several potential pathways exist for introduction of invasive aquatic species. These pathways included fish farms, international and local movement of bait and game fish, trade in live seafood, aquaculture, and contaminated sport angle gear brought into Alaska, as well as ballast discharge from international vessels (Fay 2002, Schrader and Hennon 2005). Several aquatic species have been noted as potential threats to Alaska, including fish (northern pike, Atlantic salmon, yellow perch, ornamental aquarium fish), invertebrates (green crab, New Zealand mudsnail, Chinese mitten crab, zebra mussel, signal crayfish, spiny water flea), plant (cordgrass), and several additional miscellaneous taxa (Fay 2002, Schrader and Hennon 2005). Additionally, eastern brook trout (non-native) and non-endemic rainbow trout have been stocked in many areas where they were not native and compete or hybridize with native trout (Schrader and Hennon 2005). Of these fish, transplanted northern pike and Atlantic salmon are the two fish species of greatest concern (Fay 2002). The invertebrates Chinese mitten crab, green crab, and New Zealand mudsnail, even though they have not been found in Alaska, are of major concern because of their potential to do serious damage to the Alaskan ecosystems (Hines et al. 2004, Schrader and Hennon 2005). Atlantic salmon that have escaped from fish farms pose a threat to native salmon by competing for habitat and introducing diseases and parasites. This species has been observed in Southeast Alaska marine waters and, rarely, in streams (Fay 2002). Also, northern pike, which has not appeared in Southeast Alaska (with the exception of a native stock in Yakutat), have caused widespread damage to resident trout where they have been introduced, and could potentially affect coho salmon through predation. Northern pike have the potential to cause serious environmental and economic damage to highly productive salmon streams in Southeast Alaska (Fay 2002). In the Tongass, there is a risk that these and possibly other non-native sport fish may be introduced into lakes and rivers by individuals seeking to increase sport fishing opportunities. As the road network is extended into more areas of Southeast Alaska, this risk increases. Refer to the ADF&G aquatic species management plan for additional details.

Environmental Consequences

Direct and Indirect Effects

Many of the standards and guidelines in the current Forest Plan were based, to a large extent, on the recommendations of the Anadromous Fisheries Habitat Assessment (AFHA) (USDA Forest Service 1995a). AFHA is considered the most comprehensive scientific review available for the Tongass. The 1997 ROD notes that the standards and guidelines and other direction included in the current Forest Plan meet or exceed all of the recommendations by AFHA. The AFHA evaluation is still relevant for the current EIS.

Additionally, two separate panels assessed effects of alternatives on fish-related issues (Dunlap 1996, 1997). The two panel assessments were completed, one in 1996, which was used for the 1997 EIS assessment, and a more limited assessment completed in 1997 that added additional panel assessments for a subset of the alternatives included in the 1997 EIS. While the current alternatives being evaluated have differences from the alternatives evaluated by these panels, four of them are based on the 1997 alternatives and differ only in specific ways. Where the similarities are comparable, the results of the assessments can be used to help evaluate relative effects of the considered alternatives.

The panel assessments were based on activities that are part of timber management among the alternatives. The main activities included roads and harvest. The location and amount of road miles have historically affected slope stability and runoff to steams having major effects on water quality and fish passage, which are both factors that affect fish habitat and abundance. Additionally, the location and amount of timber harvest can affect riparian vegetation and slope stability, especially on unstable soils, which also have substantial influence fish habitat. These two items, as well as aquatic habitat enhancement, will be discussed first under General Effects. They will set the stage for the discussion of how the alternatives compare to the past panel assessments. The Fish/Riparian Assessment Panel summary reports (Dunlap 1996, 1997) serve as the basis for the second part of the following discussion of environmental consequences.

In general, with the exception of Alternatives 4 and 7, the effects of all alternatives on fish resources are expected to be at or below those predicted for the selected alternative in the 1997 Tongass FEIS, which represents the current Forest Plan. The Forest Plan is very similar to Alternatives 5 and 6.

General Effects

Roads

Roads pose the greatest risk to fish resources on the Tongass (Dunlap 1996, USDA Forest Service and U.S. Department of the Interior (USDI), Bureau of Land Management 1995), partly because they pose the largest risk of management-caused sediment input to streams (Reid and Dunne 1984, Furniss et al. 1991, Gomi et al. 2005, Hassan et al. 2005). Roads can potentially create areas of hillslope instability resulting in landslide generation, contribute fine sediment from surface erosion, and alter surface and subsurface water flow patterns. Landslide debris (sediment, large wood) that enters streams may block or shift channels, fill pools, and increase fines in spawning areas. Increased sediment yield, including yields during road construction, road use during timber harvest activities, and lack of sufficient maintenance or proper closure following timber harvest activities, are all viewed as potential areas of risk for maintaining fish resources. Roads may also increase risk to fish movement due to improper construction relative to fish passage (Gibson et al 2005) and blocked culverts. Stream-rearing fish, particularly cutthroat trout and Dolly Varden, that occupy the smaller headwater streams during some parts of their lives are at the greatest risk. Juveniles of stream-rearing fish are often highly mobile during their freshwater stage, moving seasonally between stream reaches.

While riparian protection (e.g., buffers) can greatly reduce sediment delivery to streams (Belt et al. 1992, Chamberlin et al. 1991), they provide little reduction in the risks to fish or stream channels caused by roads during construction. Road construction practices require additional attention to ensure that risks to fish and stream channels are not excessively high. Roads also increase the risk that improved access would contribute to over-harvest of fish by anglers. These potential effects are best addressed at the site-specific level during project design.

USDA Forest Service and USDI, Bureau of Land Management (1995) concluded that watersheds with fewer roads generally have healthier fish populations. NMFS, as part of their working guidance document for comprehensive salmon restoration initiatives on the Pacific coast, developed a matrix of key habitat indicators of watershed conditions to determine where adverse effects may occur, and identify factors that limit salmonid production (NMFS 1996). NMFS indicted that these factors are appropriate for use at watershed, reach, and site scales. One of these habitat indicators was road density. NMFS noted the following: 1) a watershed with road density of less than 2 miles per square mile and no valley bottom roads would be considered “properly functioning,” 2) watersheds with road density of 2 to 3 miles per square mile and some valley bottom roads were “at risk,” and 3) watersheds with road density greater than 3 miles per square mile and many valley bottom roads were rated as “not properly functioning.” Based on this information, the frequency of occurrence of road densities exceeding the “properly functioning” value of 2 miles of road per square miles, not considering road location, was used as a general index of relative effects of roads on aquatic resources.

Total road miles and road density would increase under all alternatives and follow a similar pattern (Table 3.6-2). The increase in road miles over existing conditions could range from 16 to 118 percent for the alternatives over the next 100+ years. This percentage increase would be 16 to 57 percent for Alternatives 1, 2, and 3; 76 to 78 percent for Alternatives 5 and 6; and 99 to 118 percent for Alternatives 4 and 7. Currently, the Value Comparison Units (VCUs) containing at least some harvest account for about 41 percent of all VCUs on the Tongass; however, total harvest in each VCU is highly variable ranging from just a few acres to several thousand. Currently, the average road density on NFS lands on all VCUs is 0.19 mile per square mile, while the average road density in only VCUs with some past harvest is approximately 0.46 mile per square mile. After more than 100 years of Forest Plan implementation, the estimated overall road density on NFS lands would range from 0.22 mile per square mile under Alternative 1 to 0.41 mile per square mile under Alternative 7. On average, all of these densities are within the range of what NMFS (1996) characterized as “properly functioning” watershed road densities for west coast salmon. Currently, about 98 percent of all VCUs have road densities in the “properly functioning” range (less than 2 miles of road per square mile) for NFS lands. The alternatives would reduce the portion of VCUs with this road density on NFS lands to about 96 percent (Alternative 1) to 90 percent (Alternative 7) (Table 3.6-2). Alternatives 1 and 2 would have the lowest frequency of VCUs with road density over 2 miles per square mile. The largest relative increase in the percentage of VCUs with high road density would occur between existing conditions and Alternative 7. Additionally, the number of VCUs that have no roads on NFS lands is currently about 68 percent; this percentage would remain about the same under Alternative 1 and decrease to 60 to 66 percent under Alternatives 2, 3, and 6, and to 51 to 59 percent under Alternatives 4, 5, and 7. Increases in road densities are primarily in watersheds that already have roads. Potential effects that additional road construction and increases in density would have on any specific VCU and related watershed condition would ultimately be addressed on a project-specific level.

Table 3.6-2
Estimated Road Miles and Percent of VCUs in Road Density Categories on NFS Lands under Existing Conditions and after 100+ years of Full Implementation[1]

Road Type	Existing	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Existing Roads	4,941	4,941	4,941	4,941	4,941	4,941	4,941	4,941
New Road Construction	-	774	2,079	2,799	4,890	3,874	3,744	5,825
Road Reconstruction[2]	-	925	1,784	1,932	2,182	2,100	2,046	2,371
Total Roads	4,941	5,716	7,021	7,741	9,832	8,816	8,686	10,767
Percent Increase	-	16%	42%	57%	99%	78%	76%	118%
Road Density Categories (Mi /Sq. Mi.)[3]								
0	68.0%	67.8%	66.0%	63.6%	52.1%	58.9%	60.0%	51.4%
>0 - 1.0	21.5%	20.4%	19.4%	20.2%	26.1%	22.4%	21.1%	24.9%
>1.0 - 2.0	8.0%	7.3%	8.7%	9.3%	13.5%	11.0%	11.4%	13.5%
>2.0 - 3.0	2.0%	3.5%	4.8%	5.5%	6.6%	6.3%	6.1%	7.6%
>3.0 - 4.0	0.4%	1.0%	1.2%	1.4%	1.7%	1.4%	1.4%	2.5%
>4.0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Percent of VCUs with Average Road Density less than 2 miles/mi^2	98%	96%	94%	93%	92%	92%	93%	90%
Average Road Density (miles /mi^2) for all NFS Lands	0.19	0.22	0.27	0.30	0.38	0.34	0.33	0.41

[1] Assumes full implementation of Forest Plan at ASQ levels plus future non-NFS harvest. Includes adjusted road miles estimated to be needed to harvest all suitable timber in the alternative allowing for approximation of fall down (the reduction between the planned and the actual roads needed due to discovering additional streams, soils issues, etc, during timber sale layout). See Appendix B for details of estimating methods.
[2] Estimated existing road miles that would need to be reconstructed.
[3] Percentages are based on 935 VCUs that contain at least 100 acres of NFS lands.

It should be noted that these projected road densities are based on harvesting at the ASQ level, including both non-interchangeable components (NIC) I and II, over the next 100 years or so. Some adjustment has been made to the harvest acres to account for normal “fall down” that would result from actual on-the-ground surveys during layout when more streams, unsuitable soils, and other factors greatly reduce the actual amount of road and harvest that would occur on these lands. However, based on past harvest practices, even these adjustments may overestimate the future amount of harvest area, these road densities represent maximums and are not likely to be achieved.

Soils of high risk for landslide or mass wasting failure are those indicated as a mass movement index of 3 (MMI 3) (generally gradient of 55 to 72 percent). The upper ranges of these soils (65 to 72 percent) generally have the higher risk of slope failure. Those soils with slopes greater than 72 percent mass movement index of 4 (MMI 4) are removed from the suitable timber base, but may have small inclusions within the MMI 3 layer. Also, current standards and guidelines, in consideration of these concerns, recommend avoiding building roads on slopes greater than 67 percent. Therefore, roads built on soils with slopes greater than about 67 percent are considered at greater risk of slumping or mass failure, increasing the chance of large amounts of sediment entering streams. The miles of road likely to be constructed on soils of this type are shown in Table 3.6-3. While the area is small among all alternatives, due to standards and guidelines that restrict construction of roads in regions of this slope category, there are differences among the alternatives. Overall, Alternative 1 has the lowest portion of new roads in this category.

Table 3.6-3
Estimated Maximum Road Miles on Potentially Unstable Soils Based on Slopes Greater Than 67 Percent over the Length of the Project (approximately 100+ years)[1]

Road Type	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Road mile > 67% Slope	9	30	41	66	53	51	80

[1] Includes adjusted roads miles estimated to be needed to harvest all suitable timber in the alternative allowing for approximation of fall down (the reduction between the planned and the actual roads needed due to discovering additional streams, soils issues, etc, during timber sale layout).

Alternative 2 and 3 areas are also moderately low, while Alternatives 5 and 6 are intermediate and Alternatives 4 and 7 are the highest.

The number of road crossings of streams increases the risk of both adding sediment to streams and impeding fish passage (Class I and II streams). While the BMP for construction methods of culverts and bridges reduce these risk for sediment and turbidity, monitoring of some streams, which have mostly compliance with water quality standards, have found occasional increases in turbidity at least in the short term as described in the USDA Forest Service Tongass Monitoring Reports (USDA Forest Service 2004c). Also, new fish passage guidelines (Forest Service Handbook 2090.21 Aquatic Habitat Management Handbook as USDA Forest Service 2001a) for culvert design greatly reduce risk of new culvert installation impeding fish passage on Class I and II streams. But some risks still remain. An index of these risks to both added sediment from road crossings and impedance of fish passage is shown in Table 3.6-4. Currently about 3,600 fish stream crossings exist on the Tongass. The various alternatives would add moderately to this number increasing risk. Alternative 1 would have the least risk, while Alternatives 4 and 7 would have the most risk. Alternatives 5 and 6 would be similar, and intermediate. In general the trend follows that of road miles constructed.

Table 3.6-4
Estimated Number of Existing and Maximum New Stream Crossings for New Roads by Alternative over the Length of the Project (approximately 100+ years)[1]

Stream Class	Alternative							
	Existing[2]	1	2	3	4	5	6	7
I	1,300	47	137	193	377	296	293	472
II	2,300	121	293	389	769	621	603	958
III	-	650	1,783	2,371	3,917	3,186	3,093	4,899
Total	**3,600**	**817**	**2,213**	**2,952**	**5,064**	**4,103**	**3,989**	**6,328**

[1] Based on adjusted roads estimated to be needed to harvest all suitable timber in the alternative allowing for approximation of fall down (the reduction between the planned and the actual roads needed due to discovering additional streams, soils issues, etc, during timber sale layout). See Appendix B for details of estimation methods.
[2] Approximate estimate based on USDA Forest Service 2006 data. Values expanded based on portion of road miles assessed and known portion of Class I and II crossing in the Tongass. Class III stream crossing not assessed.

Timber Harvest

Timber harvest activities can increase risk to fish resources. Protection of riparian areas, including floodplains, areas of riparian vegetation, and certain wetlands associated with riparian systems are of particular concern. As discussed earlier, riparian vegetation serves many important functions for stream fish habitat, including supplying LWD, food input, and stream shade to name a few. Also of concern is the amount of protection afforded steeper channels (often not fish-bearing) in the headwaters areas and protection of steep hillslope areas. These streams (e.g. class III streams) also require LWD to properly function (Paustian et al. 2006), as well as contributing nutrients, food resources, and, in some situation, LWD to downstream fish streams. Protection of estuaries is also important when locating roads and timber harvest units. Although Forest Plan standards and guidelines associated with riparian areas, wetlands, and beach and estuary fringe are expected to protect fish resources from significant impacts associated with timber harvest, there is still some level of risk. The risk is related to the level of harvest, portion of streams in the harvest area, and quantity of potentially unstable slopes in the harvest area associated with each alternative.

Timber harvest activities on the Forest could potentially affect as many as 144,000 (Alternative 1) to 1,070,000 total acres (Alternative 7) after full implementation of the Forest Plan (100+ years) (Table 3.6-5). Alternatives 1, 2, and 3 would harvest the least acreage and Alternatives 4 and 7 the most, while Alternative 5 (No Action) and Alternative 6 (Proposed Action) would be in the higher portion of the intermediate range of alternatives. Projected acreages are based on harvesting at the Allowable Sale Quantity (ASQ) level, but with adjustment for probable fall down rates to account for reductions from on the ground surveys during project examination during specific project National Environmental Policy Act (NEPA) evaluation and final project layout. Therefore, the values are expected to reasonably approximate Forest-wide harvest (see the *Timber* section).

As harvested forest areas mature, young growth is predicted to become an increasingly larger portion of the harvest. When this occurs, the alternatives with lowest overall harvest have the highest portion of second-growth harvest reducing areas of new ground disturbance related to harvest. Alternatives 1, 2, and 3 would have at least 39 percent as young-growth harvest, while Alternatives 5 and 6 would have 33 percent. Altenatives 4 and 7 would have only 25 to 26 percent of the harvest as young growth. Actual acres of young growth would range from about 58,000 under Alternative 1 to 262,000 under Alternative 7.

Table 3.6-5
Estimated Maximum Acres of Timber Harvest after 100+ Years of Full Forest Plan Implementation[1]

Alternative	Maximum Acres Likely to be Harvested Over the Life of the Forest Plan[2]	Percent of Likely Harvest that is Young Growth
Alternative 1	144,265	40%
Alternative 2	393,937	46%
Alternative 3	513,676	39%
Alternative 4	891,986	26%
Alternative 5	686,583	33%
Alternative 6	663,471	33%
Alternative 7	1,069,624	25%

[1] Based on the ASQ. Incorporates adjustments for falldown.
[2] Includes productive old growth and young-growth harvest.

The number of stream miles within development LUDs can be used as an index to risk for fish resources from harvest-related actions. As shown in Table 3.6-6, the stream habitat at risk closely follows the quantity of harvest. The total stream miles in development LUDs ranges from a low of 4,300 miles for Alternative 1 to 19,900 miles for Alternative 7 (Table 3.6-6). Class I streams are considered most important because these are anadromous and high-quality resident fish streams. Class I stream miles range from about 1,300 miles under Alternative 1 to 5,300 miles under Alternative 7. Total fish stream miles (Class I and II) range from 2,300 under Alternative 1 to 9,500 under Alternative 7. Streams receive substantial protection from riparian buffers and the beach fringe under all of the alternatives. In general, the riparian protections would greatly reduce direct effects to fish resources. However, the greater the miles of streams in development LUDs, the greater the risk to fish resources. The lower reaches of all streams under Alternatives 1, 2, 3, 4, 5, and 6 would be protected within a 1,000-foot beach fringe and Class I, II, and III streams would all receive buffers. Alternative 7 would fully protect a smaller portion of lower stream reaches because of only a 500-foot beach fringe. Alterntive 7 would not require buffers on Class III streams, which may affect downstream fish-bearing streams through a reduction in LWD contributions in certain situations (Paustian et al. 2006).

Table 3.6-6
Mapped Stream Miles[1] within Development LUDs by Alternative

	Alternative						
Stream Class	1	2	3	4	5	6	7
I	1,341	2,364	3,037	4,841	3,752	3,628	5,274
II	951	1,772	2,321	3,912	3,117	2,983	4,216
III	2,004	4,582	6,318	9,657	7,618	7,344	10,425
Total	4,295	8,718	11,676	18,411	14,487	13,954	19,915

[1] Note: Streams have been inventoried more completely in areas that were proposed as Development LUDs compared with areas in Non-development LUDs. Development LUDs include Timber Management, Modified Landscape, Scenic Viewshed, and Experimental Forest.

As noted under the road section, disturbance to hillslope regions with potentially unstable soils could cause slumping and mass wasting. While most of the soil types of highest risk potential would be excluded from the timber base, some areas may still be harvested. Regions greater than 67 percent slope are areas with higher potential for slumping (see the *Roads* discussion in this section). The old-growth acreage of these areas that may be harvested is shown in Table 3.6-7. Because of very limited harvest, Alternative 1 has the least area of potential harvest on steep slopes and Alternative 2 is also relatively low. The larger area of harvest on steep slopes would be under Alternatives 4 and 7, while Alternatives 3, 5, and 6 are intermediate.

Table 3.6-7
Estimated Maximum Acres of Old-Growth Harvest on Potentially Unstable Soils (Slopes > 67%) after Full Implementation of the Forest Plan (approximately 100+ years)[1]

Hill Slope	Alternative 1	2	3	4	5	6	7
Harvest Acres on Slopes > 67%	2,414	8,176	12,391	21,592	17,445	16,626	30,036

[1] Includes adjusted harvest acres estimated in the alternatives allowing for approximation of fall down (the reduction between the planned and the actual harvest area due to discovering additional streams, soils issues, etc, during timber sale layout). See Appendix B for details of estimating methods.

Fish Habitat Enhancement and Log Tranfer Facilities

Fish enhancement projects, such as fish passage, stream and lake stocking, and lake fertilization would not be affected by any of the considered alternatives. Project enhancement funding and selection of projects is primarily independent of amount or location of timber harvest; therefore, all alternatives would have similar effects on enhancement activities.

Effects of LTFs on marine aquatic species are addressed in the *Transportation and Utilities* section of this chapter. Generally, effects would be somewhat proportional to the amount of harvest and include slight coverage of shallow (less than 60 feet deep) regions of nearshore habitat with wood debris (primarily bark), affecting primarily benthic marine organisms in very small areas of tidal and subtidal habitat.

Fish/Riparian Panel Assessment Elements

The panel process is described in the *Introduction* to this chapter. The 1995 Fish/Riparian Assessment panel included four fisheries scientists and two physical scientists (hydrology and geomorphology). The 1997 assessment meeting included just the original four fisheries scientists. The first panel assessed both effects to fish and stream physical attributes (relating to riparian conditions), while the second panel only assessed effects to fish of a subset of the alternatives included in the 1997 EIS.

The detailed results of the first assessment panel analysis is presented in the 1997 FEIS (USDA Forest Service 1997a) and will only be summarized here because many of the factors among current and past alternatives differ. At the time of the first panel meeting, the 1997 Alternative 11 (Alternative 5 [No Action] in this analysis) was not available to the panels. The second panel, however, included this alternative in its assessment. The 2007 alternatives that are based on a corresponding 1997 alternative are as follows:

- 2007 Alternative 4 was based on 1997 Alternative 6
- 2007 Alternative 5 was based on 1997 Alternative 11
- 2007 Alternative 6 was based on 1997 Alternative 11
- 2007 Alternative 7 was based on 1997 Alternative 2

The extension of the panel assessments from the 1997 alternatives to the corresponding 2007 alternatives are primarily based on similarities in acres and locations of potential harvest, miles of proposed roads, and the level of riparian protection and beach/estuary protection between the alternative pairs. In general, the acres and locations of harvest and the miles of proposed roads are very similar for each alternative pair. Similarly, the beach/estuary protection level is the same within each pair. The level of riparian protection is also the same between the 2007 Alternatives 5 and 6 and the 1997 Alternative 11. However, the 2007 Alternative 4 has slightly greater riparian protection than the 1997 Alternative 6, and the 2007 Alternative 7 has the same riparian protection as the 1997 Alternative 2. The extension of panel assessment conclusions is qualified below, where appropriate.

The fisheries and physical scientists rated five possible outcomes for each of eight species of fish, including both resident and anadromous life strategies for two of the species. The fish considered included all five salmon species, cutthroat trout, steelhead, and Dolly Varden char. The physical scientist rated the effects of each alternative on natural stream conditions based on stream attributes, including amount of large woody debris, percent pool area, and stream width-to-depth ratio; residual pool depth; and stream bed grain size for a similar five possible outcomes.

The panels for fish and riparian estimated the effect of each alternative in one of five outcomes (categories) of effects to fish and riparian conditions. Alternatives rated in the first two outcomes (Outcome I and II) generally had mostly no or minimal adverse effects to fish or riparian conditions. Alternatives that had greater portion of ratings in Outcomes III, IV, and V had moderate to severe rated adverse effects to fish or riparian conditions (Dunlap 1996, 1997).

Generally, adverse effects of any alternative in the 1997 EIS were lower and varied less among alternatives on Chinook and sockeye salmon than other species. This is because most Chinook salmon in the Tongass region are present in large river systems (mostly flowing out of Canada) or on Admiralty Island, and most of these systems would have little management activity that could affect them. Sockeye salmon primarily spawn and rear in lakes (although some stream spawning does occur), and lake areas are well protected under all alternatives. Other species, including coho, pink and chum salmon, cutthroat trout, steelhead, and Dolly Varden char are more at risk from management activities because of their greater reliance on stream habitats for spawning, rearing (fry, juvenile), and immigration. The outcome rating for these species was more varied among alternatives and varied among species, mostly based on the amount time and number of life stages spent within streams of the Tongass. Generally, the panel assessments concluded that the level of road construction and timber harvest was positively related to the level of risk to fish and fish habitats. This same trend would hold for the 2007 alternatives.

The scientists in the panels noted several factors they considered important in their evaluation of risks for these alternatives (Dunlap 1996, 1997). These parameters are relevant for evaluation of the current alternatives. Generally, roads were considered the greatest risk to fish resources. Amount, location, and type of timber harvest, especially relative to steep slopes, soil type, stream type, and estuaries were also considered very important in affecting risk. Watershed analysis was important where guidelines would be modified. Also, high levels of riparian protection were a major item considered important for protection of fish resources and their habitat. Firm standards, guidelines, and adequate monitoring were all considered important. Most of the panel's concerns and recommendation were considered and adopted into the final alternative selected for 1997 and are incorporated into Alternatives 1, 2, 3, 5, and 6, to a slightly lesser extent into Alternative 4, and even less into Alternative 7.

The panels described the significant characteristics of each of the alternatives that affected their evaluation. Below is a summary of the 2007 alternatives presented with reference to the panel assessments.

Alternative 1: This alternative would have future harvest and road construction concentrated in a relatively small part of the Forest, which would reduce additional degradation and facilitate recovery of degraded habitat in some watersheds. Riparian and beach/estuary protection would be high because the Alternative's Riparian and Beach/Estuary Standards and Guidelines are essentially the same as the current Forest Plan standards and guidelines. These are the same as the 1997 Alternative 11 standards and guidelines, which were highly rated by the expert panel. Overall, harvest and road construction levels would be the lowest among the alternatives. Because of the low level of harvest and road construction as well as the level of riparian protection, if this alternative were to be evaluated by the panel today, it would likely rank as the lowest risk alternative among the alternatives considered in this EIS, and would generally rank between the two lowest risk alternatives of the 1997 alternatives.

Alternative 2: This alternative is similar to Alternative 1, but with moderately greater distribution of harvest area and increase in roads. Riparian and beach/estuary protection would remain high for the same reasons as for Alternative 1. Harvest and road construction would be increased moderately over Alternative 1 expanding into some new area, but still remain relatively low. It would rank second lowest risk among alternatives evaluated in this EIS and would likely have been between the second and third lowest risk alternative evaluated by the panel in the 1997 EIS.

Alternative 3: This alternative increases harvest considerably over Alternative 1 by expanding into many more watershed areas. However, riparian and beach/estuary protection would remain high for the same reasons as Alternative 1. The moderate network of roads and harvest would increase likelihood of areas of habitat degradation and reduce likelihood of habitat recovery. This alternative, based on riparian protections and moderate harvest, would be ranked third lowest for risk among this EIS alternatives and likely would have been ranked between the third and fourth among alternatives for the 1997 EIS by the panel.

Alternative 4: This alternative is based on the 1997 Alternative 6. The panel assessments concluded that the relatively large area harvested and moderate road network in this alternative would increase the chance of gaps in fish distribution and fish habitat recovery (Dunlap 1996). The old-growth reserves and retention proposed in this alternative may offset some of the harvest and road effects. However, if this alternative were evaluated by the panel today, it would likely rank as the second highest risk alternative among the alternatives considered in this EIS; it ranked in the middle of the 1997 alternatives evaluated (Dunlap 1996).

Alternative 5 (No Action): This alternative is the 1997 Forest Plan (Alternative 11) as amended. The panel assessment concluded that the relatively few miles of roads and moderate levels of timber harvest over the next 100 years in this alternative would reduce risk to fish habitat (Dunlap 1997). Further, the panel noted that the Forest-wide relatively high riparian protections would have relatively low risks to fish habitat (Dunlap 1997). If this alternative were evaluated by the panel today, it would likely rank as the third highest risk alternative among the alternatives considered in this EIS; it ranked in the lower risk group of alternatives in 1997 (Dunlap 1997).

Alternative 6 (Proposed Action): This alternative was based on the 1997 Alternative 11. This alternative would have very slightly lower harvest and roads than the current Alternative 5. The panel assessment concluded that the relatively few miles of roads and moderate levels of timber harvest over the next 100 years in this alternative would have relatively low risk to fish habitat (Dunlap 1997). Further, the panel noted that the Forest-wide relatively high riparian protections would reduce the risks to fish habitat (Dunlap 1997). If this alternative were evaluated by the panel today, it would likely rank as the fourth highest risk alternative among the alternatives considered in this EIS; it would have ranked in the lower risk group of alternatives in 1997 (Dunlap 1997).

Alternative 7: This alternative was based on the 1997 Alternative 2. The panel assessment concluded that the road network and area harvested would increase the likelihood of areas of future habitat degradation and reduce the likelihood of habitat recovery (Dunlap 1996). Of particular concern was harvest on MMI 3 soils, which has greater potential to increase stream habitat degradation and increase risks to stream channels and fish habitat due to lower riparian protection along Class III streams (Dunlap 1996, 1997). In addition, the 1997 panel assessment concluded that management of slopes around steep-gradient Class III streams could change the rate of wood and sediment delivery and affect downstream fish habitat over the long term (Dunlap 1997). This alternative was thought to result in degradation of fish habitat and increase gaps in fish distribution in the next 100 years (Dunlap 1997). Estuary protection would be high because of the essential continuation of current Forest Plan standards and guidelines for estuaries, which were highly rated by the panel (Dunlap 1997). Although beach protections are reduced for this alternative relative to others. Overall, harvest and road development would be the highest, and riparian protections the lowest, of all alternatives. If the panel were to assess this alternative it would likely rate it as the highest risk to fish resources of any in this EIS. The comparable 1997 alternative was rated second highest for risk among all alternatives evaluated in 1997.

Species Assessments

Threatened and Endangered Species

Consultation requirements for the Forest Plan Revision under Section 7 of the ESA, as amended, were completed with the USFWS and NMFS for the 1997 Forest Plan EIS. Both USFWS and NMFS reviewed the biological assessments for threatened and endangered species under their regulatory jurisdiction and concluded that the Tongass Forest Plan Revision was “not likely to adversely effect” threatened or endangered species occurring on the Tongass for the 1997 Plan. These findings were made subject to the programmatic scope of the Forest Plan Revision and following the associated Forest-wide standards and guidelines (see Chapter 4 of the 1997 Forest Plan).

Formal and informal consultation procedures (as directed by the ESA, as amended in 50 CFR 17.7, and Forest Service Manual 2670) are used with NMFS and USFWS on all projects that implement the 1997 Forest Plan. Forest-wide standards and guidelines (see Chapter 4 of the amended Forest Plan) for threatened, endangered, and sensitive species direct that all projects would comply with requirements of the ESA, as amended, and Forest Service policy (Forest Service Manual 2670).

Because Alternative 11 of the 1997 Forest Plan Revision Final EIS was deemed not likely to adversely affect threatened or endangered species occurring on the Tongass, the alternatives being examined in this EIS would also likely fall in this category because they have the same or similar protective measures as Alternative 11 from the 1997 Final EIS, with the exception of greater acreage harvested under Alternatives 4 and 7.

Most of the currently ESA-listed salmon and steelhead are unlikely to be in marine waters near the Tongass Forest because their migration routes and rearing areas mostly to the west of the forest boundaries, although a small number may be present in the inner waters. Because of this very limited distribution relative to the project and lack of affects to the marine environment, it is not anticipated that adverse effects would occur to listed fish species from any of the alternatives. The Biological Assessment for the considered actions is presented in Appendix F. The conclusion of this Biological Assessment is that the considered actions for the Tongass Land and Resource Management Plan are "not likely to adversely effect" any endangered or threatened salmon or steelhead ESU/DPS.

Essential Fish Habitat Assessment

Section 305(b)(2) of the Magnuson-Stevens Act requires all federal agencies to consult with the Secretary on all actions or proposed actions authorized, funded, or undertaken by the agency that may adversely affect EFH. This consultation is done for site-specific projects with ground-disturbing activity. The application of Forest-wide standards and guidelines and BMPs developed to meet soil protection, water quality standards, and fish habitat protection will help protect EFH on the Tongass National Forest and adjacent estuarine and marine waters. Because adoption of the Forest Plan does not specifically result in any actions that could affect EFH, and any action that would be taken following adoption of the Plan that could affect EFH would have a formal EFH developed, no formal EFH was developed for the considered actions in this EIS.

Sensitive Species

Northern Pike

Northern Pike are found in five lakes east of Yakutat. Forest-wide standards and guidelines for wetlands and riparian management generally cover these areas. Although road access exists within 0.5 mile of Pike Lakes, there is no land suitable for timber harvest immediately around the lakes. Natural habitat conditions associated with the lakes are expected to be maintained under all alternatives; therefore, no effects are anticipated.

Fish Creek Chum Salmon

The habitat for the Fish Creek chum salmon, near Hyder on the Portland Canal, would be managed in accordance with the Forest-wide standards and guidelines for wetlands and riparian management (see Chapter 4 of the amended Forest Plan) under all alternatives; one exception is the elimination of Class III stream buffers under Alternative 7. Additional standards and guidelines for chum salmon that apply to the Fish Creek chum salmon include coordination with appropriate agencies to protect, maintain, and preserve this run of chum salmon, and to provide for habitat improvement as necessary to maintain the viability of the run. Alternative 1 is expected to have no effect on the Fish Creek chum salmon. Alternatives 2, 3, 4, 5, and 6 would have a slight risk of effects, but if effects occur, they are not expected to be significant. Alternative 7 would have a larger risk of effects because of the elimination of Class III stream buffers under this alternative; but the potential for significant effects is still small.

There have been improvement projects to increase spawning habitat for this population. With these improvement projects, the habitat for these chum salmon is expected to be improved in the future. Alternatives 2, 3, 4, 5, 6, and 7 would maintain the current LUD as Scenic Viewshed, which would allow continued habitat improvements. Alternative 1 would convert this area to Remote Recreation, which may limit continued enhancement activities and/or the ability to conduct stream habitat improvement projects.

Island Run King Salmon

King Salmon River and Wheeler Creek habitats for island run king salmon are both within Kootznoowoo Wilderness. Natural habitat conditions are to be maintained, and specific Forest-wide standards and guidelines also apply (see Chapter 4 of the amended Forest Plan). None of the alternatives would change how this area would be managed. Application of the wilderness prescription and Forest-wide standards and guidelines to sustain habitat conditions would not result in any affects on these island run king salmon.

Invasive Aquatic Species

ADF&G lists four species of fish that are non-native to Alaska found in Alaskan waters (Fay 2002). Only two, the Eastern Brook trout and Atlantic salmon, have been found in the aquatic habitats of the Tongass National Forest. Additionally, northern pike, which has only been found in apparently native waters in the Yakutat area in the Tongass, is of greatest concern because of its potential to directly impact native salmon species. Other aquatic species, including the Chinese mitten crab and New Zealand mudsnail, both of which can inhabit freshwater, are a major concern for impacts they would cause if they invaded these aquatic habitats (Schrader and Hennon 2005, Fay 2002). While no alternative would have substantial effects on invasion or establishment of non-native aquatic species, some actions could have potential indirect effects. One of the biggest concerns for invasive fish is active stocking of waters primarily with species often considered game fish in other areas. This would apply primarily to northern pike, which can inhabit lakes and rivers. In general then, alternatives that increase human access to fresh waters within the Forest would have the greatest risk of increasing invasive aquatic species in aquatic habitat of the Forest. The major form of increased access to aquatic habitats of the Forest would be through increased roads where people may travel with invasive species either intentionally, such as northern pike, or by accident, such as in the case of some aquatic species, like the New Zealand mudsnail. Based on this criterion, the relative risk would be proportional to road miles (Table 3.6-2) with Alternative 1 having the least and Alternative 7 having the most risk.

Some negative effects, or more appropriately, increased risk to, the natural range of variation in stream processes and fish habitat would likely occur by management activities over the long term for all alternatives. The extent of harvest activity and associated road development are likely to result in decreases of some fish populations in managed watersheds. Measures taken to mitigate, or moderate, the negative effects have been incorporated into the alternatives in ways to reduce levels of risk to the fisheries resource. All alternatives have the same or substantially similar standards and guidelines that influence fish habitat as were adopted following the 1997 EIS. While the standards and guidelines do supply substantial protection of fisheries resources, some risk of impacts would remain, and these are generally proportional primarily to the amount of road miles and to a lesser degree on acres harvested. Therefore, the major difference between the alternative is the relative risk from the construction of roads and harvest, which are directly proportional to the quantity of these two parameters by alternative. In general, Alternatives 1, 2, and 3 would have the lowest risk because of low harvest and road miles, 5 and 6 would be intermediate and similar because harvest is very similar, and Alternative 4 and especially 7 would have most risk to fish resources due to the relatively high portion of harvest and road building.

Conclusions – Direct and Indirect Effects

Much of this EIS evaluation has been based on the conclusions, derived from scientific literature, monitoring reports, and expert evaluations, that current Forest Plan standards and guidelines, practices, and related BMPs are adequate to ensure minimal or no harm to fish resources, at least for most of the alternatives considered. However, there is a degree of scientific uncertainty associated with these conclusions. The current Plan has only been in place for 10 years, although many of the practices have been in place longer. The active monitoring that has been occurring does not suggest marked problems with water quality or fish resources as a result of these actions (USDA Forest Service 2004c, 2006b). While active monitoring has been occurring, the full effect of these types of actions has not had an extensive period of evaluation. Even though relevant information indicates protections would be adequate under most of the alternatives, there is some risk to fisheries resources in implementing any of the considered alternatives.

Based on best available science, it can be concluded that there is a relatively low long-term risk to fish habitat from Alternatives 1, 2, 3, 5, and 6 because of low to moderate levels of timber harvest and road construction, and the relatively high riparian protections offered by Forest Plan standards and guidelines. Under Alternative 4, the risks are higher because of an increase in harvest and road development, and the risks are higher yet under Alternative 7 because of further increases in harvest and road development, and a decrease in riparian protections for Class III streams.

Cumulative Effects

General

The effects of the alternatives on fish resources may be influenced by other actions occurring in the project area. The main cumulative factors affecting fish are related to land development actions that occur regionally. This includes primarily other timber harvest-related actions on non-NFS lands, especially associated roads. The total lands within the Tongass National Forest boundary, which includes all NFS lands and other non-NFS lands, equals about 17.8 million acres. Of this, only about 6 percent (1.1 million acres) are non-NFS lands. However, development actions on these non-NFS lands, which include most cities and towns in Southeast Alaska, are moderately intense.

As discussed previously, one of the main factors affecting fish resources in the Tongass is the level of road development. Generally, the greater the density of roads in the watershed, the greater risk there is to fish resources. Among several indicators used by NMFS (1996) to characterize status of watershed conditions, they recommended a maximum road density threshold levels for maintaining “properly functioning” watersheds for coastal salmon as 2 miles per square mile, with increased risk to salmon as road densities increase beyond this value. There are 947 VCUs inside the Tongass boundary, including both NFS and non-NFS lands. VCUs approximate watershed sizes, so road densities by VCU would be comparable for evaluating conditions relative to NMFS threshold road densities.

The average road densities by alternative and for the region are shown in Table 3.6-8. For this assessment, we have assumed an increase in road miles on non-NFS lands for the life of the project (100+ years). The average road density on non-NFS lands is much higher than on NFS lands. This high average density is partly the result of the high number of road miles in city areas, as well as concentrated timber harvest areas. Even though the amount of non-NFS land area is relatively low, high density on these lands results in the overall average densities increasing sharply relative to NFS lands. However, even with these increases, overall averages remain relatively low for any alternative, ranging from 0.42 (Alternative 1) to 0.60 (Alternative 7).

Table 3.6-8
Estimated Average Total Road Density on Tongass NFS Lands and Non-NFS Lands within the Tongass National Forest Boundary by Alternative over 100+ years[1]

	Road Density as Miles/Square Mile		
Alternative	Road Density on NFS Lands	Road Density on Non-NFS Lands[2]	Total Road Density All Lands
Existing	0.19	2.19	0.31
Alternative 1	0.22	3.49	0.42
Alternative 2	0.29	3.49	0.47
Alternative 3	0.32	3.49	0.49
Alternative 4	0.40	3.49	0.57
Alternative 5	0.35	3.49	0.53
Alternative 6	0.35	3.49	0.52
Alternative 7	0.43	3.49	0.60

[1] Assumes full implementation of Forest Plan at ASQ levels plus future non-NFS harvest. Includes adjusted roads miles estimated to be needed to harvest all suitable timber in the alternative allowing for approximation of fall down (the reduction between the planned and the actual roads needed due to discovering additional streams, soils issues, etc, during timber sale layout). Annette Island is included because it is surrounded by areas within the Forest boundary.
[2] Assumes an estimated the increase in non-NFS road miles within the Forest boundary from 3,756 miles at present to 5,970 after 100+ years.

However, there are VCUs that have higher road densities that are increased by the addition of roads from the alternatives (Table 3.6-9). Currently, most (68 percent) of the VCUs on NFS lands have no roads and only just over 2 percent have road densities exceeding 2 miles per square mile. The inclusion of non-NFS lands reduces the percentage of VCUs with no roads to 61 percent and pushes the portion of VCUs exceeding 2 miles per square mile to almost 6 percent under existing conditions. Under Alternatives 1 and 2 for all lands combined, the percentage of VCUs exceeding 2 miles per square mile would increase to a maximum of 10 to 12 percent after 100+ years. The largest increase in the percentage of VCUs with high density would occur under Alternative 7, which would have a maximum of 16 percent of VCUs exceeding the 2 miles per square mile threshold.

After 100+ years, Alternatives 3 through 6 would have a maximum of 12 to 14 percent of VCUs with density greater than 2 miles per square mile when roads on non-NFS lands are included. When roads on all lands are included, a minimum of about 37 to 46 percent of the VCUs would still have no roads after 100+ years (Table 3.6-9).

The effect on fish resources are less directly tied to amount of harvest than to roads, but harvest may influence them through effects on water quality, riparian management, and regions where harvest is allowed, as discussed under direct effects. The cumulative effects of timber harvest were discussed in the *Water* section on water quality for all lands (including non-NFS lands) within the Forest boundary and relate to potential effect to fish resources. Existing conditions include retention of 87 percent of the original productive old-growth forest inside the Forest boundary and with 95 percent of the land area remaining undisturbed from direct timber harvest (Table 3.4-3 of the *Water* section). Overall the cumulative effects to fish relating directly to quantity of timber harvest would be least for Alternative 1 as 82 percent of the original productive old growth on all lands within the Forest boundary would be retained and greatest for Alternative 7 as productive old growth would be reduced to 70 percent, in addition to reduced riparian protections for Alternative 7. Even with highest harvest alternative, the majority of productive old

Table 3.6-9
Estimated Road Miles and Percent of VCUs in Road Density Categories on NFS Lands and on All Lands Combined within the Tongass National Forest Boundary by Alternative after 100+ years of Full Implementation[1]

Road Density Categories[2]	Alternative							
	Existing	1	2	3	4	5	6	7
Road Miles Per Sq. Mi.	NFS Lands	NFS Lands	NFS Lands	NFS Lands	NFS Lands	NFS Lands	NFS Lands	NFS Lands
0	68.0%	67.8%	66.0%	63.6%	52.1%	58.9%	60.0%	51.4%
>0 - 1.0	21.5%	20.4%	19.4%	20.2%	26.1%	22.4%	21.1%	24.9%
>1.0 - 2.0	8.0%	7.3%	8.7%	9.3%	13.5%	11.0%	11.4%	13.5%
>2.0 - 3.0	2.0%	3.5%	4.8%	5.5%	6.6%	6.3%	6.1%	7.6%
>3.0 - 4.0	0.4%	1.0%	1.2%	1.4%	1.7%	1.4%	1.4%	2.5%
>4.0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
New Miles	**-**	**774**	**2,079**	**2,799**	**4,890**	**3,874**	**3,744**	**5,825**
Total Miles	**4,941**	**5,715**	**7,020**	**7,740**	**9,831**	**8,815**	**8,685**	**10,766**
Road Miles Per Sq. Mi.	All Lands	All Lands	All Lands	All Lands	All Lands	All Lands	All Lands	All Lands
0	60.8%	45.1%	44.6%	43.3%	37.2%	41.0%	41.6%	36.9%
>0 - 1.0	22.4%	35.2%	33.2%	32.9%	34.1%	32.7%	32.0%	32.5%
>1.0 - 2.0	11.4%	9.7%	10.7%	11.4%	14.9%	12.9%	13.3%	15.1%
>2.0 - 3.0	4.4%	6.5%	7.5%	7.9%	9.1%	8.9%	8.6%	9.9%
>3.0 - 4.0	1.0%	2.3%	3.0%	3.3%	3.6%	3.4%	3.4%	4.2%
>4.0	0.0%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.4%
New Miles	**-**	**2,988**	**4,293**	**5,013**	**7,104**	**6,088**	**5,958**	**8,039**
Total Miles	**8,697**	**11,685**	**12,990**	**13,710**	**15,801**	**14,785**	**14,655**	**16,736**

[1] Assumes full implementation of Forest Plan at ASQ levels plus future non-NFS harvest. Roads on NFS lands adjusted for fall down. Estimated the increase in non-NFS road miles within the Forest boundary from 3,756 miles at present to 5,970 after 100+ years. Annette Island is included as a VCU because it is surrounded by areas within the Forest boundary.
[2] For NFS lands, percentages are based on 935 VCUs that contain at least 100 acres of NFS lands. For all lands, percentages are based on all 947 VCUs inside the Forest boundary, including Annette Island.

growth would remain unaffected for the full implementations of the Forest Plan over more than a 100-year period (Table 3.4-3 of the *Water* section). Total cumulative effects to fish resources, based on relative amount of area disturbed, would be relatively low as 90 to 94 percent of the land base would remain undisturbed by direct timber harvest for all alternatives. However, some local regions may have fish resources affected where watershed harvest levels and road density are high. Additionally, with less protections for riparian areas on state and private land (e.g., no required buffers on non-fish bearing streams, and some fish bearing streams), a greater risk to fish resources would occur in watersheds that have a high portion of non-NFS harvest occurring. Again, effects of harvest activities on fish resources would ultimately be considered at the project-specific levels, ensuring minimal adverse cumulative effects.

Climate Change

Climate change is one factor that has some unquantifiable potential to affect fishery resources on the Tongass. While the models do not fully agree on the climate change predictions for Southeast Alaska, they generally predict warmer weather, with more winter rainfall, less snowfall, and a decrease in summer rain in some areas. Both factors, if large enough, have the potential to affect fish resources. Climate models from both the Canadian Climate Center and the Hadley Center predict rising temperatures and a 10 percent decrease in summer precipitation in portions of Southeast Alaska (though they differ on the areas affected). Given the high summer rainfall levels in Southeast Alaska (Ketchikan averages over 7 inches of rain per month in the summer), a 10 percent decrease in summer rainfall would still result in wet conditions in most years. However, Southeast Alaska does occasionally experience dryer conditions. For example, in July 1971 there were 23 days without rain. Juday et al. (1998) postulate that warmer, dryer conditions could increase stream temperatures and cause reduced seasonal low flows, both of which could adversely affect salmon. Reduced stream flow in summer months and high water temperatures during this same period have been a common concern for salmonid populations in much of their native range. These types of concerns are less prominent in the cool wet environment common in Southeast Alaska, although some conditions of low flow and higher stream temperature resulting in adverse effects have been observed. Specific concerns, for example, include changes in the timing of emerging pink and chum salmon and the potential for not being properly timed with early marine planktons supplies (Heard and Salo 1991), and elevated temperatures and lower summer flows reducing holding pool survival of adults because of dissolved oxygen depletion.

In the case of coho salmon, sidechannels may have lower flows and increased temperatures, which could reduce their usability. However, increased temperature could reduce rearing time in freshwater for coho salmon from 2 years to 1, which may have advantages (less overwinter mortality) and disadvantages (smaller size on marine water entry, reducing marine survival). Sea-level rise could inundate estuarine rearing areas. However, the Southeast Alaska land mass is rising in many areas, and the potential change in water level over the next century is 0.3 to 3 feet, while some areas, particularly in northern Southeast Alaska, may rise several feet 1 to 4 feet (Kelly et al 2007). Changes in the next decade or two, will obviously be much less. So overall effects on estuarine areas and fish stocks will vary considerably and, within the timeframe covered by this Forest Plan amendment (i.e., 10 to 15 years) changes are difficult to predict and may even be difficult to detect.

In summary, there is general agreement that the climate is warming and that summer precipitation is may decline. However, there is considerable uncertainty surrounding specific predictions and even more uncertainty regarding the effect of these changes on resources including fish.

Conclusions – Cumulative Effects

Overall, the cumulative effects of considered alternative actions in conjunction with other non-NFS lands and actions associated with timber harvest would increase the regions of greatest risk for fish resources. While all alternatives would increase high road density areas, overall the number of VCUs of increased risks to fish remains relatively small, at 16 percent for the entire region, even for Alternative 7, which has the highest average density and the highest frequency of high road density areas. Other alternatives would have less risk with high road density areas ranging from about 10 to 14 percent for all lands combined. Cumulative effects of actual timber harvest would follow a similar trend among the alternatives; however, the potential cumulative effects of harvest, road building, and other actions would be evaluated on a project-specific basis so that the potential for adverse cumulative effects to fish resources within a given watershed could be reduced or eliminated.

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Plants

Affected Environment

This section describes the affected environment for plants on the Tongass National Forest. It is divided into three areas of focus: Plant Communities, Threatened, Endangered, and Sensitive (TES) Species, and Invasive Plants. The *Plant Communities* subsection below provides an overview of vegetation and describes the process and status of vegetation classification and vegetation mapping on the Tongass. The *Threatened, Endangered, Sensitive, and Rare Plant* and *Invasive Plant Species* subsections below include an overview of current conditions.

Plant Communities

The composition, age, and structure of the plant communities present today on the Tongass are the result of interactions between biological and physical environments, natural disturbances, and land use history. This subsection introduces the ecological context for the occurrence of common forested and non-forested plant communities.

The coastal forest of Southeast Alaska is part of the cool, temperate rain forest that extends along the Pacific coast from Northern California to Cook Inlet in Alaska. Most of the Forest is composed of old-growth conifers, primarily western hemlock *(Tsuga heterophylla)* and Sitka spruce *(Picea sitchensis)*, with a scattering of mountain hemlock *(Tsuga mertensiana)*, Alaska yellow-cedar *(Chamaecyparis nootkatensis)*, and western redcedar *(Thuja plicata)* in the south. Red alder *(Alnus rubra)* is common along streams, beach fringes, and on soils recently disturbed by management activities and landslides. Black cottonwood *(Populus balsamifera* ssp. *trichocarpa)* grows on the floodplains of major rivers and recently deglaciated areas.

Blueberry and huckleberry *(Vaccinium* spp.), Sitka alder *(Alnus viridis* spp. *sinuata)*, devil's club *(Oplopanax horridus)*, and salal *(Gaultheria shallon)* are common shrubs in forested communities. The Forest floor is habitat for a variety plants, such as false lily-of-the-valley *(Maianthemum dilitatum)*, bunchberry *(Cornus canadensis)*, five-leaf bramble *(Rubus pedatus)*, and skunk cabbage *(Lysichiton americanum)*. Because of the high rainfall and resulting high humidity, a large variety of mosses grow in great profusion on the ground, fallen logs, the lower trunks and branches of trees, as well as in forest openings. Hundreds of epiphytic lichen species can also be found on tree trunks and branches, especially in old-growth forests, riparian areas, and maritime beach fringe forests.

Grass and sedge meadows usually lie at low elevations, often along the coast and toeslopes of hills and mountains. Stands of willows *(Salix* spp.) border many of the stream channels. Muskeg (peatland) communities, dominated by shore pine *(Pinus contorta* var. *contorta),* peat moss *(Spaghnum* spp.), and sedges *(Carex* spp.), occur throughout the Forest. These non-forest vegetation types are also described in the *Wetlands* and *Biodiversity* sections of this chapter.

Alpine and sub-alpine vegetation usually occurs above 2,500 feet elevation. The sub-alpine zone is often dominated by mountain hemlock (*Tsuga mertensiana*) where the coastal forest treeline begins to decline into low-lying and krumholtz vegetation between 2,500 and 2,800 feet elevation. Resident plants have adapted to persistent snow cover and wind desiccation by evolving low-growth forms. Mat-forming heaths, such as mountain heather (*Cassiope* spp. and *Phyllodoce* spp.), cover much of the area, with cushion-like flowering plants and non-vascular plants (lichens, mosses, and liverworts) occupying exposed rock outcrops, crevices, and talus slopes.

The detailed description and effects analysis to vegetation on a habitat/landscape scale can be found in the *Biodiversity* section of this chapter.

Vegetation Classification

Integrating vegetation information in analysis, planning, and decisionmaking includes the development of vegetation classifications, the use of the classifications to map vegetation with remotely sensed imagery, and ecological models. Classification of vegetation types is an effective tool for studying, understanding, and communicating habitat information. Vegetation classifications at appropriate scales have been widely used in wildlife management, forest planning, project planning, and silviculture in the National Forests. Vegetation classifications can be used to identify realistic objectives and management opportunities, determine capability and suitability, and evaluate forest health. They can be used to streamline monitoring design and facilitate extrapolation of monitoring interpretations; assess risks for the introduction of invasive species, fire, insects, and disease; and describe current habitats for plant and animal species based on current vegetation composition, structure, and function. Function refers to the interactions and influences between plant and animal species within an area and their environment, including natural processes of change or disturbance (wind, aging, etc.).

On the Tongass National Forest, fine-scale vegetation communities known as plant associations have historically been used for project-level planning and analysis of silvicultural treatments. Work on describing forested plant communities on the Tongass began in the early 1980s. Three guides, one each for the former Ketchikan, Stikine, and the Chatham Areas, were developed to identify and describe forested plant associations (DeMeo et al. 1992, Pawuk and Kissinger 1989, Martin et al. 1995). They provide a key for identifying the plant associations based on dominant and diagnostic species in the tree, shrub, and herb layers of the Forest. Plant association names consist of the dominant tree species that occurs in the overstory canopy, along with dominant or diagnostic species found in the shrub and/or herb strata (layers). Plant association descriptions include species cover and constancy (how often a species occurs in a particular association), productivity estimates, and management considerations to guide the interpretation of effects of actions on an area with a specific plant association.

In the Tongass plant association guides, forested plant associations are grouped into the following series based on the dominant tree species in the overstory canopy:

- Mixed-Conifer Series
- Mountain Hemlock Series
- Shore Pine (Lodgepole Pine) Series
- Sitka Spruce Series

- Western Hemlock Series
- Western Hemlock-Western Red Cedar Series
- Western Hemlock-Yellow Cedar Series

The Federal Geographic Data Committee established the National Vegetation Classification Standards (NVCS), which is a hierarchical existing vegetation classification with nine levels (Federal Geographic Data Committee 1997). The seven upper levels are primarily based on physiognomy. The two lowest levels, alliance and association, are based on floristic attributes. This hierarchy has been incorporated into the recently published Forest Service Existing Vegetation Classification and Mapping Technical Guide (Brohman and Bryant 2005). All of the forested plant associations of Southeast Alaska have been crosswalked to the NVCS. A list of the crosswalked forested plant associations can be found on the Alaska Natural Heritage Program (ANHP) Web site at: http://aknhp.uaa.alaska.edu/ecology/Ecology_Plant_Association_Tracking_List.htm.

Development of a non-forested vegetation classification for the Tongass is currently in progress. The Yakutat Forelands plant community classification (Shephard 1995) included a classification of non-forested vegetation types. In order to produce a consistent product for the rest of the Tongass that is compatible with the NVCS and meets the needs of the Forest Service, the protocols in the Forest Service Existing Vegetation Classification and Mapping Technical Guide are being followed. Once the non-forested classification is complete, a guide containing descriptions of plant associations will be developed.

Vegetation Mapping

The only Forest-wide vegetation map currently available is the Tongass Existing Veg map, a GIS-based data set that was derived from the former TimberType database. In Existing Veg, forested stands are identified by broad forest canopy cover types. Information for forested stands includes dominant overstory species, type for low productivity stands, size class (e.g., seedling, sapling, young growth, or old growth), and volume class for productive stands. Generic non-forested types are also mapped (e.g., ice, shrub, muskeg, beach, alpine, and sand).

A new, interim model for classifying productive forests of the Tongass has been developed that organizes forested stands in the Existing Veg map into seven size-density categories (Caouette and DeGayner 2005). This system, referred to as the Size-Density Model (SD7), is described in the *Biodiversity* section of this chapter, and may be useful for describing forest structural diversity and wildlife habitats.

Mapping vegetation communities at the plant-association level has not occurred on the Forest. Producing plant-association maps requires large amounts of field data and high-resolution imagery combined with modeling; therefore, plant-association maps will most likely need to be developed on a project-specific basis, while still meeting Forest-wide standards for vegetation mapping. New and updated mid-level (alliance and/or dominance type) maps of vegetation types sufficient for Forest- or watershed-scale analysis may be developed in the near future.

Threatened, Endangered, Sensitive, and Rare Plants

There are no federally listed or proposed Threatened or Endangered plants that are known to occur or are likely to occur on the Tongass National Forest. The only federally listed or proposed plant in Alaska is the Aleutian hollyfern (*Polystichum aleuticum)*, which is listed as endangered; however, it is only known to occur on Adak Island and is not expected to occur on the Tongass National Forest.

Sensitive plant species are those plant species identified by the Regional Forester for which population viability is a concern on National Forest System (NFS) lands within the region. A viability concern is identified by either a significant current or predicted downward trend in population numbers or density, or a significant current or predicted downward trend in habitat capability that would reduce a species' existing distribution. The goal of the Forest Service Sensitive Species Program (Forest Service Manual 2670) is to ensure that species numbers and population distribution are adequate so that no federal listing will be required and no extirpation will occur on NFS lands.

ANHP's Rare Species Global Rankings Criteria is the primary source of information used to rank rare plant species in Alaska. The Regional Sensitive Plant Species List identifies certain rare plants on the ANHP list as sensitive and are known or suspected to occur on the Tongass. There are currently 17 plant species listed as sensitive on the Tongass National Forest. Revisions to the Regional Sensitive Plant Species list are periodically recommended based on new information derived from recent publications, field work, and laboratory analysis concerning rare plants.

The sensitive plants known or suspected to occur in the Tongass National Forest are listed in Table 3.7-1. This table includes a general range and habitat description for each species. In addition, it includes a preliminary estimate of the potential number of acres of habitat for each species. These estimates are likely to be overestimates of available habitat, because the habitat requirements of sensitive plant species are often not well known and, even when they are well known, the habitat requirements are generally tied to micro-habitat characteristics. These estimates are based on available Tongass Forest GIS mapping and, as a result, are tied to macro-habitat information that is currently available. Nevertheless, they provide a means or an index of measuring the effects of the alternatives by assessing the percentage of each habitat affected.

Sensitive plant surveys are conducted as part of project planning to identify populations or habitats of sensitive species within planning areas. An understanding of the distributions of sensitive and rare plants on the Tongass is limited because most botanical surveys are focused on project areas. As a result, very few Forest-wide inventories have been conducted.

ANHP maintains a list of plants that are considered rare within Alaska. This list currently contains 86 plants (including those with sensitive or rare designations, or with significant range extensions on the Tongass) documented to occur on the Tongass National Forest. Rare plant species are those that are inherently rare or not naturally well distributed on the Forest; however, rare plants do not have the same protection in the Forest-wide standards and guidelines or the same determination language as sensitive plants. The State of Alaska list of rare plants, with global and state rankings, is used as guidance for determining which rare plants may be addressed in the project-level analysis. The State list with state and global rankings is available online at: http://aknhp.uaa.alaska.edu/botany/Botany_tracking_page.htm. Generally, plants with a state ranking of S1 (critically imperiled in state) or S2 (imperiled in state) are given consideration during project analysis.

Table 3.7-1
Regional Forester Sensitive Plant Species that are Known or Suspected to Occur on the Tongass National Forest[1]

Common Name (*Scientific Name*)	Range and Habitat[2]
Eschscholtz's little nightmare (*Aphragmus eschscholtzianus*)	This plant is confined to southern Alaska and adjacent areas in Canada in a band extending from the Aleutians through the southwest Yukon. The plant is known from about 30 sites throughout its range. It is suspected to occur in mountainous areas on the northern mainland of the Tongass. It grows in moist mossy areas, seeps, heaths, and scree slopes in the subalpine and alpine. Because the plant is so small, it is easily overlooked. This plant has not been documented on the Tongass. The Tongass contains a high estimate[2] of approximately 1,424,000 acres of habitat that is potentially suitable for Eschscholtz's little nightmare.
Norberg arnica (*Arnica lessingii* ssp. *Norbergii*)	This plant has been found in less than 20 sites in a range extending from Prince William Sound through the northern panhandle. The plant grows from sea level to subalpine in meadows, shrublands, dry meadows, and open forest. This plant has been identified in five locations on the Yakutat Ranger District. The Tongass contains a high estimate[2] of approximately 502,000 acres of habitat that is potentially suitable for Norberg arnica.
Moonwort fern, no common name (*Botrychium tunux*)	This fern has a specific habitat found on well-drained open areas on maritime beaches or upper beach meadows. Six populations have been found on the Yakutat Ranger District. The Tongass contains a high estimate[2] of approximately 16,000 acres of habitat that is potentially suitable for *Botrychium tunux.*
Moonwort fern, no common name (*Botrychium yaaxudakeit*)	This plant is found on well-drained open areas on maritime beaches or upper beach meadows. Five populations are known on the Yakutat Ranger District. The Tongass contains a high estimate[2] of approximately 16,000 acres of habitat that is potentially suitable for *Botrychium yaaxudakeit.*
Goose-grass sedge (*Carex lenticularis* var. *dolia*)	The sedge ranges from the Aleutians east to the Alaska-Canada Coast Range, through the Rockies south to Glacier National Park. It grows in wet meadows, along lakeshores and snowbeds, generally at high elevations. There are seven known locations on the Juneau, Ketchikan, and Sitka Ranger Districts. Recent research has recognized *Carex enanderi* as the same species as *Carex lenticularis* var. *dolia*. Consequently, goose-grass sedge is more common than thought, although still rare. It is proposed to remove this plant from the sensitive species list. The Tongass contains a high estimate[2] of approximately 526,000 acres of habitat that is potentially suitable for goose-grass sedge.
Edible thistle (*Cirsium edule*)	This plant ranges from southern Southeast Alaska, through western Washington, to extreme northwestern Oregon. It grows in open meadows, scree slopes, and along glacial streams and lakeshores. There are three documented locations in the Misty Fiords National Monument. This plant is expected to occur elsewhere in the southeast portion of the Tongass National Forest. The Tongass contains a high estimate[2] of approximately 695,000 acres of habitat that is potentially suitable for edible thistle.
Davy mannagrass (*Glyceria leptostachya*)	This plant has a range from central Southeast Alaska, disjunctly south through central California. It grows in shallow freshwater and along stream and lake margins. In Alaska, it has been identified at five sites in Ketchikan, Wrangell, and Sitka areas. The Tongass contains a high estimate[2] of approximately 1,314,000 acres of habitat that is potentially suitable for Davy mannagrass.
Wright filmy fern (*Hymenophyllum wrightii*)	This fern's range is disjunct from Russian Far East, Korea, and Japan to the Petersburg and Sitka areas in the Tongass National Forest, south to about four sites in British Columbia coastal areas and the Queen Charlotte Islands. Only the gametophyte stage has been recorded in Alaska, while the sporophyte stage has been documented on the Queen Charlotte Islands. It grows on shaded cliff faces; bases of trees; decaying wood and rootwads; and in the dense, humid coastal forests near saltwater and low elevation areas. It has been found on Biorka, Baranof, Chichagof, Mitkof, Etolin, and Kupreanof Islands The Tongass contains a high estimate[2] of approximately 8,845,000 acres of habitat that is potentially suitable for Wright filmy fern.
Truncate quillwort (*Isoetes truncata*)	This plant grows immersed in shallow fresh water pools or ponds. It is known from Kodiak and Vancouver Islands, with a disjunct population at Pyramid Lake, Alberta. It is suspected to occur from Prince William Sound through the Tongass National Forest. There are three documented locations on the Sitka Ranger District. The plant on the Tongass is thought to be a hybrid of more common species: *Isoetes occidentalis, I. maritima* and possibly *I. echinospora.* Therefore, it is proposed that this plant be removed from the sensitive species list. The Tongass contains a high estimate[2] of approximately 31,000 acres of habitat potentially suitable for wright filmy fern within the Tongass.

Table 3.7-1 (continued)
Regional Forester Sensitive Plant Species that are Known or Suspected to Occur on the Tongass National Forest[1]

Common Name (*Scientific Name*)	Range and Habitat[2]
Calder lovage (*Ligusticum calderi*)	This plant is known from Vancouver Island north through the southern part of the Tongass National Forest (Dall and Prince of Wales Islands) and disjunct to Kodiak Island. It occurs in alpine and subalpine meadows, boggy slopes, and rocky areas. It has been identified in 10 locations in the Craig Ranger District. The Tongass contains a high estimate[2] of approximately 681,000 acres of habitat that is potentially suitable for Calder lovage.
Pale poppy (*Papaver alboroseum*)	A rather spectacular poppy, this species has been identified in three disjunct areas: Kamchatka and northern Kurile Islands; Cook Inlet, Kenai Peninsula, Portage Glacier; and northern British Columbia and southern Yukon. The plant grows in open areas, recently deglaciated areas, rock outcrops, sand, gravel, and on well-drained soils. In the Tongass National Forest, it is suspected on the mainland in the Skagway and Juneau areas. It has been identified in seven locations on the Sitka Ranger District. The Tongass contains a high estimate[2] of approximately 1,598,000 acres of habitat that is potentially suitable for the pale poppy.
Bog orchid (*Platanthera gracilis*)	This orchid is known from a limited range in the southernmost part of the Tongass and adjacent British Columbia. It has been identified at four sites in wet meadows and is expected in peat bogs. Little is known about this plant. Distributions, population size, population trends, existence of historical populations, and habitat requirements have not yet been determined. This plant has been synonimized with the common *Platanthera stricta* and is proposed to be removed from the sensitive list. The Tongass contains a high estimate[2] of approximately 84,000 acres of habitat that is potentially suitable for the bog orchid.
Loose-flowered bluegrass (*Poa laxiflora*)	This grass ranges from the Hoonah area south to Oregon. The plant grows in upper beach meadows, open areas, open forests, and along riparian areas. It is suspected to occur throughout the Tongass National Forest from the Juneau Ranger District south. There are over 20 populations on the Juneau, Craig, Petersburg, and Ketchikan Districts, and Admiralty Island National Monument. The Tongass contains a high estimate[2] of approximately 7,287,000 acres of habitat that is potentially suitable for loose-flowered bluegrass.
Kamchatka alkali grass (*Puccinellia kamtschatica*)	This grass ranges from the Aleutians through the central Tongass National Forest. It grows on tidal flats, salt marshes, and sea beaches. The status of this species is in question. Some authors recognize it as a distinct species; others do not. Current research on *Puccinellia* may conclude that this species is the same as the much more common *Puccinellia nutkaensis*. The Tongass contains a high estimate[2] of approximately 26,000 acres of habitat that is potentially suitable for Kamchatka alkali grass.
Unalaska mist-maid (*Romanzoffia unalaschcensis*)	This plant ranges from the Aleutian Islands through Prince William Sound, disjunct to the Tongass National Forest. The plant grows in cracks in rock outcrops; along stream banks; beach terraces; open rocky areas; and on grassy, mossy rock cliffs along shores. There are two documented occurrences on Thorne Bay and Sitka Ranger Districts. At a very broad scale, the Tongass contains a high estimate[2] of approximately 3,158,000 acres of habitat that is potentially suitable for Unalaska mist-maid.
Queen Charlotte butterweed (*Senecio moresbiensis*)	This plant has been found in the southern half of the Tongass National Forest, Queen Charlotte Islands, and northern Vancouver Island. It grows in alpine and subalpine meadows, boggy or rocky slopes, open rocky heaths, or grassy areas. It has been found adjacent to a road on Prince of Wales Island. Less than 15 populations have been documented on the Thorne Bay and Craig Ranger Districts. The Tongass contains a high estimate[2] of approximately 681,000 acres of habitat that is potentially suitable for Queen Charlotte butterweed.
Circumpolar starwort (*Stellaria ruscifolia ssp. aleutica*)	This plant ranges from the eastern Aleutians east across southern coastal Alaska to the northern Tongass. This plant is inconspicuous and difficult to identify. It grows in open gravely sites and along creeks in the mountains. It has been identified in one location on the Yakutat Ranger District. The Tongass contains a high estimate[2] of approximately 176,000 acres of habitat that is potentially suitable for circumpolar starwort.

[1] Sensitive Plant list updated June 2002.
[2] Habitat acreage estimates for each species are approximate and tend to overestimate the potential habitat because they are based on macro-habitat information currently available in GIS. Nevertheless, they provide a means of measuring the effects of the alternatives by assessing the percentage of each habitat affected.

Invasive Plant Species

In the past, Alaska's remoteness and relatively low disturbance level has protected it from infestations of non-native plants. Compared to the lower 48 states, Alaska has a low level of invasive plants, but it is growing. As inventories have increased, more non-native species have been documented in Southeast Alaska on NFS lands (Schrader and Hennon 2005). Not all non-natives are invasive. Executive Order 13112 (1999) defines an "invasive species" as a species that is 1) non-native (or alien) to the habitat under consideration, and 2) whose purposeful or accidental introduction causes or is likely to cause economic or environmental harm or harm to human health. Executive Order 13112 directs all federal agencies to address invasive species concerns and refrain from actions likely to increase invasive species problems.

Many existing laws and directives provide management direction for "noxious" plants. Noxious is a political designation used by state or federal governments and, in the past, has primarily been driven by threats to agriculture or rangelands. Laws pertaining to only "listed noxious species" are inadequate in addressing threats to NFS lands in Alaska. The Forest Service recognizes this and refers to species of concern as "invasive." Invasive species terminology, in this document, includes noxious and invasive alien plant species.

There are two programs in Alaska that were created to track occurrences of non-native plants and rank the invasiveness of non-native species. The first program is Alaska Exotic Plants Information Clearinghouse (AKEPIC), a database administered and coordinated by ANHP. AKEPIC is a cooperative project between the USDA Forest Service, State and Private Forestry, the National Park Service, U.S. Geological Survey, University of Alaska, and other federal, state, and local agencies in support of the Alaska Committee for Noxious and Invasive Plants Management and the Strategic Plan for Noxious and Invasive Plants Management in Alaska. The Tongass National Forest maintains an inventory of occurrences of non-native plants in the AKEPIC database to track and monitor occurrences. The database is available online at: http://akweeds.uaa.alaska.edu/.

The second statewide program is the Weed Ranking Project that was created to better assess what species could be most problematic in the Alaska system. The Weed Ranking Project assesses the potential invasiveness of non-natives that have been found in Alaska and non-natives that have been invasive in other locations and for which there is appropriate habitat in Alaska. The invasiveness rankings are available online through ANHP at: http://akweeds.uaa.alaska.edu/akweeds_ranking_page.htm.

During the past several years, surveys along some roads, trails, trailheads, and other sites of recent human activity in Southeast Alaska have been conducted. Recently, systematic surveys of all non-native species have been initiated in areas of heavier use that are more susceptible to non-native plant invasion. The areas of greatest non-native plant diversity and extent of invasion have been found around towns and the most heavily traveled areas. The areas with the lowest number of species were further from population centers or paved roads (Arhangelsky 2005). Schrader and Hennon (2005) cited references that suggest that highest invasive plant occurrences are in areas of human activity, such as roads, recreational areas, industrial, commercial, and industrial development.

Survey results of all non-natives found on the Tongass are documented in the AKEPIC inventory. The data do not provide the extent of infestation, but do include the location of species found. While the database includes some entries for the Tongass starting in 2000, the majority of the entries are from 2002 and later. Table 3.7-2 shows the number of non-native species found on the Tongass during

Table 3.7-2
Number of Non-Native Species Recorded by District

Ranger District	Number of Non-Native Species Recorded[1]
Admiralty National Monument	17
Craig Ranger District	56
Hoonah Ranger District	10
Juneau Ranger District	17
Ketchikan-Misty Fiords Ranger District	26
Petersburg Ranger District	21
Sitka Ranger District	24
Thorne Bay Ranger District	59
Wrangell Ranger District	28
Yakutat Ranger District	14
Total	**88**

[1] Sites may be very close to each other and done on the same day (e.g., the survey of Prince of Wales Is included recording non-native species every 0.25 mile of road)
Source: AKEPIC 2006 and Tongass GIS

surveys. The number of species is notably larger on the Craig and Thorne Bay Ranger Districts due to the systematic survey of roads completed on Prince of Wales Island in 2005.

The 2005 systematic survey of Prince of Wales Island also provided information that many more species exist than had previously been recorded on the island. The 2005 survey of Prince of Wales Island recorded 33 new species of non-native plants on NFS lands (Arhangelsky 2005).

Table 3.7-3 shows a list of all non-native plant species recorded on the Tongass National Forest and invasiveness rankings from the Alaska Weed Ranking Program. The rankings are for the South Coastal zone of Alaska and range from 1 to 100 (100 representing the highest invasiveness rating) for the species that have an invasiveness ranking.

Of the 88 species of non-natives on the Tongass, 46 have an invasiveness ranking. The invasiveness ranking is based on analysis of four parameters for each species, including:

- Ecological impact: impact on processes, community structure and composition, and other trophic levels.
- Biological characteristics: mode of reproduction, methods of dispersal, competitive abilities, and habitat.
- Ecological amplitude and distribution: United States and global distribution, and level of impact in other locations.
- Feasibility of control: seed bank viability, other methods of reproduction, and effort known to be required for control.

Table 3.7-3
Non-Native Plants on the Tongass: Number of Occurrences and Invasiveness Ranking

Common Name	Scientific Name	No. of Locations on the Tongass[1]	Invasiveness Ranking [2]
alfalfa	*Medicago sativa*	2	
alsike clover	*Trifolium hybridum*	417	57
annual bluegrass	*Poa annua*	460	51
annual hawksbeard	*Crepis tectorum*	25	43
bird's foot trefoil	*Lotus corniculatus*	6	
bitter dock	*Rumex obtusifolius*	2	
black bindweed, wild buckwheat	*Polygonum convolvulus*	7	51
black medic, hop clover	*Medicago lupulina*	57	48
bladder campion	*Silene latifolia*	1	45
bluegrass	*Poa pratensis*	654	57
brittlestem hempnettle	*Galeopsis tetrahit*	67	
bull thistle	*Cirsium vulgare*	92	61
burr medic	*Medicago minima*	4	
butter and eggs	*Linaria vulgaris*	21	
Canada bluegrass	*Poa compressa*	83	35
Canada thistle	*Cirsium arvense*	72	76
Canary grass	*Phalaris canariensis*	1	
cat's-ears	*Hypochoeris radicata*	161	
chicory	*Cichorium intybus*	1	
colonial bentgrass	*Agrostis tenuis.*	56	
common chickweed	*Stellaria media.*	22	57
common comfrey	*Symphytum officinale*	6	
common dandelion	*Taraxacum officinale*	1,681	62
common dogmustard	*Erucastrum gallicum*	6	
common groundsel	*Senecio vulgaris*	31	
common hawkweed	*Hieracium lachenalii*	12	
common plantain	*Plantago major* var. *major*	2,264	44
common St. Johnswort	*Hypericum perforatum*	15	52
common tansy	*Tanacetum vulgare*	39	57
common velvetgrass	*Holcus lanatus*	238	
common yarrow	*Achillea millefolium*	120	48
creeping bentgrass, red top	*Agrostis gigantea*	463	
	Agrostis stolonifera	126	
creeping buttercup	*Ranunculus repens*	526	54
crested wheatgrass	*Agropyron cristatum*	1	
curled dock	*Rumex crispus*	24	48
European mountain ash	*Sorbus aucuparia*	1	
fall dandelion	*Leontodon autumnalis*	2	
field bindweed	*Convolvulus arvensis*	2	
field mustard	*Brassica rapa*	66	
fowl bluegrass	*Poa palustris*	830	
foxtail barley	*Hordeum jubatum*	8	63
garden dock	*Rumex longifolius*	4	
garlic mustard	*Alliaria petiolata*	12	70
golden clover	*Trifolium aureum*	1	
hedge false bindweed	*Calystegia sepium* ssp. *sepium*	1	
Himalayan blackberry	*Rubus armeniacus (R. discolor)*	1	
Italian rye grass	*Lolium multiflorum*	5	41
Japanese knotweed	*Polygonum cuspidatum*	254	87
lamb's quarters	*Chenopodium album*	7	
large-leaf lupine	*Lupinus polyphyllus*	77	
larger mouse-eared chickweed	*Cerastium fontanum Baumg*. ssp. *triviale*	1,262	39
maltesecross	*Lychnis chalcedonica*	2	
marsh cudweed	*Gnaphalium palustre*	11	
mayweed, stinking chamomile	*Anthemis cotula*	3	41

Table 3.7-3 (continued)
Non-Native Plants on the Tongass: Number of Occurrences and Invasiveness Ranking

Common Name	Scientific Name	No. of Locations on the Tongass[1]	Invasiveness Ranking [2]
meadow foxtail	*Alopecurus pratensis*	15	
meadow hawkweed	*Hieracium caespitosum*	8	
mouseear hawkweed	*Hieracium pilosella*	1	
Narrow-leaf Hawkweed	*Hieracium umbellatum*	60	35
night-flowering catchfly	*Melandrium noctiflorum*	1	
Norwegian cinquefoil	*Potentilla norvegica*	2	
orange hawkweed	*Hieracium aurantiacum*	325	71
orchard grass	*Dactylis glomerata*	610	
ornamental jewelweed	*Impatiens glandulifera*	2	
ox-eye daisy	*Leucanthemum vulgare*	610	
perennial rye grass	*Lolium perenne*	162	
perennial sowthistle	*Sonchus arvensis*	8	59
pineappleweed	*Matricaria discoidea*	140	34
prickly lettuce	*Lactuca serriola*	8	
purple foxglove, foxglove	*Digitalis purpurea*	73	51
purple-topped turnip	*Brassica rapa* var. *rapa*	6	
quackgrass	*Elymus repens*	5	
Queen Anne's lace	*Daucus carota*	1	
red clover	*Trifolium pratense*	206	
reed canary grass	*Phalaris arundinacea*	3,120	83
ribgrass, buckhorn, English plantain	*Plantago lanceolata*	2	
rough bluegrass	*Poa trivialis*	34	
rough hawkbit	*Leontodon hirtus*	3	
scentless mayweed	*Tripleurospermum inodorum*	1	48
scotch broom	*Cytisis scoparius*	22	69
sheep sorel	*Rumex acetosella* ssp. *acetosella*	86	45
	Rumex acetosella ssp. *angiocarpus*	2	
shepherd's purse	*Capsella bursa-pastoris*	6	40
	Capsella rubella	1	
silverweed	*Potentilla anserina*	3	
slender hairgrass	*Deschampsia elongata*	304	
smooth brome	*Bromus inermis*	9	62
sneezeweed	*Achillea ptarmica*	1	46
spearmint	*Mentha spicata*	1	
spiny sowthistle	*Sonchus asper*	35	
splitlip hempnettle	*Galeopsis bifida.*	5	43
spotted knapweed	*Centaurea biebersteinii*	6	88
spurry	*Spergula arvensis*	1	
stick chickweed	*Cerastium glomeratum*	1	
tall buttercup	*Ranunculus acris*	1	
tall fescue	*Festuca arundinacea*	20	
tansy ragwort, stinky willie	*Senecio jacobea*	9	63
thyme-leaf speedwell	*Veronica serpyllifolia subsp. serpyllifolia*	228	
timothy	*Phleum pratense*	1,373	56
true forget-me-not	*Myosotis scorpioides*	25	
wall lettuce	*Mycelis muralis*	39	32
western pearly everlasting	*Anaphalis margaritacea*	46	
wheat	*Triticum aestivum*	2	
white clover	*Trifolium repens*	2,269	59
white mustard	*Sinapis alba*	1	
white sweet clover	*Melilotus alba*	54	80
willow weed	*Polygonum lapathifolium*	6	
wormseed mustard	*Erysimum cheiranthoides subsp. cheiranthoides*	2	
yellow salsify, goatsbeard	*Tragopogon dubius*	1	48
yellow sweet clover	*Melilotus officinalis*	9	65

[1] AKEPIC 2006 http://akweeds.uaa.alaska.edu/
[2] Alaska Weed Ranking Proogram. http://akweeds.uaa.alaska.edu/akweeds_ranking_page.htm

Environmental Consequences

Direct and Indirect Effects

This section compares effects of the seven alternatives on sensitive and rare plant species and on the introduction or spread of invasive species. There would be no effects to Threatened or Endangered plant species because there are none found on the Tongass.

Threatened, Endangered, Sensitive, and Rare Plants

Direct effects of the proposed alternatives on sensitive or rare plants would include physical damage to sensitive plants by cutting, trampling, or crushing them with vehicles, other machinery, foot traffic, or felled trees. Severe impacts may cause mortality, or inhibit the vigor and reproductive capability of the plants.

Indirect effects involve alteration of habitat, such as changes in sunlight and moisture availability, herbivore or pollinator behavior, soil structure and fertility, vegetation structure, and competition from other native species as well as invasive and other non-native species. Some indirect effects, such as changes in sunlight or moisture, can be beneficial or harmful depending on the effect and the specie's life history. For example, if a plant has habitat requirements of partial sun, then increasing the size of a forest opening may benefit that species; however, that same opening may be harmful to a plant that requires shade. Activities likely to cause indirect effects to sensitive and rare plants include removal or reduction of tree canopy, road construction, changes in hydrology associated with road construction, increased competition by invasive plants, construction of other facilities, increased off-road vehicle use, increased access, and increased use and associated trampling by recreationists.

The alternatives described in Chapter 2 differ primarily by the proposed amount of timber that is likely to be harvested and the miles of road construction and reconstruction. Alternative 5, the No-Action Alternative, would follow the 1997 Forest Plan standards and guidelines. The other six alternatives would mostly follow the proposed standards and guidelines, which provide additional protection for sensitive and rare plants. There are three exceptions that could affect sensitive and rare plants: the area of non-development LUDs, beach buffer requirements, and Class III stream protection. Table 2-16 in Chapter 2 provides a comparison of the components of the alternatives.

Alternatives 1, 2, 3, and 6 would have more acreage in old-growth reserves and other non-development LUDs than Alternative 5 (current Forest Plan) or Alternatives 4 and 7. This increased area in reserves would provide more area in large blocks of intact habitats, which would be beneficial to sensitive and rare plants. Alternative 4 utilizes a reduced old-growth strategy and Alternative 7 would reduce non-development LUDs even further (including the elimination of the Old-Growth Habitat LUD). This could contribute to the risk of direct or indirect effects to sensitive or rare plant species that generally occur in old-growth habitats. Both Alternatives 4 and 7 could result in the loss of local viability for some sensitive species due to the creation of large gaps within old-growth habitat. Species listed as sensitive on the Tongass that include forest or forest openings as a potential habitat are Norberg arnica, Wright filmy fern, and loose-flowered bluegrass.

In Alternative 7, the beach buffer would be reduced to 500 feet for timber harvest, compared to 1,000 feet in the other alternatives. This would increase the risk of direct or indirect effects to species that inhabit areas close to shore or in low elevations. The species listed as sensitive on the Tongass that may inhabit areas close to shore are moonwort fern, Wright filmy fern, loose-flowered bluegrass, Kamchatka alkali grass, Unalaska mist-maid, Queen Charlotte butterweed, and circumpolar starwort.

Finally, Alternative 7 is different from the other alternatives in that it would not require timber harvest buffers along Class III streams. As a result, plant species that occupy riparian areas along steep, rocky and mountainous streams would not receive the same degree of protection under Alternative 7.

Construction of roads would involve removal of vegetation within the path of the road. This could affect rare and sensitive plants that inhabit the specific habitat found within the location of the new road. Roads can be constructed in many types of habitat, depending on the need for access for forestry activities.

Reconstruction of a road for timber harvest maintains the original investment and makes the road suitable and safe for the intended use. Reconstruction for forestry activities involves the rehabilitation of the original roadbed. It can include cleaning ditches, replacing drainage structures, re-installing bridges, and grading and shaping. The roadbed had been created and used (compacted) in the past and, in general, no longer supports sensitive or rare plants; however, newly exposed bedrock in unique geological areas can create new habitat for rare and sensitive plants. Road maintenance can include reconditioning the original road template, grading the road surface, cleaning roadside ditches, and removing vegetation that may encroach upon the road or block vision. Because the maintenance activities remain in the road prism, this would be unlikely to have an effect on sensitive or rare plants.

In general, alternatives with low amounts of timber harvest and road construction would have less risk of direct and indirect effects. Alternatives with more acres proposed for harvest and road construction would have more risk of effects. Other activities related to timber harvest, such as log transfer facility (LTF) construction, would increase with elevated timber harvests. Effects to sensitive and rare plants would, therefore, also be related to the amount of timber harvest allowed.

Alternative 5, the No-Action Alternative, proposes harvesting up to approximately 463,000 acres of old growth and constructing up to 3,874 miles of new roads over the next 100+ years (Table 3.7-4). Alternatives 1 and 2 would maintain the most acres of undisturbed forest and have less risk of adverse effects due to harvest and related activities. Alternatives 1 and 2 propose harvesting approximately 86,000 and 215,000 old-growth acres, respectively, or 19 to 46 percent of the acreage proposed in Alternative 5 (No Action). Alternatives 1 and 2 also propose constructing approximately 20 and 54 percent of the road miles proposed by Alternative 5. Alternatives 3 and 6 are in the middle of the alternatives in terms of acres for harvest and road construction. They include harvesting 335,000 and 445,000 acres, respectively, or 72 and 96 percent of the maximum acres of old growth proposed under Alternative 5. They propose to construct up to 2,799 and 3,744 miles of new road, respectively. Alternatives 4 and 7 propose the highest level of harvest and road construction and would have the highest risk of adverse effects due to harvest and related activities. They would harvest a maximum of 656,000 to 807,000 acres of old growth, respectively, and would build more miles of roads to achieve that harvest than any other alternative. Following Table 3.7-4 is a discussion of the likely effects to sensitive and rare plants, taking into account the Forest management direction for activities proposed by the alternatives.

Table 3.7-4
Maximum Acres of Harvest and Maximum Miles of Road Construction by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Maximum Acres Likely to be Harvested after Full Implementation of the Forest Plan (thousands of acres after 100+ years)							
Productive Old Growth	86.0	214.5	313.4	656.5	462.6	445.1	807.4
Young Growth	58.3	179.4	200.2	235.5	224.0	218.4	262.2
Total Acres	**144.3**	**393.9**	**513.7**	**892.0**	**686.6**	**663.5**	**1,069.6**
Maximum Miles of Road Likely to be Constructed							
New Road Construction	774	2,079	2,799	4,890	3,874	3,744	5,825
Road Reconstruction	925	1,784	1,932	2,182	2,100	2,046	2,371
Total Road Work (includes reconstruction)	**1,948**	**4,344**	**5,252**	**7,660**	**6,541**	**6,342**	**8,836**

Source: Tongass National Forest GIS database

Sensitive Plants

Within all alternatives, a biological evaluation, including a sensitive plant review, is prepared for individual project proposals as part of the site-specific environmental analysis. The sensitive plant review is required to include sufficient detail to determine how a proposed action may affect each sensitive species. The intensity and scope of inventories selected to provide information for effects analysis is required to be commensurate with the potential risk of a proposed project to sensitive plant species. The review is used to evaluate project-level impacts to sensitive plants in order to ensure that proposed project activities do not contribute to population or habitat declines that could lead to federal listing or loss of viability. In addition, appropriate Forest-wide standards and guidelines (TES species) will be applied to sustain those plants and their habitat that are listed as sensitive.

The proposed standards and guidelines for Alternatives 1, 2, 3, 4, 6, and 7 include an additional provision for reviewing the implementation and effectiveness of conservation actions for sensitive plants. This review would provide information to improve conservation efforts and reduce the likelihood of negative effects due to management actions.

The risk of adverse effects to sensitive plants would increase with increasing land disturbance; therefore, over time, Alternatives 4 and 7 would have a higher risk of direct and indirect effects due to harvest and road work, when compared to other alternatives. Alternatives 5 and 6 would have the next highest risk. The acres of harvest and miles of road construction for Alternative 3 is intermediate and its risk to affect sensitive plants would likely fall in the mid-range when compared to the other alternatives. Alternatives 1 and 2 would have the least risk of effects. It should be noted that through project-level evaluation and application of Forest-wide standard and guideline protection measures, it is unlikely the alternatives under consideration would have substantial adverse effects.

A species distribution is limited to areas that can meet the species-specific physical and biological needs. Due to the limited scope of surveys conducted within the Tongass, exact species distributions are unknown; however, by utilizing existing GIS data and available habitat information, areas that contain the necessary biological and physical requirements of each species on a macro-scale can be approximated. Although this analysis can not predict the exact distribution of each species, it can aid in assessing the location and total acreage of potentially suitable habitat for each sensitive species. For the sake of this discussion, potentially suitable habitat is defined as an area where the biological and physical requirements of a sensitive species are met, at least on a macro-scale, based on available GIS data. Although this technique overestimates the actual available habitat, it is likely that it also overestimates the acreage affected and, therefore, it is useful to be able to compare the percent of habitat affected by each alternative. Only 3 of the 17 sensitive species found on the Tongass would experience an impact on more than 0.1 percent of their potentially suitable habitat due to road construction and harvest activities. These include Norberg arnica, Wright filmy fern, and loose-flowered bluegrass. In general, the magnitude of effects for these species declines in order from Alternative 7 to 4, 5, 6, 3, 2, and 1. The effects on each of the sensitive species and their potentially suitable habitat are addressed below and in Table 3.7-5.

Eschscholtz's little nightmare (*Aphragmus eschscholtzianus*):
There is a high estimate of approximately 1,424,000 acres of potentially suitable habitat for Eschscholtz's little nightmare within the Tongass. This species grows within moist mossy areas, seeps, heaths, and scree slopes in subalpine and alpine areas, where harvest would not occur. Very little access to timber through alpine or subalpine areas would be needed. Each of the alternatives considered would impact less than 0.1 percent of potentially suitable habitat (Table 3.7-5). Because of the protection from the Forest-wide standards and guidelines, and the very low chance of impacting this habitat, there is essentially no risk that any alternative would result in loss of this specie's viability, or create significant trends towards federal listing.

Norberg arnica (*Arnica lessingii ssp. Norbergii*):
There is a high estimate of approximately 502,000 acres of potentially suitable habitat for Norberg arnica within the Tongass. This plant grows in various habitats, including open forests where it could be affected by silvicultural practices or associated road construction. The largest effect would result from Alternatives 4 and 7, which could impact approximately 0.3 percent of potentially suitable habitat for Norberg arnica (Table 3.7-5). The magnitude of effect declines in order from Alternative 7 to 4, 5, 6, 3, 2, and 1. Alternative 1 would result in an impact to less than 0.1 percent of potentially suitable habitat. Through project-level evaluation and application of Forest-wide standard and guideline protection measures, and based on the low proportion of habitat potentially affected, there would be a very low risk that effects would result in loss of this specie's viability, or create significant trends towards federal listing.

Moonwort fern, no common name (*Botrychium tunux* and *Botrychium yaaxudakeit*):
There is a high estimate of approximately 16,000 acres of potentially suitable habitat for *Botrychium tunux* and *Botrychium yaaxudakeit* within the Tongass. These plants grow in open areas on maritime beaches or upper beach meadows where harvesting activities would not occur. While access to timber through beaches may be needed if new LTFs are required, it would be infrequent. Each of the Alternatives considered would impact less than 0.1 percent of potentially suitable habitat (Table 3.7-5). Because of the protection from the Forest-wide standards and guidelines, and the very low chance of impacting this habitat, there is essentially no risk that any alternative would result in loss of this specie's viability, or create significant trends towards federal listing.

Goose-grass sedge (*Carex lenticularis* var. *dolia*):
There is a high estimate of approximately 526,000 acres of potentially suitable habitat for goose-grass sedge within the Tongass. This plant grows in moist mossy areas, seeps, heaths, and scree slopes in the subalpine and alpine where harvest would not occur. While access to timber through alpine or subalpine areas may be

needed, it is not likely. Each of the alternatives considered would impact less than 0.1 percent of potentially suitable habitat (Table 3.7-5). Additionally, goose grass sedge is more common than originally thought, although still rare. It has been proposed to be removed from the sensitive species list. With the very low chance of impacting potential habitat and the protection of Forest-wide standards and guidelines, there would be essentially no risk that effects would result in loss of this specie's viability or create significant trends towards federal listing.

Edible thistle (*Cirsium edule*):
There is a high estimate of approximately 695,000 acres of potentially suitable habitat for edible thistle within the Tongass. The likelihood of adverse effects is low because this plant grows in open meadows, scree slopes, and along glacial streams and lakeshores where harvest would not occur; however, access to timber through this type of habitat may be needed. Each of the alternatives considered would impact less than 0.1 percent of potentially suitable habitat (Table 3.7-5). Because of the protection from the Forest-wide standards and guidelines, and the very low chance of impacting this habitat, there is essentially no risk that any alternative would result in loss of this specie's viability, or create significant trends towards federal listing.

Davy mannagrass (*Glyceria leptostachya*):
There is a high estimate of approximately 1,314,000 acres of potentially suitable habitat for davy mannagrass within the Tongass. This plant grows in shallow freshwater and along stream and lake margins where harvest would not occur. While these areas are generally protected by Riparian Standards and Guidelines, it is possible that access to timber through this type of habitat may be needed. Under Alternative 7, road construction would impact approximately 0.1 percent of potentially suitable habitat for davy mannagrass. Road construction and harvest activities under all other alternatives considered would impact less than 0.1 percent of potentially suitable habitat (Table 3.7-5). The magnitude of effect declines in order from Alternative 7 to 4, 5, 6, 3, 2, and 1. With the protection of Forest-wide standards and guidelines along with the Riparian Standards and Guidelines, there is a very low risk that effects would result in loss of this specie's viability, or create significant trends towards federal listing.

Wright filmy fern (*Hymenophyllum wrightii*):
There is a high estimate of approximately 8,845,000 acres of potentially suitable habitat for wright filmy fern within the Tongass. This plant grows in various habitats, including near the bases of trees, on decaying wood and rootwads, and in the dense, humid coastal forests near saltwater and low elevation areas. These areas could be affected by silviculture or associated road construction, indicating that all alternatives considered may affect this sensitive plant. Alternative 7 would impact up to approximately 9 percent of potentially suitable habitat; 0.2 percent of this would be as a result of road construction (Table 3.7-5). The magnitude of effect declines in order from Alternative 7 to 4, 5, 6, 3, 2, and 1. Alternative 1 would impact up to approximately 1 percent of potentially suitable habitat. Through project-level evaluation and application of Forest-wide standard and guideline protection measures, there is a low risk that effects would result in loss of this specie's viability, or create significant trends towards federal listing.

Truncate quillwort (*Isoetes x truncata*):
There is a high estimate of approximately 31,000 acres of potentially suitable habitat for truncate quillwort within the Tongass. This plant grows immersed in shallow fresh water pools or ponds where harvest would not occur. While these areas are protected by riparian standards and guidelines, it is possible that access to timber through this type of habitat may be needed. Each of the alternatives considered would impact less than 0.1 percent of potentially suitable habitat (Table 3.7-5). This

species is more common than previously thought and it has been proposed to be removed from the sensitive species list. With the extremely low chance of impacting this habitat and the protection of Forest-wide standards and guidelines, there is essentially no low risk that effects would result in loss of specie's viability, or create significant trends towards federal listing.

Calder lovage (*Ligusticum calderi*):
There is a high estimate of approximately 681,000 acres of potentially suitable habitat for calder lovage within the Tongass. This plant occurs in alpine and subalpine meadows, boggy slopes, and rocky areas where harvest would not occur. While access to timber through alpine and subalpine areas may be needed, it is not likely. Each of the alternatives considered would impact less than 0.1 percent of potentially suitable habitat (Table 3.7-5). Because of the protection from the Forest-wide standards and guidelines, and the very low chance of impacting this habitat, there is essentially no risk that any alternative would result in loss of this specie's viability, or create significant trends towards federal listing.

Pale poppy (*Papaver alboroseum*):
There is a high estimate of approximately 1,598,000 acres of potentially suitable habitat for pale poppy within the Tongass. This plant occurs in open areas, recently deglaciated areas, rock outcrops, sand, gravel, and on well-drained soils where harvest would not occur. While access to timber through this type of habitat may be needed, it is not likely. Each of the alternatives considered would impact less than 0.1 percent of potentially suitable habitat (Table 3.7-5). Because of the protection from the Forest-wide standards and guidelines, and the very low chance of impacting this habitat, there is essentially no risk that any alternative would result in loss of this specie's viability, or create significant trends towards federal listing.

Bog orchid (*Platanthera gracilis*):
There is a high estimate of approximately 84,000 acres of potentially suitable habitat for bog orchid within the Tongass. This plant grows in wet meadows and peat bogs where harvest would not occur. While standards and guidelines provide protection to wetlands, it is possible that access to timber through this type of habitat may be needed. Each of the alternatives considered would impact less than 0.1 percent of potentially suitable habitat (Table 3.7-5). In addition, this plant has been synonymized with the common *Platanthera stricta* and is proposed to be removed from the sensitive list. With the extremely low chance of impacting this habitat and the protection of Forest-wide standards and guidelines, there is essentially no risk that effects would result in loss of this specie's viability, or create significant trends towards federal listing.

Loose-flowered bluegrass (Poa laxiflora):
There is a high estimate of approximately 7,287,000 acres of potentially suitable habitat for loose-flowered bluegrass within the Tongass. This plant grows in various habitats including along riparian areas and in open forests where it could be affected by silvicutlure or associated road construction. Alternative 7 would impact up to approximately 6 percent of potentially suitable habitat; 0.2 percent of this would be as a result of road construction (Table 3.7-5). The magnitude of effect declines in order from Alternative 7 to 4, 5, 6, 3, 2, and 1. Alternative 1 would impact 0.6 percent of potentially suitable habitat. Through project-level evaluation and application of Forest-wide standard and guideline protection measures, there is a low risk that effects would result in loss of this specie's viability, or create significant trends towards federal listing.

Kamchatka alkali grass (*Puccinellia kamtschatica*):
There is a high estimate of approximately 26,000 acres of potentially suitable habitat for Kamchatka alkali grass within the Tongass. This plant occurs in tidal flats, salt

marshes, and sea beaches where harvest would not occur. While access to timber through beach areas may be needed if new LTFs are required, it would be infrequent. Each of the alternatives considered would impact less than 0.1 percent of potentially suitable habitat (Table 3.7-5). Because of the protection from the Forest-wide standards and guidelines, and the very low chance of impacting this habitat, there is essentially no risk that any alternative would result in loss of this specie's viability, or create significant trends towards federal listing.

Unalaska mist-maid (*Romanzoffia unalaschcensis*):
There is a high estimate of approximately 3,158,000 acres of potentially suitable habitat for Unalaska mist-maid within the Tongass. The plant grows in cracks within rock outcrops, along stream banks, beach terraces, open rocky areas, and on grassy/mossy rock cliffs along shores where harvest would not occur; however, access to timber through these habitats may be needed. Each of the alternatives considered would impact less than 0.1 percent of potentially suitable habitat (Table 3.7-5). Because of the protection from the Forest-wide standards and guidelines, and the very low chance of impacting this habitat, there is essentially no risk that any alternative would result in loss of this specie's viability, or create significant trends towards federal listing.

Queen Charlotte butterweed (*Senecio moresbiensis*):
There is a high estimate of approximately 681,000 acres of potentially suitable habitat for Queen Charlotte butterweed within the Tongass. This plant grows in meadows, boggy or rocky slopes, open rocky heaths, or grassy areas where harvest would not occur. While access to timber through these areas may be needed, it is not likely. Each of the alternatives considered would impact less than 0.1 percent of potentially suitable habitat (Table 3.7-5). With the very low chance of impacting this habitat and the protection of Forest-wide standards and guidelines, there is essentially no risk that effects would result in loss of this specie's viability, or create significant trends towards federal listing.

Circumpolar starwort (*Stellaria ruscifolia* ssp. *aleutica*):
There is a high estimate of approximately 176,000 acres of potentially suitable habitat for circumpolar starwort within the Tongass. This plant grows in open gravely sites and along creeks in the mountains where harvest would not occur; however, access to timber through this type of habitat may be needed. Each of the alternatives considered would impact less than 0.1 percent of potentially suitable habitat (Table 3.7-5). Because of the protection from the Forest-wide standards and guidelines, and the very low chance of impacting this habitat, there is essentially no risk that any alternative would result in loss of this specie's viability, or create significant trends towards federal listing.

Rare Plants

The proposed standards and guidelines for all alternatives, except Alternative 5 (No Action), include additional protection for rare plants. Alternatives 1, 2, 3, 4, 6, and 7 include the proposed standards and guidelines that provide specific direction to avoid, minimize, or mitigate adverse effects to rare plants and populations during project planning. The additional protection provided by the proposed standards and guidelines would reduce the risk of adverse effects on rare plants.

Table 3.7-5.
Maximum Effects on Potential Suitable Habitat for Sensitive Plant Species by Alternative (contributing effect of roads shown in parentheses)

Common Name (*Scientific Name*)	Total Potential Suitable Habitat (acres)	Percent of Total Potential Suitable Habitat Affected by Alternative						
		1	2	3	4	5	6	7
Eschscholtz's little nightmare (*Aphragmus eschscholtzianus*)	1,424,000	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Norberg arnica (*Arnica lessingii* ssp. *Norbergii*)	502,000	< 0.1%	0.1%	0.2%	0.3%	0.2%	0.2%	0.3%
Moonwort fern, no common name (*Botrychium tunux*)	16,000	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Moonwort fern, no common name (*Botrychium yaaxudakeit*)	16,000	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Goose-grass sedge (*Carex lenticularis* var. *dolia*)	526,000	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Edible thistle (*Cirsium edule)*	695,00	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Davy mannagrass (*Glyceria leptostachya*)	1,314,000	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	0.1% *(0.1%)*
Wright filmy fern (*Hymenophyllum wrightii*)	8,845,000	1.0%	2.5% *(0.1%)*	3.7% *(0.1%)*	7.3% *(0.2%)*	5.5% *(0.1%)*	5.4% *(0.1%)*	9.4% *(0.2%)*
Truncate quillwort (*Isoetes x truncata*)	31,000	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Calder lovage (*Ligusticum calderi*)	681,000	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Pale poppy (*Papaver alboroseum*)	1,598,000	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Bog orchid (*Platanthera gracilis*)	84,000	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Loose-flowered bluegrass (*Poa laxiflora*)	7,287,000	0.6%	1.5%	2.3% *(0.1%)*	4.6% *(0.1%)*	3.4% *(0.1%)*	3.4% *(0.1%)*	6.0% *(0.2%)*
Kamchatka alkali grass (*Puccinellia kamtschatica*)	26,000	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Unalaska mist-maid (*Romanzoffia unalaschcensis*)	3,158,000	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Queen Charlotte butterweed (*Senecio moresbiensis*)	681,000	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Circumpolar starwort (*Stellaria ruscifolia* ssp. *aleutica*)	176,000	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%

Source: Tongass National Forest GIS database
Percent of total potential suitable habitat affected is calculated by estimating potential suitable macro-habitat using available GIS descriptors of habitat and then intersecting these habitat areas with areas to be affected by the alternatives.
Values in parentheses *( )* represent the contributing effect of roads to the total percent of habitat affected.

Alternative 5 is covered by the 1997 Forest Plan standards and guidelines, which did not include specific protection for rare plants; however, protection of rare plant populations and their habitats in a proposed project area is generally accomplished through project analysis and planning. Effects of a proposed action on rare plant species and their habitats are generally addressed in plant resource reports.

The effects of the alternatives on rare plants would be more heavily influenced by the area of timber harvest and road construction. Therefore, the likelihood of adverse effects to rare plants would be highest for Alternative 7, followed by Alternatives 4, 5, 6, 3, 2, and 1.

Invasive Plant Species

Invasive plants can adversely affect an area either when invasive plants become established or when an existing species spreads to occupy a larger area. Invasive plants can negatively affect habitat by competing for resources such as water and light, establishing and changing the community composition, eliminating or reducing native plants, or by changing the vegetation structure. The changes in community composition or vegetation structure can reduce native plant populations as well as negatively affect habitat for wildlife. Highly invasive plant species often have aggressive reproductive methods and can successfully compete for resources (Schrader and Hennon 2005).

Ground disturbance associated with management activities on the Forest can provide an opportunity for invasive plant introduction or expansion. This would be a direct effect of timber harvest or road construction because the activities disturb soil and/or remove existing vegetation, providing openings for invasive plants to establish or spread. Movement of equipment can also provide opportunities for seed transport into new areas. Indirect effects can include the establishment or spread of invasive plants through the use of roads after harvest for recreation or during road maintenance. In general, land disturbance effects to invasive plants can be wider than the effects in the specific area of disturbance due to the interconnectedness of land.

The Tongass National Forest Invasive Plant Management Plan (Lerum and Krosse 2005) provides guidance for prevention, early detection, control, management, and rehabilitation or restoration of areas with established invasive plants. It incorporates policy and emphasis direction from federal and regional documents, including the Alaska Region Invasive Plant Strategy (USDA Forest Service 2005a).

The proposed standards and guidelines address invasive plants for all alternatives except Alternative 5 (No Action). The proposed standards and guidelines for invasive plants are new and include direction to review proposed projects to determine the risk of introduction or spread of invasive plants and implement appropriate mitigation measures. They also include direction to control existing invasions and rehabilitate habitats impacted by invasive species. The proposed standards and guidelines for Alternatives 1, 2, 3, 4, 6, and 7 would reduce the likelihood of negative effects that would result from the introduction or spread of invasive plant species.

Alternative 5 (No Action) includes the use of the 1997 Forest Plan that does not include specific standards and guidelines for controlling invasive plants. However, when followed, the guidance in the Tongass National Forest Invasive Plant Management Plan (Lerum and Krosse 2005) would provide some protection from invasive plants.

All of the alternatives include timber harvest and new road construction that could directly and indirectly increase invasive plants. Increased disturbance increases the risk of establishment or spread of invasive plants. The effects would vary between alternatives depending on the level of disturbance due to timber harvest and new roads construction.

The acres of harvest and miles of road included in each alternative are shown in Table 3.7-4. Over time, Alternatives 4 and 7 and, to a lesser extent, Alternatives 5 and 6 would have a higher risk of direct and indirect effects due to harvest and road work. In addition, Alternative 5 does not include the revised standards and guidelines; therefore, there is a greater risk of adverse effects for each acre disturbed. The acres of harvest and miles of road construction for Alternative 3 is intermediate; its risk would likely fall in the mid-range when compared to the other alternatives. Alternatives 1 and 2 propose the least amount of disturbance from timber harvest, and roads would have the lowest risk of adverse effects.

Cumulative Effects

Threatened, Endangered, Sensitive, and Rare Plants

When considering effects to sensitive and rare plants, it is important to look at land both inside and outside NFS lands and the cumulative effects of past, present, and reasonably foreseeable future activities. Each landscape area has different physical, chemical, and biological characteristics, as well as different vegetation patterns. The significance of an addition to cumulative effects from management activities would depend on factors such as the amount and type of disturbance in an analysis area, type of vegetation in the area, habitat availability for each sensitive or rare species, known locations of each species, and amount of disturbance in the potential habitat area for each species. Assessing cumulative effects to sensitive and rare plant species will be done for individual projects as part of the National Environmental Policy Act (NEPA) process for the relevant analysis area; however, past plus expected harvest and road construction for forestry and other uses on all land ownerships can be used to compare the risk that each alternative would add to cumulative effects on sensitive and rare plants.

As discussed above, Table 3.7-5 summarizes the amount of each sensitive species potentially suitable habitat on NFS lands affected for each alternative. These values create a baseline set of conditions as well as a prediction of future conditions during the life of the Forest Plan under all alternatives. These data can be used when future project-specific analyses are conducted as part of the NEPA process.

Timber harvesting on state, municipal, and private land is governed by the Alaska Forest Resources and Practices Act (AS 41.17). Alaska Forest Resources and Practices Regulations (ADNR 2004) do not address threatened, endangered, or rare plants; however, they do limit disturbance in marshes and non-forested muskegs, which would provide some protection for those plant species.

To compare the potential cumulative effects of harvest under the seven alternatives on sensitive or rare plants, harvest on lands of all ownerships in Southeast Alaska was analyzed. There are approximately 21.6 million acres of land in Southeast Alaska. Non-NFS lands comprise about 4.8 million acres or 22 percent of the 21.6 million acres in Southeast Alaska; Glacier Bay National Park consists of about 2.5 million acres. Approximately 30 percent of the lands in Southeast Alaska were originally productive old growth (POG). Approximately 13 percent of the POG on all ownerships had been harvested by 2006. Thus, approximately 87 percent of the original POG on all ownerships was remaining in 2006. The percent of POG remaining on NFS lands is higher than for non-NFS lands that lie within the Tongass National Forest boundary (92 and 70 percent, respectively) due to the concentrated timber harvest areas in the non-NFS lands that are within the Tongass boundaries.

Looking at all ownerships of land in the Forest, the POG forest remaining in 100 years under full implementation of the Forest Plan would be greatest for Alternative 1, followed by Alternatives 2, 3, 6, 5, 4, and 7 (Table 3.7-6). Therefore, the risk of cumulative effects to sensitive or rare plants due to harvest would be lowest for Alternative 1, followed by 2, 3, 5, 6, 4, and 7. Table 3.9-17 in the *Biodiversity* section shows a similar relative risk among the alternatives for cumulative effects by Biogeographic Province.

Table 3.7-6
Cumulative Percent of the Original (1954) POG Remaining on All Ownerships in 2006 and after 100+ Years under Full Implementation of the Forest Plan for Each Alternative with Estimated Future Harvest on State, Private, and Other Lands

Remaining POG on All Ownerships in 2006 as a Percent of all Original POG	Remaining POG after 100+ Years as a Percent of 1954 POG						
	Alternative						
	1	2	3	4	5	6	7
87%	82%	80%	78%	73%	76%	76%	71%

Source: Tongass National Forest GIS database

Existing road density is greater on the non-NFS lands within the Tongass National Forest boundaries than on the NFS lands due to concentrated harvest and more populated areas. It averages 0.19 mile per square mile on NFS lands and 2.19 miles per square mile for the non-NFS lands. The average for lands of all ownerships is 0.31 mile per square mile; however, those are averages over a very large area and there is great variability. The range of road density by VCU shows large variabilityacross the Tongass as seen in Table 3.6-9 in the *Fish* section (percentage of VCUs by road density category for the Tongass and lands of all ownerships). All VCUs have road densities of less than 4 miles per square mile under existing condition.

Table 3.7-7 shows the average future road density for each alternative. It includes existing roads and forestry as well as other roads proposed for construction on NFS lands and reasonably foreseeable on non-NFS lands. Alternatives 7 and 4, and to a lesser extent Alternatives 5 and 6, would have the highest average road density. Therefore, in those alternatives, there is higher risk that management actions would add to cumulative effects to sensitive or rare plants. The average road density for Alternative 3 is intermediate and its risk of cumulative effects would fall in the mid-range when compared to the other alternatives. Alternatives 1 and 2 would have the least risk of cumulative effects. Table 3.6-9 in the *Fish* section shows a similar relative risk among the alternatives of cumulative effects by VCU.

Table 3.7-7
Future Average Road Density by Alternative (miles per square mile)

	Existing	Alternative						
		1	2	3	4	5	6	7
National Forest Service Land	0.19	0.22	0.27	0.30	0.38	0.34	0.33	0.41
All Ownerships	0.31	0.42	0.47	0.49	0.57	0.53	0.52	0.60

Source: Tongass National Forest GIS database

There are other activities that have occurred in the past and are reasonably foreseeable to occur in the future that have the potential to add to cumulative effects to rare and sensitive plants in regional and local areas. They include mineral extraction, transmission line projects, hydroelectric projects, transportation developments, expansion of cities, and recreational site development. Existing mining is at Greens Creek on Admiralty Island, Berner's Bay north of Juneau, and other locations. Given the level of world pricing, an increase in exploration is expected. There are also several regional transportation projects and regional energy and transmission projects planned for construction. Each of these activities can include clearing vegetation and disturbing habitat for construction and maintenance; therefore, they have the potential to affect sensitive and rare plants and their habitat and would be considered in project analysis.

Changes in Alaska's climate (discussed in the *Climate and Air* section of this chapter) could affect the hydrology and other habitat conditions where the sensitive and rare plants occur. While the models do not fully agree on the climate change predictions for Southeast Alaska, they generally agree on warmer weather with more winter rainfall and less snowfall and a decrease in summer rain in some areas. That would likely result in lower soil moisture due to increased evaporation during warmer, drier summer months. Also, a precipitation shift from snow to rain could lead to more water running off the landscape rather than being stored to feed streams and wetlands in the late spring and summer; thus, increasing evaporation and reducing water storage. These factors could lead to drier streams, meadows, and wetlands.

Changes in temperature and hydrologic conditions would likely favor some plant species and stress others. There has been little research into the effects of changes in environmental conditions for each of the sensitive and rare species; consequently, there is uncertainty as to the effect of changes in the climate on these plant species known or suspected to occur on the Tongass.

Invasive Plant Species

When considering effects to invasive plants, it is important to look at both NFS and non-NFS lands and the cumulative effects of past, present, and reasonably foreseeable future activities. Invasive plants on any land ownership in Southeast Alaska can affect invasive establishment or spread on NFS lands and vice versa. Also, activities on land of any ownership can establish or spread plants that affect other lands. As mentioned in the direct and indirect effects, activities can have wider affects on invasive plants than the specific area of land disturbance due to the interconnectedness of land.

As discussed for rare plants, each landscape area has different characteristics and vegetation patterns. The significance of an addition to cumulative effects of forestry activities would depend on factors such as the amount and type of disturbance in the analysis area, the existence of invasive plants at the time of project implementation, type of vegetation in the area, amount of harvest and road building for a specific project, and the project plans to contain invasive plants. Assessing cumulative effects needs to be done for individual projects in the context of the effects in the relevant analysis area.

Past, present, and future harvest and road construction for harvest and other purposes on lands of all ownerships can be used to compare the risk of Alternative 6 (Proposed Alternative), to cumulative effects due to invasive plant introduction or spread. Table 3.7-7 shows the average existing road density and future road density for each alternative for all land ownerships and for NFS lands. Alternatives 7 and 4 and, to a lesser extent, Alternatives 5 and 6 would have the highest average road density and, therefore, a higher risk of adding to cumulative effects of invasive plants. The average road density for Alternative 3 is intermediate; its risk of cumulative effects would fall in the mid-range when compared to the other alternatives. Alternatives 1 and 2 would have the least risk of cumulative effects due to an individual project.

As discussed under cumulative effects for sensitive and rare plants, there are fewer restrictions on timber activities on non-NFS lands than on NFS lands. Timber activities on non-NFS lands that can contribute to the introduction or spread of invasive plants are not specifically regulated by the State of Alaska. To compare the risk of effects of harvest in the seven alternatives on invasive plants, POG remaining on land of all ownerships was analyzed. Looking at all ownerships of land in the Forest, the POG (unharvested) forest remaining in 100 years under full implementation of the Forest Plan would be greatest for Alternative 1, followed by Alternatives 2, 3, 6, 5, 4, and 7 (Table 3.7-6). Therefore, the risk of cumulative effects to be substantial for invasive plants due to harvest would be highest for Alternative 7, followed by 4, 5, 6, 3, 2, and 1.

There are other activities that have occurred and are reasonably foreseeable to occur in the future that have the potential to add to cumulative effects of invasive plants. They include mineral extraction, transmission line projects, hydroelectric projects, transportation developments, expansion of cities, and recreational site development. Each of these activities can include clearing vegetation, construction, transportation for construction and ongoing activities, and maintenance. Therefore, they have the potential to introduce or spread invasive plants in an area and would need to be considered in the project analysis.

Changes in Southeast Alaska's climate (discussed in the *Climate and Air* section of this chapter) could also create the conditions that encourage the spread of invasive plants by altering opportunities for invasive plants to colonize new areas, where could be compounded by climate change. Changing climate may also result in range extensions for some species that are native at more southerly latitudes, and they may become established or become more widespread on the Tongass, as a result. Changes in growing conditions would likely favor some plant species and stress others. There is uncertainty in the effect of changes in the climate to the invasive plants on the Tongass.

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Forest Health

Affected Environment

Current Situation

Insects, diseases, related decay processes and windthrow are an integral and natural part of forest ecosystems. Many of these appear to play key roles in gap-level disturbance (see discussion of old-growth forests in the *Biodiversity* section of this chapter) and in providing wildlife habitat. The majority of the forests on the Tongass are old-growth forests. Losses to the timber resource caused by heart rot in live trees are considerable in old-growth forests. Approximately one-third of the volume of the old-growth hemlock-spruce forests in Southeast Alaska is decayed by heart rot fungi (USDA Forest Service and ADNR 2007).

In addition to heart rot, some of the more common destructive insects, diseases, and conditions within Southeast Alaska are listed below.

Black-Headed Budworm, *Acleris gloverana* (Walsingham), is one of the more destructive forest insects in coastal Southeast Alaska. In 1993, a peak year for budworm, approximately 258,000 acres of spruce-hemlock forests were affected. This was the largest outbreak in decades. In the 1950s, almost one-third of the net timber volume was lost on many hemlock sites due to budworm defoliation (USDA Forest Service and ADNR 2000). Black-headed budworm populations are currently at endemic levels, with less than 1,000 acres of mapped defoliation in the last 3 years (USDA Forest Service and ADNR 2007). Larval feeding strips hemlock foliage and can cause growth reduction, top-kill, and, at times, tree mortality (USDA Forest Service and ADNR 2000). Juday et al. (1998) rated many potential impacts on the coastal forests of Southeast Alaska due to climate change. They concluded that there was a high risk of increased damage from black-headed budworm outbreaks.

Hemlock Sawfly, *Neodiprion tsugae* (Middleton), is a serious defoliator of western hemlock throughout Southeast Alaska. Outbreaks tend to be of longer duration in southern Southeast Alaska where widespread damage is usually confined to the area south of Frederick Sound, especially along Clarence Strait. Larvae feed on mature (older) needles rather than current year (new) foliage. Most sawfly outbreaks do not cause tree mortality, but the tops are killed in some trees and tree growth may be reduced. Heavy defoliation by hemlock sawflies is known to reduce radial growth and cause top kill. No hemlock sawfly defoliation was mapped in 2006 (USDA Forest Service and ADNR 2007).

Spruce Beetle, *Dendroctonus rufipennis* (Kirby), is the most destructive forest insect Alaska-wide, although outbreaks in Southeast Alaska are typically smaller and of shorter duration than those in south/central and interior Alaska. Most outbreaks originate in blowdown or in cull logs left in harvest units and spread to adjacent standing timber. Mortality in unmanaged Sitka spruce stands varies and can be as high as 75 percent. Weather conditions appear to play a role in the expansion or contraction of beetle populations. Spruce beetle activity has been noted across the Tongass National Forest and adjacent lands from Yakutat Forelands to Dall Island (USDA Forest Service and ADNR 2000). Spruce beetle activity in 2006 centered on a 4,000-acre area between Haines and Skagway (USDA Forest Service and ADNR 2007).

Spruce Needle Aphid, *Elatobium abietinum* (Walker), is an introduced species that feeds on the needles of Sitka spruce, often causing reduced growth and increasing susceptibility to other mortality agents such as spruce beetle. As with other insect pests, populations have cycles, generally increasing following mild winters. More than 25,000 acres of spruce forest were defoliated in the winter of 1991 to 1992 (USDA Forest Service and ADNR 2000). The current outbreak began in 1998, with the worst defoliation occurring in 2003 when more than 30,000 acres were affected. Defoliation by spruce aphids affected approximately 9,120 acres in 2006, mostly in small pockets within the beach fringe from Lynn Canal in the north to Dall Island in the south (USDA Forest Service and ADNR 2007).

Hemlock Dwarf Mistletoe, *Arceuthobium tsugense* (Rosendhal, G. N. Jones), is a parasitic flowering plant that infects western hemlock throughout Southeast Alaska as far north as Haines. Infestation levels vary—dwarf mistletoe is absent in some stands, while almost every hemlock is infected in other stands. The upper elevational limit for Hemlock dwarf mistletoe in approximately 500 feet (Shaw and Hennon 1991). Volume growth in western hemlock trees heavily infected with dwarf mistletoe can be reduced by 39 percent or more (Thomson et al. 1985). In addition to reduced stem growth, infestations cause increased growth and retention of lower branches and distortation and weakening of wood strength at and near swellings. The spread of dwarf-mistletoe in young hemlock stands can result from leaving standing infected hemlock in harvest units (Laurent 1974). Dwarf mistletoe responds to light with increased seed production. Rates of spread to adjacent and lower canopy trees may increase in partial cuts where infected hemlocks remain. Trummer et al. (1998) developed a model for dwarf mistletoe infections in uneven-aged forests of Southeast Alaska that suggests infection rates are significantly correlated with levels of dwarf mistletoe infection in the residual trees. Deal (2001) reports partial cutting resulted in maintaining mistletoe levels at generally undamaging levels, with a trend towards less mistletoe in stands with higher harvest levels. A recent study of partial cut stands in British Columbia found that most young trees infected with mistletoe were advanced regeneration established before logging (Muir 2006).

Alaska Yellow-Cedar. Decline and mortality of yellow-cedar continues to be one of the most widespread and important forest problems in Southeast Alaska. Aerial surveys have mapped approximately 500,000 acres of decline in a wide band from western Chichagof and Baranof Islands to the Ketchikan area (USDA Forest Service and ADNR 2007). This decline is associated with wet, poorly drained sites, and recent research has demonstrated that no organism is the primary cause of the decline (Hennon and Shaw 1997). Hennon and Shaw suggest that reduced snow pack in low-elevation areas associated with a warming trend that started in the 1800s has exposed fine surface roots to freezing, which in turn kills trees. As the climate continues to warm, cedar decline is likely to continue to spread, especially in the south and east. Conversely, yellow-cedar appears to be spreading northward as climate warms, into areas that retain snow longer into the spring.

Hemlock Fluting. Hemlocks with fluting have deeply incised grooves and ridges extending vertically along their trunks, a condition that reduces the value of hemlock logs because they yield less sawlog volume and some of the milled wood contains bark. Fluting is a common problem in Southeast Alaska, especially on mid- to high-quality sites at low elevations, on gradual slopes, and with western exposure (Julin et al. 1993). It is rarely found away from the coast. The cause of fluting is not completely understood, but it may be associated with increased wind firmness, especially on shallow soils, due to growth increases triggered by silvicultural treatments or natural disturbance (USDA Forest Service and ADNR 2007). Julin et al (1993) found that the larger buttresses were generally aligned with the direction of the tree lean. They also concluded that western hemlock trees in Southeast Alaska may be genetically predisposed to form fluted trunks. Silvicultural treatments that favor other species and reduce branch size and retention period would greatly reduce fluting (Julin et al. 1993). However, because fluting primarily occurs in the beach buffer, the effect on timber resources is limited.

Decays. Stem decays cause substantial loss in all tree species in unmanaged stands. Tree death and stem breakage resulting from decay contribute to the structural diversity in stands and may be a major factor in small-scale disturbance in Southeast Alaska (Hennon and McClellan 2003). Many decay fungi enter through tree wounds. The accidental wounding of trees during partial cuts and commercial thinnings can increase the impact from decay organisms in managed stands (USDA Forest Service 1997a, Appendix G). However, Christensen et al. (2002) found very low levels of disease-caused defects in both thinned and unthinned 90-year-old hemlock-Sitka spruce stands on the Tongass compared to old-growth forests. Juday et al. (1998) rated many potential impacts on the coastal forests of Southeast Alaska due to climate change. They concluded that there is a risk that new fungal tree diseases will appear in Southeast Alaska as the climate warms.

Animal Damage. Significant animal damage to trees is apparent at various locations across the Tongass National Forest. Porcupine feeding on hemlock and spruce is common on Mitkof Island and many mainland areas. Young trees in managed and unmanaged stands are often top-killed or killed outright as porcupine feeding girdles the main bole. Bark beetles have been found infesting damaged trees. This damage becomes significant when groups of trees are killed or deformed. As trees grow larger (age 40 to 50 years), porcupine damage shifts from top kill to basal wounds, which serve as entry points for decay fungi. Brown bears cause basal wounds on Alaska yellow-cedar each spring on Baranof and Chichagof Islands. Bears rip off the bark in the spring to lick the sweet cambium. The majority of yellow-cedar in some stands have basal wounds from bear feeding (ADNR 2000).

Fire. Fire has played a minor role in the forests of Southeast Alaska because of the abundant year-round precipitation. The average size of fires on the Forest between 1958 and 1988 was less than 7 acres (USDA Forest Service 2003b). More recently, approximately 400 to 500 acres have burned annually on the Tongass. The average fire has been approximately 10 acres (pers. com. Dexter Duehn, Fire Management Officer, Tongass National Forest). Juday et al. (1998) rated many potential impacts on the coastal forests of Southeast Alaska due to climate change. They concluded that there would be an increased risk of forest fires, though they anticipated the effects on resources would be low.

Windthrow. Windthrow is the dominant disturbance agent in Southeast Alaska. Two forms occur: small-scale events (gap disturbance) and large-scale events (catastrophic disturbance). Most of the Forest is subject to small-scale windthrow events. Individual trees or small groups of trees blow over during storm events, opening gaps in the canopy that allow young trees to grow to fill the openings. This results in complex, mixed-aged stands. Disease and decay agents also play a role in this process. Nowacki and Kramer (1998) state that diseased trees are more at risk to windthrow and stem-snap, while Hennon and McClellan (2003) report that many of the uprooted or broken-stemmed trees had died before falling. Small-scale events occur on a regular basis and result in openings from 6 to 13 percent on the canopy (Nowacki and Kramer 1998). Areas not protected by topographic barriers from the severe effects of infrequent, major storms are subject to large-scale windthrow events that cause catastrophic damage. Entire stands have been blown down in the past, resulting in the regeneration of more even-aged stands with more uniform canopies (Nowacki and Kramer 1998). Both forms of windthrow are a part of the natural forest generation, growth, and development. Juday et al. (1998) rated many potential impacts on the coastal forests of Southeast Alaska due to climate change. They concluded that there was a high risk of increased large-scale blowdown across Southeast Alaska as well as increased windthrow around harvest units.

Monitoring and Pest Management

Forest pest activity on the Tongass National Forest is typically detected during on-the-ground activities, or during annual aerial surveys conducted by the region's Forest Pest Management group. The timing of surveys coincides with foliage and pest development. Pest activity noted during surveys is documented and reported to the appropriate land manager. In cooperation with land managers, Forest Pest Management people conduct on-site investigations to verify the pest, evaluate the pest and its host(s), and formulate future management alternatives. Often, pest and host monitoring is required to fully understand potential impacts prior to development of management alternatives.

Populations of historically significant defoliating insects are monitored through a sampling system that occurs in conjunction with the annual aerial survey. Defoliating larvae are collected, identified, and counted at designated sites. Gypsy moth pheromone traps have been placed throughout Southeast Alaska to provide an early warning that these insects are present. Data from larvae counts and pheromone traps, in conjunction with the collection of host and weather information, enhances forest pest managers' ability to predict defoliator damage.

The impact of hemlock dwarf-mistletoe and methods of reducing damage from the disease in managed stands have been established by several research studies. In addition, Forest Pest Management has surveyed numerous even-aged stands from 10 to 100 years old to determine the incidence and impact of hemlock dwarf-mistletoe in managed stands.

Research studies have yielded information on the pathology and epidemiology of decline of yellow-cedar (cited above). In addition, information on the distribution of decline and acreage affected has been determined by mapping during aerial surveys. Porcupine damage in managed stands is currently being assessed. As more young-growth stands reach commercial thinning age, forest pest research is beginning to focus on pest activity within these stands.

The Forest develops site-specific prescriptions, based on monitoring information, scientific information, and pest management projections, to prevent or limit insect and disease damage. The objective is to limit infestations of natural insects, disease-causing organisms, and parasites to normal background levels, and to prevent or reduce infestations of non-native organisms to the extent feasible. Similarly, the Forest objective is to limit windthrow to levels that would occur naturally through silvicultural prescriptions prepared for each timber sale.

Environmental Consequences

Direct and Indirect Effects

In general, alternatives that favor low amounts of timber harvest will tend to perpetuate current disease levels in old-growth forests. Ecological processes and wildlife habitat for old-growth associated species would be maximized, but so would the continued loss of timber, primarily due to high levels of heart rot. Higher amounts of timber harvest would generally yield young stands with lower levels of insect and disease activity. However, two-aged and uneven-aged management, primarily used in the Scenic Viewshed LUD, could maintain or even increase levels of hemlock dwarf mistletoe. Two-aged and uneven-aged management may also result in higher levels of stem and root disease caused by injuring residual trees during harvest operations; however, the degree of increase, if any, is uncertain. Two-aged treatments that clump leave trees are less likely to cause damage to residual trees. Similarly, thinning young, even-aged stands may also lead to stem and root disease due to wounding of leave trees during thinning, although a retrospective study did not find that thinning had increased defect levels in thinned stands on the Tongass compared to unmanaged stands (Deal et al. 2002), and Christensen et al. (2002) did not find higher levels of decay in two 90-year old stands that had been commercially thinned 25 years earlier compared to unthinned stands.

Alternative 7 proposes approximately three times the suitable acres as Alternative 1, and Alternatives 4, 5, and 6 propose approximately twice the number of suitable acres as Alternative 1 and substantially more than Alternatives 2 and 3. Most suitable acres would be harvested at some time during the next 100 years (refer to the *Timber* section for a discussion of likely harvest under each alternative). Therefore, over time, Alternatives 7 and 4 and, to a lesser extent, Alternatives 5 and 6, are likely to result in more acres with a lower risk of insect activity and somewhat less forest with high levels of heart rot and other disease organisms than the other alternatives. Conversely, Alternatives 1 and 2 would retain more acres of old-growth forest, which would likely result in somewhat higher levels of insect and disease across the Tongass. The acres of suitable land proposed for Alternative 3 is intermediate between Alternatives 2 and 5, and its effects on insect and disease would likely fall in the mid-range, compared to the other alternatives.

Alternatives 4, 5, 6, and 7 could result in approximately four to ten times as many acres of two-aged and uneven-aged harvest over time as Alternatives 1 and two to four times as many acres as Alternative 2 in the first decade (Table 3.8-1). There is some concern that two-aged and uneven-aged harvest could lead to higher levels of windthrow, dwarf mistletoe, and stem decay compared to even-aged harvest methods. Dean et al. (2002) report that the number of uprooted trees was somewhat higher in partially harvested stands, but overall tree mortality rates were similar. Bole wounds were common on trees in partially harvested stands, but “natural tree injuries from falling trees and animal feeding were far more abundant at several sites” (USDA Forest Service and ADNR 2002). Alternatives with more two-aged and uneven-aged management may favor shade-tolerant species (western hemlock, mountain hemlock, and yellow-cedar), while even-aged may result in stands with a higher proportion of Sitka spruce. However, retrospective studies indicate that Sitka spruce can be maintained in mixed hemlock-Sitka spruce stands over a wide range of cutting intensities if enough Sitka spruce trees are present in the stand after harvest (Dean 2002).

Table 3.8-1
Approximate Projected Annual Harvest During First Decade (acres)

	Alternative						
	1	2	3	4	5	6	7
Even-aged	1,180	3,674	5,181	7,308	6,872	6,769	10,030
Two-aged and Uneven-aged	602	1,586	2,193	3,957	3,028	2,859	5,902

Source: SPECTRUM Model (Forest-wide Activity and Output Results)

In general, endemic levels of insect and disease activity in mature and overmature forests would be allowed to run their course under all alternatives. Harvesting flexibility would be maintained to take advantage of timber salvage opportunities, particularly for dead and dying yellow-cedar stands. Insect and disease suppression may be justified in high-quality, mature to overmature stands that cannot be salvaged immediately, or that lie near recreation areas and communities where scenic values are high.

Animal damage, such as that from porcupines, is expected to continue and would likely be increasingly evident in precommercially thinned stands where porcupines are present. Winter feeding by porcupines is known to damage and sometimes kill young trees. The Forest has been alternating precommercial thinning prescriptions to reduce porcupine damage by favoring cedar and deferring thinning in some areas. Bear also damage young trees by removing bark to reach the sweet cambium tissue below the bark. Alternatives that result in creating more young stands (Alternatives 4, 5, 6, and 7) would lead to more acres of forest that would be vulnerable to animal damage.

Damage from wind would continue to occur; some increase is likely to occur along the edges of harvest units and along stream buffers and other legacy trees. Riparian buffers would be protected under Alternatives 1 to 6 by leaving sufficient additional trees along the outer edge of the stream buffer to provide a reasonable assurance of a windfirm (RAW) buffer. Riparian buffers on Class I and II streams would be protected by RAW buffers under Alternative 7. Alternatives with more harvest and road building (Alternatives 4, 5, 6, and especially 7) would tend to increase the risk of harvest- and road-related windthrow compared to those with less harvest and road building (Alternatives 1 and 2). If the current climate trend continues and more gale-force wind storms occur, blowdown may increase for all alternatives in proportion to the amount of harvest (refer to the *Timber* section of this chapter).

There may be a short-term increase in fire risk during harvest operations if activities are conducted during dry periods. Alternatives with higher levels of timber harvest (Alternatives 4, 5, 6, and 7) may have a small increase in fire risk compared to alternatives with less harvest. If climate change results in warmer, dryer summer conditions, fire risk may increase for all alternatives compared to the last several decades. Warmer winters are likely to increase insect damage because more insects will survive the winter. This, in turn, could lead to larger and more frequent fires (refer to the *Climate and Air* section of this chapter).

Cumulative Effects

The greatest potential forest insect and disease problems are likely to be in mature and overmature stands where disease levels are high. Tree vigor tends to decrease with maturity, causing an increase in susceptibility to insects and diseases. Heart rot levels are directly proportional to both tree and stand ages. The spruce beetle has the potential to significantly alter the desired condition of stands in certain locations near the mainland where the insect has periodically become active. The spruce aphid was introduced approximately 80 years ago and appears to be causing more damage to spruce as the climate warms (Shrader and Hennon 2005). The recent assessment of invasive pathogens in Alaska and its national forests states that Alaskan forests are particularly vulnerable to invasive pathogens because of the relatively small number of native tree species and the narrow genetic base (Shrader and Hennon 2005), although damage in 2006 was down 60 percent from the peak in 2003 (USDA Forest Service and ADNR 2007). The Shrader and Hennon report concluded that the European scolytid bark beetle poses the greatest threat to the spruce forests throughout Alaska if introduced.

Stem and root decay, and the incidence of hemlock dwarf-mistletoe, have historically increased with intensified land management activities, particularly under harvesting systems other than clearcutting (Trummer et al. 1998). If the current warming trend continues, cedar decline and damage from insects are likely to increase, both from species currently present in Southeast Alaska and from entering the area from other parts of North America or elsewhere. Hotter, dryer summers could also lead to increased fire frequency, size, and damage, which could have fundamental changes in age class and species composition. This, in turn, could result in changes in wildlife habitat. Invasive plants may also adversely affect forest health. Refer to the *Plant* section of this chapter for a discussion of invasive plant species.

There have been approximately 767,000 acres of harvest in Southeast Alaska, approximately 41 percent of this has been on non-National Forest System (NFS) lands. There are over 330,000 acres of old-growth forest on state and Native corporation lands. It is likely that most of this would be harvested over the next few decades and replaced with young stands that would be managed on relatively short rotations. Shorter rotations and even-aged silvicultural prescriptions implemented on non-NFS lands are likely to contribute to decreasing mistletoe, insect, and disease levels in the forests of Southeast Alaska, especially the loss due to heart rot. Alternatives with more even-aged management, especially Alternatives 4 and 7, would add to these changes. Conversely, increased use of commercial thinning in the outer decades may damage leave trees, increasing decay rates. Also, the younger stands established after harvest on all lands are likely to add to the loss of growth and tree mortality caused by animal damage in the region. Harvest-related windthrow may increase on NFS lands and adjacent areas that are harvested using even-aged silvicultural systems whether on NFS or non-NFS lands.

Maintaining biotic and structural diversity provides an opportunity for limiting some insect and disease problems. Some insects and diseases are host-specific, depend upon plants that are under stress, or flourish under homogeneous conditions. In other cases, and particularly for heart rot, favoring younger-aged stands through even-aged management may be the most effective way of limiting insect and disease problems. Maintaining healthy young-growth stands through stand density control (thinning) may reduce insect damage (Neilson 2007).

The careful use of alternatives to even-aged harvest methods can be a tool for maintaining natural but not excessive levels of diseases, such as heart rot and dwarf mistletoe, which have important ecological consequences. Integrated Pest Management provides the opportunity to evaluate these and more traditional clearcut practices. Through prescription processes, stands with unacceptable insect and disease-related losses, as well as those of high risk for future losses, would be identified for treatment. Detection methods such as aerial surveys, currently in use, would continue to be used for the early identification of epidemics.

The current warming trend increases the risk of increased insect and disease outbreaks, catastrophic blowdown events, and fires. Juday et al. (1998) rated many potential impacts on the coastal forests of Southeast Alaska due to climate change. They concluded that there was a high risk of increased large-scale blowdown across Southeast Alaska and increased windthrow around harvest units; although, they also state that as of the date of their report, the increased frequency of storms in the last few decades has not corresponded to an increase in large-scale blowdown in Southeast Alaska. Also, the 2006 Forest Health report noted very little blowdown in aerial and ground surveys (USDA Forest Service and ADNR 2007); however, this does not rule out the risk of increased windthrow in the future as additional warming occurs.

Warmer, dryer weather may result in increased levels of insect and disease levels. For example, Juday et al. (1998) concluded that there was a high risk of increased damage from black-headed budworm outbreaks, and there is a risk that new fungal tree diseases will appear in Southeast Alaska as the climate warms.

As discussed under the *Climate and Air* section, some climate models for Southeast Alaska predict rising temperatures, a 10 percent decrease in summer precipitation in portions of the region, and decreased soil moisture due to increased evaporation during warmer, dryer summer weather. These factors may lead to an increase in fire frequency and severity by 2060, ranging from 10 to 30 percent, depending on the model (Dale 2003). Currently, fire is not a factor in the ecology of Southeast Alaska, and an increase of 30 percent in acres burned would still result in very little fire damage. Given the high rainfall levels in Southeast Alaska (Ketchikan had only 2 days without rain in July 2007, receiving a total of 10 inches of rain that month), a 10 percent decrease in summer rainfall would still result in wet conditions in most years. However, Southeast Alaska does occasionally experience dryer conditions. For example, in July 1971 there were 23 days without rain. If warmer winter weather results in higher insect populations and increased tree defoliation, there is a risk that increased dead material and warmer, dryer weather may spawn more fires than are normal for the area. Berman et al. (1998) state that it is difficult to predict the magnitude of area likely to be burned in a region with no historic fire record, but they believe that most fires would be small and of low intensity. Berman et al. (1998) suggest a scenario in which 5,000 acres might burn over a period of decades. Juday et al. (1998) also suggest that the effects of fires on resources are likely to be low.

Biodiversity

Affected Environment

The conservation of biological diversity, or biodiversity, is of national and global concern. Biodiversity may be defined as “The variety of and variability within and among living organisms and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems.” (United Nations Environment Programme 1991). Biological diversity encompasses the variety of genetic stocks, plant and animal species and subspecies, ecosystems, and the ecological processes through which individual organisms interact with one another and their environments. Under the National Forest Management Act (NFMA), the Forest must provide for diversity of plant and animal communities based on the suitability and capability of specific land areas.

The conservation of biological diversity commonly requires a dual strategy addressing both individual species, as well as entire ecosystems (Marcot et al. 1994). Many discussions of biodiversity revolve around the maintenance of species; however, it must be emphasized that conserving biodiversity is about maintaining genetic, species, community or ecosystem, and landscape levels of biological organization. The traditional species-by-species approach is important for featured or management indicator species, sensitive or rare species, and for the recovery of federally designated threatened or endangered species. A more comprehensive strategy focused on higher levels of biological organization, and ecosystems may be necessary to conserve rare or declining habitats, as well as the entire complement of associated biota and ecological processes (Noss 1991, Scott et al. 1991, Franklin 1993). For a conservation strategy targeting biodiversity to be truly effective, it should have the following characteristics or expected outcomes:

- It should include the conservation of all levels or scales of biodiversity in the planning area (Schwartz 1999, Poiani et al. 2000),
- It should be comprehensive in its inclusion of all elements (Lambeck and Hobbs 2002, Groves 2003),
- It should address the concept of adequacy (Lambeck and Hobbs 2000, Tear et al. 2005),
- It should provide a framework for monitoring (Haufler et al. 2002, Tear et al. 2005), and
- It should anticipate change (Tear et al. 2005).

Maintaining and/or enhancing habitats to sustain viable populations of individual species are addressed by guidelines for specific species or species groups. This "fine filter" approach to biological conservation is discussed in the Wildlife, Fish, and Plant sections of this chapter. The most practical way to address conservation of these species and other elements of biodiversity is by using a broader “coarse filter,” or ecosystem/landscape-based strategy for conserving biological diversity (Noss 1991, Scott et al. 1991, Wilcove 1993). While many conservation planning efforts blend the two strategies, it is important to note that there are fundamental differences between these conservation strategies. Fine filter strategies focus on providing for the needs of individual or multiple species within a landscape while coarse filter strategies focus on providing an appropriate mix of ecosystems or ecological communities across a planning landscape (The Nature Conservancy 1982, Marcot et al. 1994, Haufler 1999, Schwartz 1999).

Biological diversity on an ecosystem or landscape scale can be described in terms of three components: composition, structure, and function (Noss 1990). These three components refer to the following:

- Composition refers to the numbers and types of species, plant communities, and smaller ecosystems within an area.
- Structure refers to the spatial arrangement of these communities or ecosystems across a landscape, their vertical stratification into dominant life forms (tree, shrub, herbaceous), the horizontal spacing of communities across the landscape, and how they are connected to variations in tree heights and diameters within a stand or between stands.
- Function refers to the interactions and influences between plant and animal species within an area—how each species uses its environment—and to natural processes of change or disturbance (wind, aging, etc.).

For additional discussion on composition, structure, and function components of biological diversity, see the 1997 Forest Plan Final EIS (pages 3-12 to 3-26).

Assessing biodiversity and the conservation strategy to provide viable, well distributed populations across the Tongass National Forest has been conducted at several scales from broad biogeographic provinces down to finer scales of ecological subsections, watersheds, and Value Comparison Units (VCUs). Assessing biodiversity at smaller scales such as at watershed and VCU level is done at the project-level scale. The biogeographic province and ecological section/subsection are discussed in more detail below, with the focus on maintaining biodiversity across the entire Tongass.

Ecosystem Classification

Utilizing both biogeographic provinces and ecological subsection classifications allows for some additional insight into how various communities are represented at different landscape scales. Both classification systems were developed using different processes, but complement each other in terms of addressing biodiversity. The development of biogeographic provinces is weighted more heavily toward wildlife species distributions, including barriers and linkages, while the ecological section/subsection system is more heavily weighted toward surface geology and geomorphic processes, both of which affect soils and vegetation patterns. Both of these broad-based “coarse filter” classification systems are described in more detail below.

Biogeographic Provinces

The Tongass can be subdivided on an ecosystem basis. A broad division that has been used on the Tongass for a number of years is that of the biogeographic province (USDA Forest Service 1997a). These large-scale landscape delineations are characterized by 1) similarities in terrestrial wildlife species composition, 2) similarities in distributional patterns for many of these species, 3) geologic and water barriers stemming from past events, such as glaciation, and 4) generally similar climatic conditions and physiographic characteristics. By subdividing on this scale, biogeographic provinces can assist land managers in broad-level assessment and planning.

Twenty-one biogeographic provinces were identified within the Tongass National Forest boundary. Only one of these provinces (Yakutat Forelands) extends partially outside the boundary. Two additional provinces (Chilkat River Complex and Glacier Bay/Fairweather Range) are defined completely outside the Forest boundary but within Southeast Alaska (Table 3.9-1). Figure 3.9-1 shows the location of the biogeographic provinces in Southeast Alaska with their corresponding map numbers.

Ecological Sections and Subsections

In addition to the biogeographic province approach, another way to address conservation of species and other elements of biodiversity with a “coarse filter” or ecosystem/landscape-based strategy, is to use the National Hierarchical Framework of Ecological Units, which describes and defines the process for delinating landscapes at various spatial scales. This process consists of eight nested mapping levels that serve a variety of purposes (Cleland et al. 1997). Within the hierarchy, ecological sections characterize medium to large ecosystems (on the order of 1,000 square miles) and ecological subsections characterize mid-sized ecosystems of 10 to 1,000 squares miles. Nowacki et al. (2001) used this framework to subdivide the Alaska Region into 19 ecological sections and 96 ecological subsections; 14 of the ecological sections and 73 of the ecological subsections occur on the Tongass.

Nowacki et al. (2001) provide additional detail on the ecological sections and subsections of the Tongass. Physiography, lithology, and surface geology were the primary factors for subsection delineation in Southeast Alaska, along with geomorphic processes, soil groups, subregional climate, and potential natural communities (climax vegetation). They are delineated in Figure 3.9-2 and listed later in this section under Table 3.9-6.

Table 3.9-1
Biogeographic Provinces Identified within the Tongass National Forest

No.	Province	Description
1.	Yakutat Forelands	A very young, nearly flat landscape with extensive flooding and active isostatic rebound (uplifting of the ground after glaciers recede). Most surfaces vary from 200 to 1,500 years old. Dune formation and succession are ongoing processes due to glacial rebound and wave action. Plant community patterns reflect a diverse mosaic of naturally occurring older and young forests, shrublands, bogs, and meadows. Sitka spruce, alder, and cottonwood are abundant on well drained, recently deglaciated, and active fluvial surfaces. Most of the province is inside the Tongass Forest boundary, but the southern lobe that extends into Glacier Bay National Park is not.
2.	Yakutat/ Glacier Bay Upland	The climate varies from very wet hypermaritime along the coast to very wet maritime inland. Mountains abruptly rising more than 10,000 feet from sea level, extensive active glaciers, and fiords dominate this landscape. Sitka spruce, alder, and cottonwood are abundant at lower elevations; alpine and lichen over rock plant communities dominate the land from 2,000 to over 10,000 feet elevation.
3.	East Chichagof Island	This province is drier and colder than the outer coast of Chichagof Island; the winter snow pack is generally greater. Chichagof Island is deeply dissected into three peninsulas, which may be functioning biologically more like separate islands. Vegetation in this province represents a modal condition similar to the Admiralty Island Province.
4.	West Chichagof Island	This province is dominated by a very wet hypermaritime climate and exposure to outer coastal storms. Hundreds of small islands dot the coast. Topography is gentle when compared to the mountains of Baranof Island and the coastline is highly irregular. The Sitka spruce/Pacific reedgrass plant association is abundant along the outermost coastal fringe; otherwise, vegetation is similar to the other northern islands.
5.	East Baranof Island	This province is colder than West Baranof or East Chichagof Island. Mountain glaciers occur along the divide between east and west Baranof. Topography is rugged and steep to saltwater, with little flat land. Plant associations on East Baranof are similar to much of the mainland due to the steep topography and cold environment. Spruce, devil's club, salmonberry forest associations are common on avalanche and steep erosional slopes; alpine and rock/lichen plant communities are abundant.
6.	West Baranof Island	This province is similar to the West Chichagof Island Province with the exception of southern Baranof, where precipitation exceeds 250 inches per year. Topographically, Baranof Island is the most rugged of all the islands in Southeast Alaska. The southern half of this province is highly dissected by steep-sided fiords; the outer coast is dotted with hundreds of small islands. All forest plant associations except those in the Western redcedar series and those found around large mainland rivers occur in this province. Kruzof Island has some unique vegetation communities, which have not been classified.
7.	Admiralty Island	This province is represented by relatively gentle topography and moderate rainfall. Winter conditions are moderated by the surrounding marine environment. Winds from Chatham and Icy Straits, Lynn Canal, and off the mainland are often severe. All forest plant associations except those in the Western redcedar series, those found around large mainland rivers, and those occurring only on outer coastal areas occur in this province. Forest productivity is high. Fresh and saltwater marshes in the numerous bays and inlets, and alpine and bog communities, are abundant.
8.	Lynn Canal	Rain shadows and the dominating influence of the continental climate make this the driest and seasonally warmest province in Southeast Alaska. Precipitation is generally less than 60 inches per year. The topography is rugged and glaciated. The southern portion of the Chilkat Peninsula is more similar to the East Chichagof Island Province. Western and mountain hemlock and Sitka spruce plant associations are common. Alpine tundra and extensive rock/lichen communities dominate much of the land from 2,000 to over 8,000 feet elevation.
9.	Northern Coast Range	This province has little maritime influence. Topography is rugged and glaciated. The Taku and Whiting Rivers extend into Canada. Yellow-cedar plant associations occur in this province.
10.	Kupreanof/ Mitkof Islands	The climate is cooler and the winter snow pack greater than on the islands to the south. The eastern edge of this province is strongly influenced by wind-born loess (silt) coming from the Stikine River and the mainland. All forest plant associations except those in the Western redcedar series and those occurring only on outer coastal areas occur in this province. This province contains the highest percentage of muskeg wetlands within the Tongass.
11.	Kuiu Island	Kuiu Island is deeply dissected, creating several prominent peninsulas. The topography is gentle compared to neighboring Baranof Island or the mainland. The climate is cooler and winter snow pack greater than on islands to the south, yet milder than the mainland or islands nearer the mainland. The western portion of Kuiu Island is subject to severe windstorms from both the ocean and Chatham Strait. Most forested plant associations occur here, but those found in outer coastal environments dominate.

Table 3.9-1 (continued)
Biogeographic Provinces Identified within the Tongass National Forest

No.	Province	Description
12.	Central Coast Range	This province is warmer than the Northern Coast Range Province. The topography is similar, but overall less precipitous. The Stikine River system is located in the center of this province and has a major continental influence, providing a migration corridor for plant and animal species. Plant associations found along saltwater are similar to those occurring elsewhere in northern Southeast Alaska except for those near the mouth of the Stikine River. Here, unique plant associations subject to high loess-carrying winds can be found.
13.	Etolin Island and Vicinity	Similar to the Kupreanof/Mitkof Islands Province, this province is also subject to continental influence from the mainland and the Stikine River. Glacial flour (very finely ground particles of rock, silt, or clay created by a glacier when its rock-filled ice scrapes over bedrock and which flow out from beneath a glacier in the meltwater) is present in the marine environment in the northern part of this province nearly year-round. All forest plant associations except those occurring only on outer coast areas are present.
14.	North Central Prince of Wales Island	Topography is relatively gentle, limestone is common, and precipitation is relatively low due to interception by lands to the south and southwest. All forest plant associations except those found around the mainland river systems occur in this province. Overall forest productivity is high. Karst topography and numerous caves are present.
15.	Revilla Island/ Cleveland Peninsula	Climate is variable with warm and wet conditions predominating on land nearest the outer coast; much colder conditions occur near the mainland. Revilla, Gravina, and Annette Islands are influenced by human activities and populations, whereas the Cleveland Peninsula and Duke Island are generally in a natural condition. Revilla Island has many exceptional estuaries. Muskeg ponds are common on Duke Island, attracting many wintering and migratory birds.
16.	Southern Outer Islands	These islands are isolated and are subject to strong oceanic influences. Temperatures are moderate year-round. The topography is low-lying and gentle. These islands are relatively rich in endemic vertebrate species, including dusky shrew, long-tailed vole, and ermine. Major coastal seabird colonies are present.
17.	Dall Island and Vicinity	These islands are subject to strong oceanic influences. Temperatures are moderate year-around. The topography is rugged and dissected, with abundant limestone outcrops. Dall Island appears to be a glacial refugia but inventories of plants and animals are limited. Major coastal seabird colonies are present on Dall Island.
18.	South Prince of Wales Island	The climate is warm and wet, and deep snow is rare or highly transient. The topography is steep and rugged and the coastline is highly dissected. The vegetation in this province is strongly influenced by southeasterly storms; mixed conifer and western hemlock-redcedar plant associations dominate.
19.	North Misty Fiords	Compared to South Misty Fiords, this province has considerable topographic relief and characterized as having a colder, mainland-type climate with many glaciers. Vegetation occurs in long, narrow strips along the valleys and lower slopes of fiords. Much of the vegetation is muskeg, with cottonwoods in some of the river bottoms and subalpine fir along the Canadian border.
20.	South Misty Fiords	South Misty Fiords is typical of the other mainland provinces and is the warmest. Topographic relief is lower in comparison with North Misty. Forest plant associations are more diverse than the other coastal provinces, and the vegetation is less fragmented by rock and ice than in North Misty Fiords. The southwestern portion of this province is rolling, nearly continuous muskeg with conifer forests in the bottoms and flats. This province is the northern limit of Pacific silver fir, yew, and honeysuckle.
21.	Ice Fields	Permanent ice fields, active glaciers (some advancing and some receding), and nunataks (mountain peaks between glaciers) dominate this province.
22.	Chilkat River Complex	The Chilkat River Complex lies at the northern end of the Inside Pasage and is outside the Tongass Forest boundary. It consists of tall ridge systems, large glacial rivers, and includes glaciers and snowfields. Many of the rivers and drainage basins extend across the international boundary into Canada. Because of the overlap of coastal and interior floras and faunas, the province contains Alaska's highest vascular plant species richness and the highest mammalian diversity in Southeast Alaska (Carstensen et al. 2007).
23.	Glacier Bay/Fairweather Range	This is the largest province in Southeast Alaska (2.5 million acres) and is located outside the Tongass Forest boundary. The vast majority is high mountains and glaciers and the majority is non-vegetated. The highest peaks are in the Fairweather Range along the western edge of the province, with Mt. Fairweather at over 15,000 feet. A large flat, foreland, the Gustavus Foreland, occurs in the area around Gustavus and to the north in the Bartlett River valley. Lowlands are also fairly extensive along the Dundee River and other smaller drainages on the southwest side of Glacier Bay. Glacier Bay National Park protects virtually the entire province (97 percent), except for about 75,000 acres in the vicinity of Gustavus.

Figure 3.9-1
Map of Biogeographic Provinces of Southeast Alaska

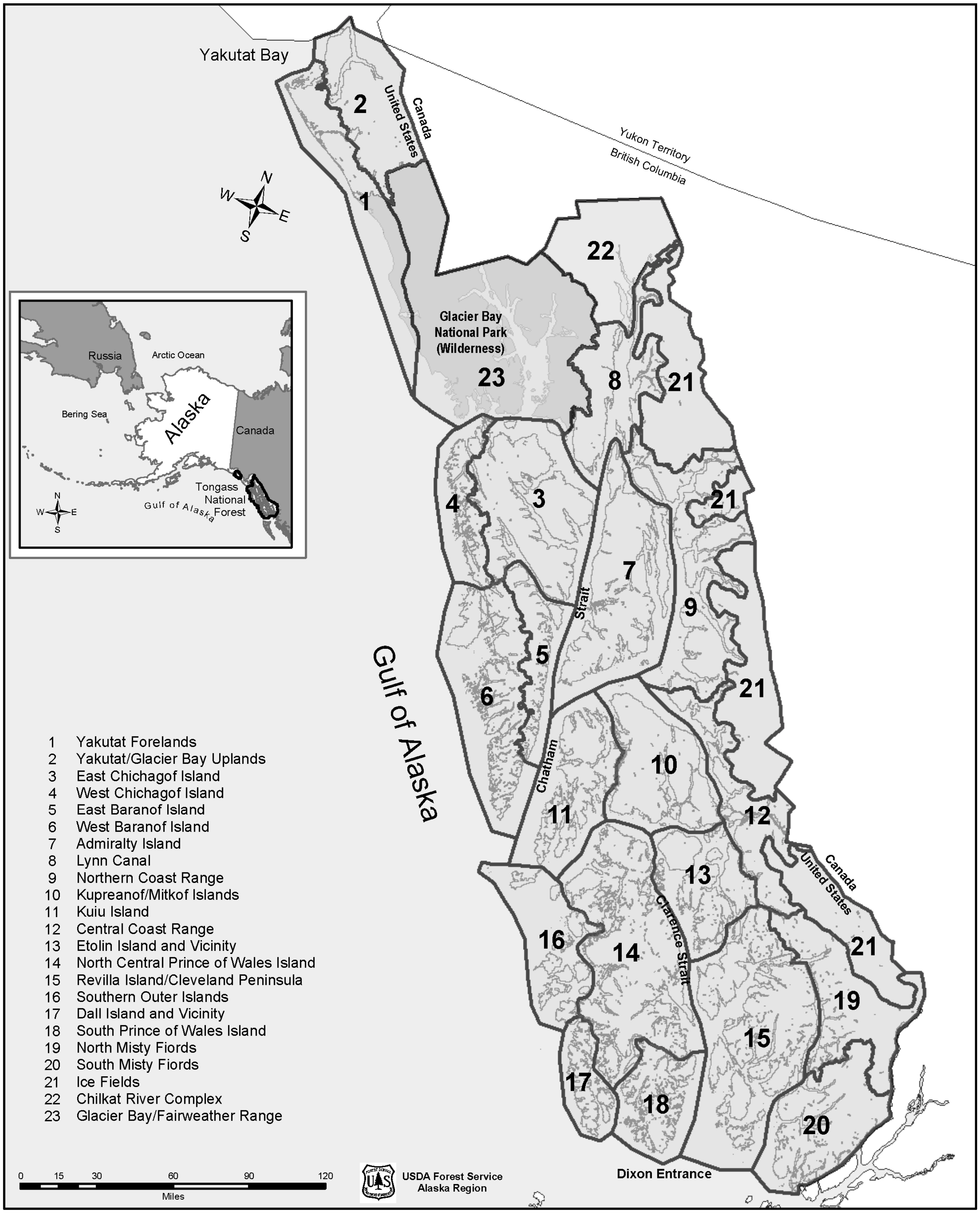
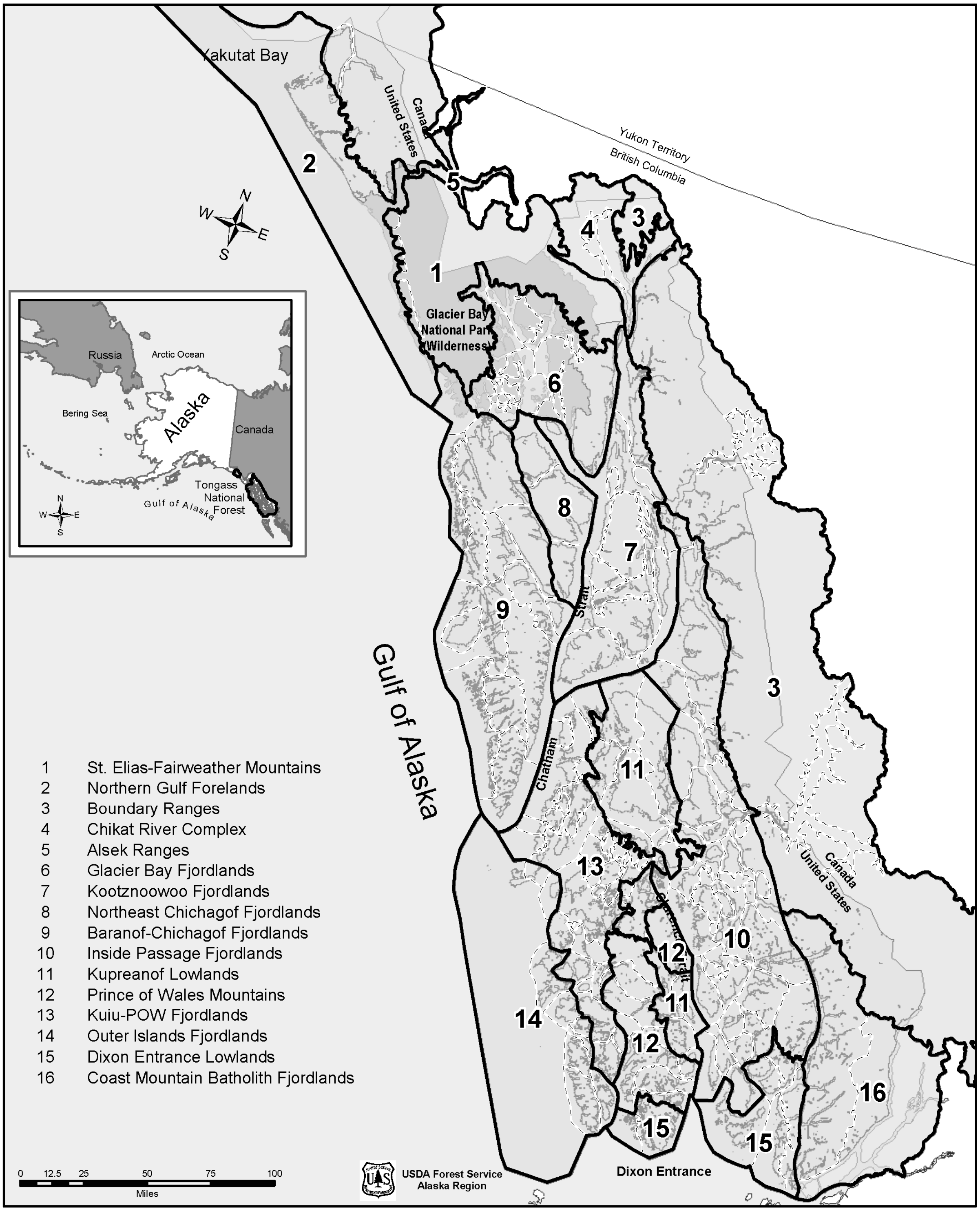


Figure 3.9-2
Ecological Sections (numbered areas) and Subsections (dashed lines) of Southeast Alaska



Cover Types

The vegetation of Southeast Alaska and the Tongass National Forest is dominated by temperate coastal rain forests at lower elevations (less than about 2,000 feet.). Interspersed within the forest are muskegs, other wetlands, and other nonforest types. At higher elevations, alpine vegetation, rock, glaciers, and snowfields dominate. Figure 3.9.3 displays a general breakdown of the broad cover types on the Tongass. Table 3.9-2 provides a summary of this breakdown by biogeographic province.

The Tongass contains approximately 9.9 million acres of forest lands (approximately 59 percent of the total land area of the Tongass National Forest). These forest lands are divided into productive and unproductive forest lands. Productive and unproductive forest lands are distinguished in terms of their ability to produce wood. The distinction is primarily used in timber management; however, it is useful for describing forest cover types for biodiversity and wildlife habitats as well. Productive forest land (5.64 million acres of the Tongass) is defined as land capable of producing at least 20 cubic feet of wood fiber per acre per year or having greater than 8,000 board feet per acre of standing volume. Unproductive forest land (4.22 million acres of the Tongass) is forest land that does not meet these thresholds. Timber harvest occurs only within the productive forest land base.

Of the 5.64 million acres of productive forest land on the Tongass, 4.95 million acres or 88 percent are old growth and are referred to as productive old growth (POG). The remaining 0.69 million acres are young-growth forest; about 0.45 million acres of the young growth is a result of timber harvest. The remainder of the young growth is a result of natural processes (e.g., wind, fire, glacial retreat).

The remaining 6.91 million acres of the Tongass National Forest (41 percent) is classified as non-forest and includes shrub and herbaceous habitats (e.g., muskeg, alpine, estuaries), sparsely vegetated and non-vegetated areas (e.g., snow, rock, ice), and aquatic habitats (e.g., streams, ponds, and lakes). These general cover types are further broken down and discussed in more detail below beginning with non-forested habitats and followed by unproductive old-growth and POG cover types.

Figure 3.9-3
General Cover Types on the Tongass National Forest

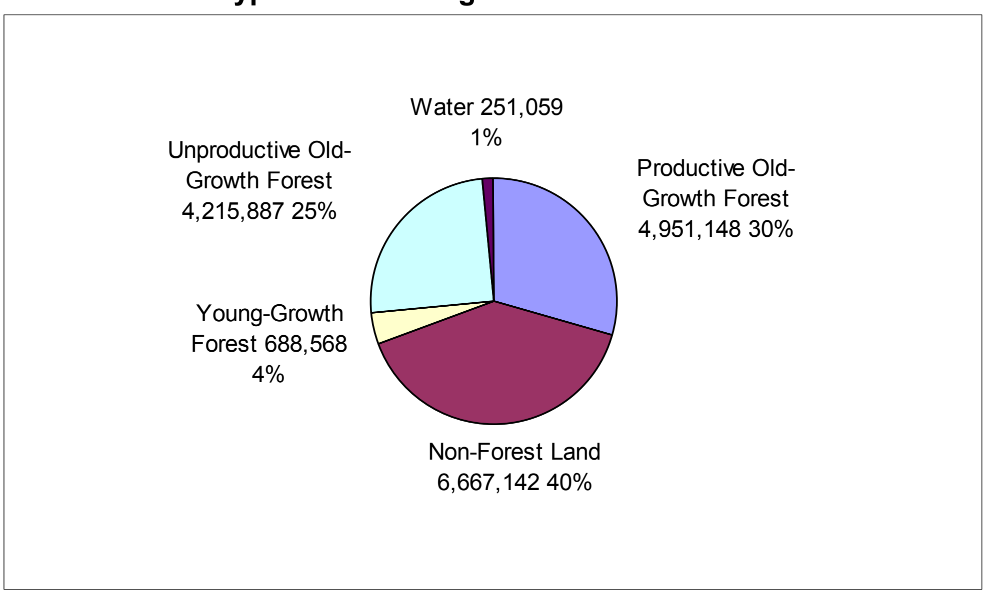


Table 3.9-2
General Cover Types on the Tongass by Biogeographic Province (in thousands of acres)

Biogeo. Province	Forest Lands						Non-Forest		
	Productive Forest Land			Unproductive Forest Land					
	POG	Young Growth[1]	Total Productive Forest Land	Forested Muskeg	Other Unprod. Forest	Total Unprod. Forest	Land	Water	Total Non-Forest
1	47,770	88,844	136,615	30,068	26,297	56,365	99,335	19,632	118,968
2	23,399	34,554	57,953	3,856	14,875	18,732	822,741	17,423	840,164
3	395,100	52,788	447,888	64,529	205,804	270,333	319,361	5,877	325,238
4	72,038	889	72,927	32,300	83,249	115,549	85,698	8,785	94,482
5	88,311	16,334	104,645	10,670	90,499	101,169	179,273	5,859	185,132
6	215,021	19,429	234,450	48,782	194,892	243,674	265,738	22,688	288,426
7	589,823	22,585	612,408	79,852	191,457	271,308	154,516	12,700	167,216
8	153,160	12,993	166,153	19,707	100,438	120,145	339,303	7,774	347,077
9	317,677	10,328	328,005	15,718	160,472	176,190	476,234	11,892	488,126
10	305,846	41,714	347,560	137,220	212,855	350,075	55,250	3,708	58,958
11	294,075	35,684	329,758	42,158	90,856	133,014	22,204	4,759	26,963
12	245,701	10,755	256,456	23,464	153,153	176,617	269,774	9,038	278,812
13	218,715	43,854	262,569	70,258	131,592	201,850	25,302	4,861	30,162
14	514,269	193,916	708,185	132,501	275,162	407,663	65,171	25,633	90,804
15	503,091	51,216	554,306	167,122	310,485	477,607	101,272	29,409	130,681
16	113,451	18,096	131,547	25,607	44,653	70,260	6,564	1,677	8,241
17	67,987	1,740	69,727	4,979	26,817	31,796	10,996	3,582	14,578
18	162,097	5,673	167,770	46,126	109,495	155,621	27,991	11,138	39,129
19	198,559	7,921	206,480	20,210	265,362	285,572	458,110	18,244	476,354
20	309,900	2,445	312,345	79,770	293,279	373,049	204,634	15,301	219,936
21	115,160	16,810	131,970	7,277	172,021	179,298	2,677,676	11,079	2,688,754
Totals	4,951,148	688,568	5,639,716	1,062,173	3,153,714	4,215,887	6,667,142	251,059	6,918,202

[1] Includes 454,724 acres of harvested young growth and 233,843 acres of natural young growth.
(Source: Tongass National Forest GIS databases)
Note: Totals may not appear to sum correctly due to rounding.

Non-Forest Lands

Non-forest ecosystems provide unique and valuable habitat types that include wetland and other areas of shrub and herbaceous types (e.g., muskegs, alpine, estuaries), non-vegetated areas (e.g., snow, rock, ice), and aquatic sites (e.g., streams, ponds, and lakes). These habitats contribute greatly to the species diversity on the Tongass National Forest by providing unique microsites and openings that contain shrub and herbaceous vegetation that is often uncommon elsewhere.

Approximately 41 percent of the Tongass is non-forested. Of the non-forest land area, over half (55 percent) comprises rock and ice/snow, followed by brush and alder brush (20 percent), alpine (8 percent), recurrent slide areas (6 percent), and wetland-meadow (4 percent) (Table 3.9-3). Approximately 0.5 million of the remaining non-forest acres (7 percent) include small amounts of mass wasting areas, uplifted beach, river fill, willow, sand dunes, urban/agriculture, and other types.

Unproductive Forest

Approximately 25 percent or 4.2 million acres of the Tongass are classified as unproductive forest. Approximately 25 percent of this habitat type is forested

Table 3.9-3
Non-Forest Cover Types on the Tongass by Biogeographic Province (thousands of acres)

		Non-Forest Lands									
No.	Biogeographic Unit	Alder Brush	Brush	Alpine	Ice & Snow Field	Muskeg-Meadow	Rock	Recurrent Slide	Fresh Water	Other[1]	Total
1	Yakutat Forelands	4	8	<0.5	<0.5	72	<0.5	<0.5	19	13	**119**
2	Yakutat Uplands	46	419	3	190	2	143	12	17	7	**840**
3	East Chichagof Island	42	<0.5	82	1	43	85	59	6	7	**325**
4	West Chichagof Island	6	<0.5	18	<0.5	13	36	12	7	2	**94**
5	East Baranof Island	5	15	25	16	2	89	25	6	3	**185**
6	West Baranof Island	3	51	54	5	22	103	24	22	5	**288**
7	Admiralty Island	3	14	37	2	6	28	60	13	4	**167**
8	Lynn Canal	9	65	45	46	1	140	24	8	9	**347**
9	North Coast Range	20	124	20	60	4	199	40	11	9	**488**
10	Kupreanof/Mitkof Island	<0.5	3	4	0	40	1	5	3	4	**59**
11	Kuiu Island	1	2	4	<0.5	1	6	4	5	4	**27**
12	Central Coast Range	15	38	23	23	4	125	25	9	16	**279**
13	Etolin Island	1	2	8	0	2	7	2	3	5	**30**
14	North Central Prince of Wales	<0.5	4	14	<0.5	22	16	6	26	4	**91**
15	Revilla Isl./Cleveland Pen.	6	12	37	<0.5	10	26	4	29	8	**131**
16	Southern Outer Islands	<0.5	<0.5	3	0	2	1	<0.5	2	<0.5	**8**
17	Dall Island and Vicinity	0	3	3	0	2	3	<0.5	4	<0.5	**15**
18	South Prince of Wales	0	5	2	0	1	15	5	11	1	**39**
19	North Misty Fiords	23	90	67	41	1	205	23	19	8	**477**
20	South Misty Fiords	14	57	49	11	1	50	15	15	7	**220**
21	Ice Fields	40	159	42	1,284	1	738	33	11	381	**2,689**
	Totals	**238**	**1,070**	**540**	**1,680**	**252**	**2,020**	**379**	**245**	**495**	**6,918**

[1] Other includes small amounts of (in descending order of available acres) Natural Grassland, Mass Wasting areas, Uplifted Beach, Uncensused Freshwater, River Fill, Willow, Urban/Agriculture, and Sand Dunes.
Source: Tongass National Forest GIS databases

muskeg (Table 3.9-2). Although some of these lands are relatively sparsely forested, they have at least 10 percent tree cover. Many unproductive forest stands are consistent with old-growth definitions, but the trees are typically small and stunted (under 40 feet in height) and the canopy is open (10 to 40 percent canopy closure). Hemlock, cedar, and lodgepole pine are the most common trees; blueberry and rusty menzesia are the most common shrubs. Near wet bogs or muskegs, heath family plants and grasses assume increasing dominance. Timber harvest has had little direct effect on unproductive forest. Past disturbance to this habitat type has occurred in the primarily as a result of road construction, which has resulted in some permanent reduction in total wetland acres. This disturbance is discussed further in the *Wetlands* section. Unproductive forests are also addressed in the *Old-Growth Forest* subsection below.

Productive Forest

As noted above, the 5.64 million acres of productive forest land on the Tongass consists of both old growth and young growth. Approximately 88 percent of the productive forest land consists of old growth and approximately 12 percent is young growth, which includes both natural young growth and harvested areas.

Old-Growth Forest

POG forests are ecosystems distinguished by old and typically larger diameter trees, with most old-growth stands greater than 150 years old. At the landscape scale, old-growth forests on the Tongass include heterogeneous stands of productive forests within a mosaic of unproductive forests and non-forested areas comprised of shrub and herbaceous plant communities. These areas have been affected by various levels of natural and human-caused disturbances.

The biological diversity associated with old-growth forests has long been recognized as important within the Tongass National Forest, and the old-growth forest is the ecosystem most affected by timber management activities on the Tongass. Franklin (1993) estimated that invertebrate biota, creatures essential to ecosystem function through such processes as nitrogen fixation and decomposition, may represent more than 90 percent of the species diversity of old-growth forests in the Pacific Northwest. Because other habitat types (e.g., non-forested habitats) are fully represented across the Tongass and have not likely changed appreciably from original conditions, the old-growth ecosystem is the primary focus for the analysis of biological diversity in this document.

As described above, old-growth forests are divided into two major categories: POG and unproductive old growth. These are further divided on the basis of their productivity, defined in terms of their ability to produce a minimum volume of wood. The relative productivity of a stand is based on site quality. Site quality is defined as the ability of a forest site to grow trees (Carmean 1975), and is based on the physiography, climate, soil, and other factors of the environment that are not easily altered. Site productivity is the capacity of a tree species to thrive and successfully compete on a particular site and is influenced by the physiological makeup of the tree species and environmental factors (Pritchett 1979). Productivity measurements are most commonly based on site index values. Site index is expressed as the height of dominant and co-dominant trees at a given age, normally 50 or 100 years. Site index values for Southeast Alaska were determined by Farr (1984) by measuring the height and age of sample trees in a stand from standard site index curves projecting the height at the index age.

A higher site quality generally translates into taller trees and higher volume per acre. Higher site quality results in faster changes in tree characteristics and stand structure. Height to diameter ratios increase faster on high sites and live crown ratios will tend to decrease faster due to the affects of heavier stocking. Species composition is influenced by site quality. For example, Sitka spruce and western hemlock tend to have a greater competitive advantage on the high site quality areas while cedars are generally better represented on mid to lower site quality areas. Site productivity, a function of site quality, is highly correlated with soil drainage, effective soil depth, soil development (parent material), and landscape position (landform and slope position) (Cullen 1987). Site variation within stands can be significant. Typically, site productivity is highest in the valley bottoms decreasing with increased elevation.

The oldest harvests on the Tongass tended to be on the higher productivity sites at lower elevations, adjacent to the beach and within floodplain riparian areas where large Sitka spruce were available and abundant. These oldest young-growth stands are generally dominated by Sitka spruce and western hemlock regeneration. Road construction, started during the pulp mill era, allowed for harvest to be located farther away from the beach and riparian areas, although harvest during the early years was still concentrated at lower elevations. Old growth on limestone soils (which includes karst terrain) was also more heavily targeted. As a result of targeting highly productive and economical sites in the early years of timber harvest, larger-tree stands were often disproportionately harvested. Due to more extensive road development and restrictions brought about by development of a Forest Plan in 1979, stands harvested in the 1980s and especially in the late 1990s to the present tend to be located across a much more diverse range of sites.

Maintaining a full representation of ecosystem types is an accepted strategy for conserving biodiversity in landscapes managed for forestry (Franklin 1993), and is part of the overall conservation strategy implemented under the 1997 Forest Plan which includes small, medium, and large old-growth reserves and forest-wide Standard and Guideline protection measures. Most species, especially those for which knowledge is sparse or absent, are best sustained by ensuring that an adequate portion of each ecosystem type is represented in a relatively unmanaged state (Wells et al. 2003). Some specific types of old-growth forest ecosystems are at greater risk than others, such as forests associated with alluvial/colluvial surfaces or karst geology (USDA Forest Service 1999a, Baichtal and Swanston 1996). POG forest stands, particularly low elevation stands, have been affected the most by human modification through timber harvest.

Young-Growth Forest

As shown in Figure 3.9-3, there are approximately 689,000 acres of young-growth forest on the Tongass. Approximately 455,000 acres of POG have been harvested on the Tongass, nearly half of this amount is on land that is currently suitable for timber harvest. (See the *Timber* section for additional discussion on young-growth and suitability.) There are opportunities to manage these stands to increase biodiversity. Young-growth stands can be treated through release, pre-commercial thinning, and commercial thinning to concentrate growth in fewer, larger trees. Since 1979, over 100,000 acres have been pre-commercially thinned on the Tongass. These treatment methods have averaged about 5,600 acres per year in recent years and can be used to extend the period that understory forage is available for species such as deer, increase habitat for certain prey species, or promote conditions that mimic old-growth stand characteristics at a faster rate than would occur without treatment (USDA Forest Service 2000a, Carey 2003). Approximately 45 percent of the areas harvested on the Tongass are no longer suitable for commercial timber harvest because of their current land use designations, which include Wilderness, LUD II, 1,000-foot wide beach fringe, riparian areas, and old-growth habitat reserves. While these stands are not managed for timber production, they can still be thinned to improve wildlife habitat using the same treatments described above.

Old Growth Classification

For the 1997 Forest Plan, the Tongass classified POG on the basis of three volume strata (low, medium, and high volume). These were refined based on using the existing TIMTYP inventory, soils, and slopes. Since the issuance of the 1997 Forest Plan, several landscape and timber-sale analyses have effectively used the three broad timber-type categories delineating non-forest, unproductive old-growth forest, and POG forest lands, which were divided further into high-, medium-, and low-volume strata forest stands (see the Timber section in this chapter for additional discussion on timber volume class and volume strata).

Size-Density Model

While the three-volume strata approach for POG is useful for estimating timber volume for forest planning purposes, it is not as useful for describing other important forest elements, including forest structure, ecosystem diversity, and wildlife habitat. Forest structure is defined as the spatial arrangement of the components of vegetation, and is a function of tree size and height, vertical stratification into layers, and horizontal spacing of trees. It is important because it reflects the complex spatial and temporal interactions between plant growth (e.g., dispersal and competition), physiographic factors (e.g., geology, soils, slope, aspect, elevation), climate, and disturbance (e.g., wind, landslides, and human activities). Areas of high-structure habitat are typically located in areas of well-drained soils on unconsolidated sediments associated with alluvial fans, floodplains, or toe slopes.

Differences in forest structure are more useful because timber volume may be misleading when describing wildlife habitat or other attributes of the stand. For example, two stands may have the same volume but one may be a dense stand of medium-sized trees with a single canopy layer while the other stand may be a combination of widely-spaced large overstory trees and two or three lower canopy layers containing small and medium sized trees (Caouette et al. 2000, Caouette and DeGayner 2001).

To move beyond the limitations of timber volume, Forest Service managers and planners have begun to revise and refine forest mapping on the Tongass by creating a tree size and density mapping model for POG forests. Such information is more applicable for assessing conservation of biodiversity, estimating timber values, and developing wildlife habitat models.

One alternative to using volume estimates is using a combination of two common forest measurements: tree sizes and tree densities (Caouette et al. 2000). These two measures provide a more comprehensive forest measuring system than timber volume (Spies and Franklin 1991, Franklin 1995). The Forest Service recently published National Guidance on vegetation classification and mapping that specifically requires tree sizes (expressed as quadratic mean diameter of all live dominant/co-dominant trees) and tree densities (expressed as canopy closure) for the mapping of forest structure (USDA Forest Service 2004d). The Tongass National Forest recently developed an approach that uses these two measurements to model structural diversity in order to better define and describe forest structural attributes (Caouette and DeGayner 2005). The size-density model (SDM) uses a combination of two common forest measurements: tree sizes and tree densities (Caouette et al. 2000). This model has proven to be the best tool for representing these other forest elements.

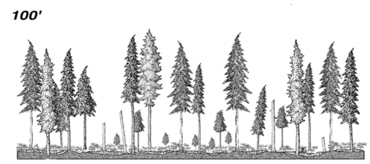
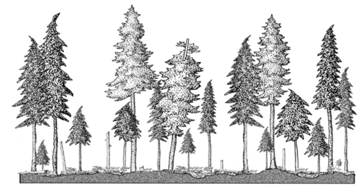
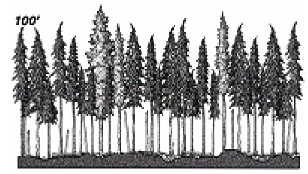
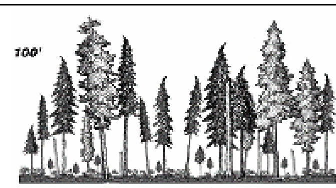
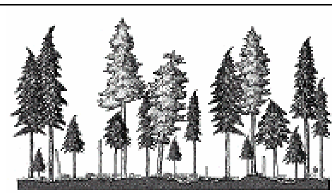
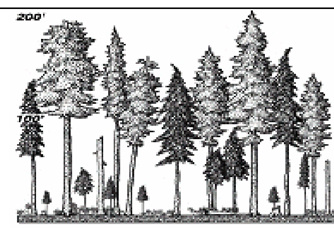
SDM uses timber volume class, hydric soil class, and aspect to characterize forest structure. These attributes were correlated with the stand density index and mean quadratic diameter to derive the various SDM categories. The following seven stand types have been defined and delineated using the Tongass Timber Inventory as the source for the analysis:

- SD4H: Volume class 4 on hydric soils
- SD4N: Volume class 4 on non-hydric soils, north aspect or flat
- SD4S: Volume class 4 on non-hydric soils, not north aspect or flat
- SD5H: Volume class 5 on hydric soils
- SD5N: Volume class 5 on non-hydric soils, north aspect or flat
- SD5S: Volume class 5 on non-hydric soils, not north aspect or flat
- SD67: Volume classes 6 and 7

These categories were used to develop a hierarchical mapping model for predicting tree sizes and densities on the Tongass National Forest. Figure 3.9-4 presents a description of each of the categories and illustrates the most probable forest type based on land form and forest condition. Figure 3.9-5 shows how the above SDM categories compare to the low-, medium-, and high-volume strata approach used for the 1997 Forest Plan. Based on their analysis, the authors suggest that the model is appropriate for use in forest or landscape planning on the Tongass (Caouette and DeGayner 2005). For example, the SDM is more useful in its ability to better define forest structure, both forest-wide and within stand, than the three-volume strata approach. Some components of the SDM have helped identify frequently used wildlife habitats in parts of the Tongass National Forest (Doerr et al. 2005, DeGayner et al. 2005). Other potential applications may include 1) broad-scale forest inventories; 2) stratification for reducing the amount or intensity of project-level field inventories; 3) developing forest structure value ranking systems for project-level analyses; 4) modeling diversity across landscapes or watersheds; and 5) setting and implementing conservation targets (DeGayner et al. 2005).

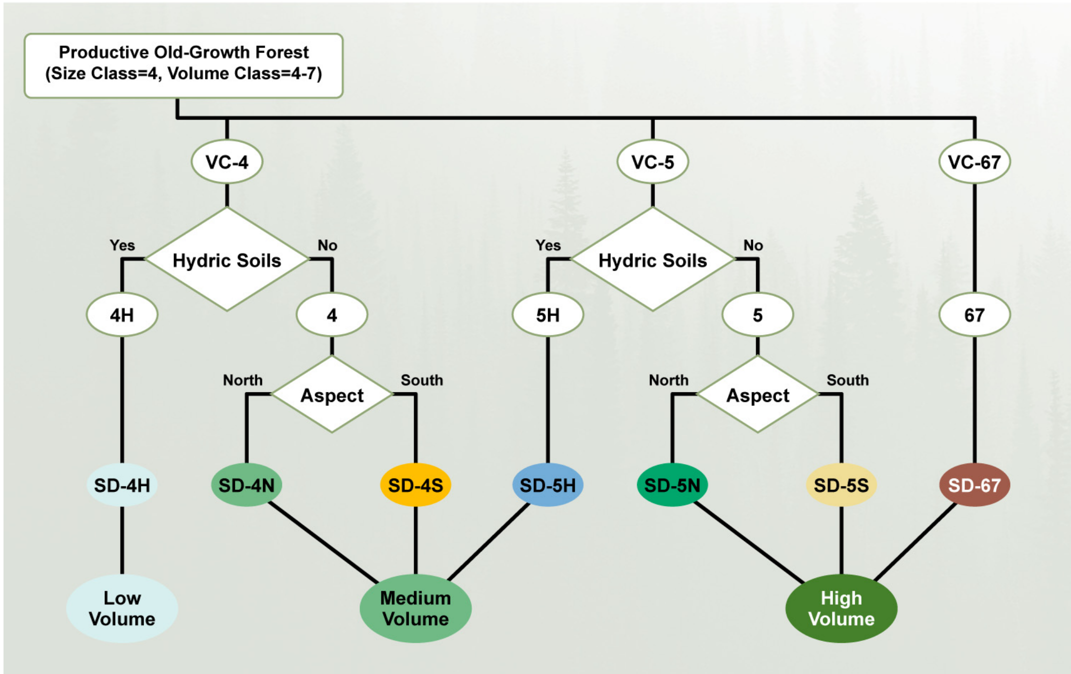
The disproportionate harvest of the larger POG types is an issue of concern relative to forest management on the Tongass. In the analysis that follows, we define the larger POG types in two ways. First, large-tree POG is defined as the SD67 POG type (Figure 3.9-4). This type represents the most productive of the POG types and typically contains the highest density of large trees. The second category is referred to as high-volume POG and is defined as the grouping of the three types that represent the highest volume stratum -- SD67, SD5N, and SD5s (Figures 3.9-4 and 3.9-5). This grouping represents the types with the largest trees on the Tongass.

Figure 3.9-4
Tree Size and Density Model used to Describe Forested Conditions across the Tongass National Forest

SD	*Land and Forest Condition* Most Probable Forest Type	*Tree Sizes and Densities* Most Probable Forest Type [1]	*Illustration* Most Probable Forest Type
4H	Low productive older forests associated with wet, poorly drained land types (e.g., muskegs, fens, rolling hills, broken mountain slopes, plateaus, glacial outwash zones). Canopy closure is variable. Trees are small, old, and defective. Stand volume is low.	Low densities **(SDI < 280)** of small-diameter trees **(QMD < 17 inches)**. Tree size distribution and spacing is variable and patchy. Tree diameters greater than 40 inches are generally not present.	
4N	Low to moderately productive older upland forests. Canopy characteristics are variable and patchy, with moderate canopy closure and relatively coarse canopy texture. Stand volume is low to moderate.	Low densities **(SDI < 280)** of medium diameter trees **(17 < QMD < 21 inches)**. Tree size distribution and spacing is variable and patchy. Tree diameters greater than 40 inches are rare.	
4S	Highly productive younger upland forests. Stand volume is moderate, but increasing rapidly. Crown competition is high. Canopy characteristics tend to be uniform, with high canopy closure and fine canopy texture.	High densities **(SDI > 280)** of medium-diameter trees **(17 < QMD < 21 inches)**. Tree size distribution and spacing tends to be more uniform. Tree diameters greater than 40 inches are rare.	
5H	Moderately productive older forests associated with wet, poorly drained land types (see 4H above). Canopy closure, texture, and structure tend to be variable and patchy. Stand volume and annual growth is also variable and patchy.	Low densities **(SDI < 280)** of medium-diameter trees **(17 < QMD < 21 inches)**. Tree diameters greater than 40 inches are somewhat common, but not uniformly distributed throughout the stand.	
5N	Moderately productive older upland forests. Stand volume is moderate to high. Canopy characteristics tend to be variable, with moderate canopy closure and coarse canopy texture.	Low densities **(SDI < 280)** of medium-to-large diameter trees **(17< QMD < 21 inches)**. Tree size distribution and spacing is variable and patchy. Tree diameters greater than 40 inches are common, but not uniformly distributed throughout the stand.	
5S	Highly productive upland forests. Stand volume is high. Canopy characteristics tend to be uniform, with moderate to high canopy closures.	High densities **(SDI > 280)** of medium-diameter trees **(17 < QMD < 21 inches)**. Tree size distribution and spacing tends to be uniform. Tree diameters greater than 40 inches are somewhat common, but not uniformly distributed throughout the stand.	
67	Highly productive forests associated with riparian areas, alluvial fans, colluvial toe slopes, karst geology, and wind-protected uplands. Stand volume is high. Stand age can vary. Canopy closure is low to moderate and canopy texture is coarse.	Low densities **(SDI < 280)** of large-diameter trees **(QMD > 21 inches)**. Tree diameters greater than 40 inches are common and uniformly distributed throughout the stand.	

[1] SDI=Stand Density Index; QMD=Quadratic Mean Diameter; >=greater than; <=less than
Source: Caouette 2006

Figure 3.9-5
Comparison of SDM Categories, the Four Volume Classes from the 1979 Forest Plan, and the Three Volume Strata Approach Used for the 1997 Forest Plan



Source: Caouette 2006

Forest-Wide Distribution of Old-Growth Forest

The distribution and condition of the old-growth ecosystem across the Tongass can be examined by comparing the representation of various types of old growth by elevation and across the biogeographic provinces and ecological subsections, with regard to the original representation. As stated earlier, because other habitat types (e.g., non-forested and unproductive forest habitats) are fully represented across the Tongass and have not changed appreciably from original levels, the old-growth ecosystem is the primary focus for the analysis of biological diversity in this document.

Old Growth Distribution by Elevation

Elevation is considered one of the most significant landscape variables influencing old-growth forest habitat values. Three elevation zones are described in Table 3.9-4 and the acreages for these components are divided between the productive and unproductive old growth. The different elevation zones displayed (less than 800 feet, 800 to 1,500 feet, and greater than 1,500 feet) are important for many wildlife species during certain times of the year. For example, old-growth forest, particularly SD5S, SD5N, and SD67, provide suitable winter habitat for Sitka black-tailed deer through increased snow-intercept capabilities (see the *Wildlife* section in this chapter for species-specific discussion).

Table 3.9-4
Conifer Old-Growth Acres of the Tongass within Three Elevation Zones

Elevation Zone	Description	Productive Old Growth	Unproductive Old Growth	Total Old Growth
Less than 800 feet	All upland old growth below 800 feet in elevation	2,961,192	1,812,165	4,773,357
800 to 1,500 feet	All upland old growth between 800 and 1,500 feet in elevation	1,409,322	1,022,014	2,431,335
Greater than 1,500 feet	All upland old growth more than 1,500 feet in elevation	580,635	1,381,708	1,962,343
Total		**4,951,148**	**4,215,887**	**9,167,035**

POG forest (all SDM categories described in Figure 3.9-4 and outlined in Figure 3.9-5) found at lower elevations accounts for approximately 60 percent of the old-growth forest on the Forest. It should be noted that POG at lower elevations (at or below 800 feet in elevation) has been harvested disproportionately in some biogeographic provinces. Forest-wide, 60 percent of all POG is found at or below 800 feet in elevation (Table 3.9-4); however, approximately 80 percent of all old-growth forest harvested since 1954 occurred below this elevation zone.

Old Growth Distribution by Biogeographic Province and SDM Category

Sixteen of the 21 biogeographic provinces covering the Tongass currently have more than 100,000 acres of POG and 11 provinces have more than 200,000 acres. Three provinces – Admiralty, North Central Prince of Wales, and Revilla/Cleveland – include more than 500,000 acres of POG each. The current POG acreage in each SDM category is displayed by biogeographic province in Table 3.9-5. These acres by SDM category can serve as a baseline for the amounts of existing structural classes at the landscape level.

The same three provinces that contain more than 500,000 acres of POG, contain more than 200,000 acres of high-volume POG, with Admiralty containing over 300,000 acres. Seven provinces contain more than 100,000 acres of high-volume POG and 14 provinces contain more than 50,000 acres. Large-tree POG (SD67), however, is not as uniformly distributed. Forty percent of the large-tree POG on the Tongass is within two provinces: North Central Prince of Wales and Admiralty. Other provinces, in which large-tree POG comprises over 10 percent of the POG include Yakutat Forelands, Kuiu Island, Southern Outer Islands, and South Prince of Wales.

Forest-wide, the Tongass consists of 20 percent low-volume, 39 percent medium-volume, and 41 percent high-volume POG types. The province with the highest percentage of low-volume POG (SD4H) is the Kupreanof/Mitkof province, which has a high percentage of low-lying wetland areas. Portions of adjacent North Central Prince of Wales and Etolin Island and Vicinity provinces also contain large areas of the low-volume type.

Old Growth Distribution by Ecological Subsection and SDM Category

Examining the distribution of old growth by ecological subsection allows comparison at a smaller scale than the biogeographic province scale. The ecological subsections better define and describe habitats with similar overall vegetative patterns. Table 3.9-6 displays the POG forest acres within each of the 73 ecological subsections on the Tongass by SDM category. Ecological subsections vary dramatically in their ability to support POG, even within similar landforms, elevation,

Table 3.9-5
Distribution of Existing POG Acres by SDM Category across the 21 Biogeographic Provinces on the Tongass National Forest

Biogeographic Province	Low Volume	Medium Volume			High Volume			TOTAL
	SD4H	SD4N	SD4S	SD5H	SD5N	SD5S	SD67	
1	6,948	2,759	2,610	6,759	2,063	1,501	25,130	47,770
2	1,829	1,657	8,148	1,054	2,005	6,707	1,999	23,399
3	83,913	44,368	85,560	31,428	42,357	72,959	34,515	395,100
4	16,714	11,994	22,963	3,144	5,333	9,878	2,012	72,038
5	15,270	13,291	25,180	6,157	11,590	14,852	1,970	88,311
6	45,715	34,958	71,142	10,072	18,262	30,760	4,113	215,021
7	87,253	55,535	101,188	43,735	67,356	136,494	98,262	589,823
8	20,710	19,585	43,837	9,102	12,384	35,748	11,796	153,160
9	43,024	35,686	79,235	27,219	41,582	68,458	22,472	317,677
10	102,873	25,362	49,867	29,484	27,240	51,465	19,554	305,846
11	54,018	16,443	32,329	34,529	43,449	76,626	36,682	294,075
12	44,458	23,603	55,247	18,750	25,559	58,108	19,975	245,701
13	63,121	20,091	43,580	15,813	23,807	39,915	12,387	218,714
14	132,698	18,722	47,170	89,807	37,119	70,773	117,979	514,269
15	109,381	32,378	73,788	74,881	62,216	118,593	31,854	503,090
16	27,750	6,911	20,161	15,643	13,408	16,767	12,810	113,451
17	9,324	5,513	15,509	4,616	10,851	14,262	7,911	67,987
18	31,743	10,788	29,621	13,682	10,819	22,115	43,328	162,097
19	16,008	34,433	77,411	4,454	18,889	34,597	12,767	198,559
20	56,978	39,468	102,131	13,814	28,691	54,676	14,142	309,900
21	8,873	19,348	47,494	2,995	9,720	20,938	5,793	115,160
Total	978,603	472,889	1,034,172	457,139	514,702	956,193	537,451	4,951,148
Percent of Total POG by SDM Category	20%	10%	21%	9%	10%	19%	11%	100%

and soil conditions. For example, the Gulf of Esquibel Till Lowlands and the Rowan Sediments vary from 32 percent to 72 percent covered by POG, respectively.

Sixty of the 73 ecological subsections currently have more than 20,000 acres of POG on National Forest System (NFS) land and 65 of the ecological subsections have more than 10,000 acres. The 13 subsections that currently have less than 20,000 acres, also had less than 20,000 acres of POG originally. Similarly, the 8 subsections with less than 10,000 acres had less than 10,000 acres originally. Fifteen ecological subsections currently have more than 100,000 acres of POG and only 2 subsections have less than 1,000 acres. The ecological sections containing the largest amounts of POG include the Inside Passage Fiordlands (1,208,000 acres), Kootznoowoo Fiordlands (653,000 acres), Baranof-Chichagof Fiordlands (573,000 acres), Kuiu-Prince of Wales Fiordlands (481,000 acres), Kupreanof Lowlands (388,000 acres), and the Coast Mountain Batholith Fiordlands (387,000 acres).

Table 3.9-6
Distribution of POG Acres by SDM Category across the 73 Ecological Subsections on the Tongass National Forest

Ecological Section (Bold) and Subsection Names	Low Volume	Medium Volume			High Volume			TOTAL
	SD4H	SD4N	SD4S	SD5H	SD5N	SD5S	SD67	
St. Elias-Fairweather Mountains								
St. Elias-Fairweather Icefields	299	849	3,453	106	409	1,880	1,530	8,526
Puget Peninsula Metasediments	359	431	2,894	129	255	2,260	961	7,290
Northern Gulf Forelands								
Yakutat-Lituya Forelands	8,196	3,305	5,271	7,657	3,755	5,212	25,512	58,908
Chilkat River Complex								
Chilkat Complex	41	711	574		111	127	197	1,759
Boundary Ranges								
Boundary Ranges Icefields	18,532	40,237	104,352	5,833	17,555	45,982	11,503	243,994
Stikine-Taku River Valleys	8,795	4,329	5,562	4,031	4,915	4,085	1,894	33,612
Glacier Bay Fiordlands								
Wachusett-Adams Hills		183	2		35	9		229
Berg Bay Complex	1,706			1,882			1,636	5,223
Chilkat Peninsula Carbonates	12,458	9,562	16,726	5,137	6,884	19,379	7,074	77,221
Baranof-Chichagof Fiordlands								
North Chichagof Granitics	18,954	12,584	20,940	10,251	11,161	16,339	6,213	96,442
Outer Coast Wave-cut Terraces	16,503	5,245	7,776	2,537	1,898	3,157	520	37,636
West Chichagof Complex	3,951	5,839	12,510	605	1,869	3,816	1,297	29,885
Ushk-Patterson Bay Granitics	8,588	6,115	11,611	1,846	5,139	5,575	3,017	41,891
Peril Strait Granitics	24,267	12,521	27,806	6,708	6,761	17,857	5,128	101,048
North Baranof Complex	7,658	8,027	13,811	3,403	8,987	10,237	1,470	53,593
Sitka Sound Complex	13,253	13,369	24,712	3,409	8,008	10,602	1,153	74,506
Mount Edgecumbe Volcanics	9,104	2,775	4,777	1,749	1,361	3,464	358	23,587
Central Baranof Metasediments	5,393	7,007	15,056	1,604	2,553	5,512	638	37,764
Necker Bay Granitics	4,772	7,287	17,705	808	3,249	5,625	1,121	40,568
South Baranof Sediments	6,990	5,285	12,303	1,557	3,157	6,326	702	36,320
Northeast Chichagof Fiordlands								
Point Adolphus Carbonates	5,795	2,371	4,291	5,009	5,878	10,189	8,256	41,789
Freshwater Bay Carbonates	24,930	10,465	21,713	6,361	9,758	18,152	6,636	98,016
Kook Lake Carbonates	7,339	5,647	9,308	2,927	7,708	11,250	4,465	48,644
Kootznoowoo Fiordlands								
Stephens Passage Glaciomarine Terraces	29,237	14,792	27,359	11,854	11,620	22,812	11,482	129,157
North Admiralty Complex	8,185	12,478	25,696	6,213	17,144	35,680	21,370	126,767
Stephens Passage Volcanics	5,438	4,544	10,810	2,951	4,551	12,531	7,110	47,934
Thayer Lake Granitics	7,257	3,231	7,099	3,518	4,505	12,624	7,337	45,571
Mitchell-Hasselborg Till Lowlands	15,796	6,337	9,383	7,803	7,037	10,228	6,028	62,613
Hood-Gambier Bay Carbonates	17,558	12,920	23,352	7,494	16,977	34,493	30,787	143,582
South Admiratly Volcanics	14,815	6,746	15,113	7,962	10,769	23,072	19,067	97,544
Inside Passage Fiordlands								
Holkham Bay Complex	38,205	23,686	56,501	25,641	35,865	60,405	18,060	258,363
Cape Fanshaw Complex	12,630	1,805	4,206	6,477	3,730	7,298	7,089	43,235
Thomas Bay Outwash Plains	3,584	796	1,522	621	787	1,089	1,718	10,117
Wrangell Narrows Metasediments	23,849	14,914	29,699	7,897	17,142	29,659	11,455	134,615
Eastern Passage Complex	14,925	11,611	23,600	6,583	15,496	31,932	7,555	111,702
Stikine River Delta	2,047	2,372	4,398	1,558	3,012	4,875	2,554	20,816

Table 3.9-6 (continued)
Distribution of POG Acres by SDM Category across the 73 Ecological Subsections on the Tongass National Forest

Ecological Section (Bold) and Subsection Names	Low Volume	Medium Volume			High Volume			TOTAL
	SD4H	SD4N	SD4S	SD5H	SD5N	SD5S	SD67	
Bell Island Granitics	27,649	14,696	30,882	9,943	14,785	32,133	4,639	134,728
Stikine Strait Complex	8,059	2,769	6,194	2,055	3,520	5,015	1,180	28,793
Etolin Granitics	5,354	3,364	7,527	1,411	3,813	7,769	1,229	30,467
Zimovia Strait Complex	26,709	9,998	17,501	8,214	10,164	15,439	4,831	92,857
Clarence Strait Volcanics	25,544	5,380	16,072	9,671	7,748	15,987	4,720	85,122
Ketchikan Mafics/Ultramafics	4,918	1,351	2,966	2,794	2,926	4,060	2,253	21,268
Vixen Inlet Till Lowlands	5,448	398	510	1,718	466	727	788	10,055
Traitors Cove Metasediments	25,264	6,307	17,610	21,641	19,070	36,149	13,364	139,405
Behm Canal Complex	10,428	5,368	8,679	12,918	13,848	29,211	6,328	86,781
Kuiu-Prince of Wales Fiordlands								
Kuiu-POW Granitics	11,577	7,314	13,410	7,190	10,666	19,532	10,683	80,372
Rowan Sediments	11,803	2,780	5,736	11,593	14,262	27,328	20,013	93,515
North POW-Kuiu Carbonates	14,398	2,847	8,219	14,703	9,314	18,754	41,545	109,779
Alvin Bay Sediments	10,604	2,418	5,212	8,513	10,055	15,997	3,558	56,357
Affleck Canal Till Lowlands	11,880	1,179	2,311	4,018	2,814	4,062	1,033	27,296
North POW Complex	11,885	593	1,577	10,837	2,660	5,434	9,704	42,689
Elevenmile Till Lowlands	5,412	269	872	3,676	525	2,702	1,112	14,567
Gulf of Esquibel Till Lowlands	5,789	1,115	2,844	2,002	993	1,457	627	14,828
Klawock Inlet Till Lowlands	144	99	129	151	84	58		665
Soda Bay Till Lowlands	13,048	2,721	7,560	5,551	3,528	4,912	3,131	40,451
Kupreanof Lowlands								
Kake Volcanics	16,523	1,316	2,485	6,075	1,775	2,690	2,365	33,229
Duncan Canal Till Lowlands	32,046	6,065	10,841	7,279	5,722	10,184	3,766	75,903
Sumner Strait Volcanics	59,191	9,633	21,131	17,840	12,904	25,254	8,863	154,815
Central POW Till Lowlands	39,785	1,263	2,946	26,001	3,982	6,432	19,322	99,730
Kasaan Peninsula Volcanics	1,316	358	601	474	544	388	515	4,197
Skowl Arm Till Lowlands	6,159	2,202	3,392	2,034	1,240	2,022	3,167	20,215
Outer Islands Fiordlands								
Outer Islands Complex	7,382	384	1,028	6,415	959	1,462	1,383	19,013
Dall-Outside Complex	19,494	10,250	29,453	8,030	20,460	23,329	13,223	124,239
Prince of Wales Mountains								
Central POW Volcanics	38,491	7,238	19,645	26,452	15,377	30,390	38,341	175,934
Hetta Inlet Metasediments	10,731	3,157	10,982	5,710	4,538	9,603	27,293	72,015
Moira Sound Complex	11,087	3,818	11,548	4,683	4,212	9,652	12,684	57,684
Dixon Entrance Lowlands								
South POW Granitics	12,121	5,151	10,997	3,837	3,365	5,427	8,211	49,109
Duke Island Till Lowlands	3,684	389	352	1,740	450	576	114	7,306
Thorne Arm Granitics	7,810	1,713	4,971	4,334	3,105	3,832	1,271	27,035
Princess Bay Volcanics	6,658	471	1,982	10,176	1,546	4,520	361	25,715
Foggy Bay Till Lowlands	10,848	1,259	3,410	2,035	963	1,734	391	20,641
Boca De Quadra Complex	12,468	8,408	19,394	2,813	5,482	7,277	912	56,754
Coast Mountain Batholith Fiordlands								
Misty Fiords Granitics	45,483	58,470	141,313	12,490	36,799	70,963	21,632	387,149
Total	**978,603**	**472,889**	**1,034,172**	**457,139**	**514,702**	**956,193**	**537,451**	**4,951,148**
Percent of Total POG by SDM Category	20%	10%	21%	9%	10%	19%	11%	100%

High-volume and large-tree POG occur throughout Southeast Alaska; however, their relative abundance varies across ecological subsections. High-volume POG represents more than 50 percent of all POG in 12 subsections. It occurs at the highest relative abundance in subsections within the Northern Gulf Forelands, Kuiu-Prince of Wales Fiordlands, and the Prince of Wales Mountains ecological sections. Similarly, large-tree POG makes up more than 20 percent of all POG in 9 subsections. It occurs in the highest relative abundance in the Northern Gulf Forelands, Kuiu-Prince of Wales Fiordlands, and the Prince of Wales Mountains ecological sections.

Past Old-Growth Harvest

Overview of Past Harvest on National Forest System Lands

Originally, 5.4 million acres of POG occupied the Tongass and 8 percent of this POG has been harvested. At least 10 percent harvest has occurred in six provinces—East Chichagof Island, East Baranof Island, Kupreanof/Mitkof Islands, Etolin Island, North Central Prince of Wales Island, and Southern Outer Islands (Table 3.9-7). With 26 percent POG harvest, North Central Prince of Wales has had

Table 3.9-7
Total POG, High-Volume POG (SD5S, SD5N, SD67), Large-Tree POG (SD67), and Low-Elevation High-Volume and Large-Tree POG: Original Acres and Percent Remaining by Biogeographic Province on National Forest System Lands

		Acres of Original POG[1]					Percent of Original POG Remaining				
No.	Geographic Unit	Total POG	High-Volume POG[2]	High-Volume[2] POG ≤800 ft	SD67 POG	SD67 POG ≤800 ft	Total POG	High-Vol. POG[2]	High-Vol.[2] POG ≤800 ft	SD67 POG	SD67 POG ≤800 ft
1	Yakutat Forelands	51,398	31,015	30,799	26,181	26,095	93%	93%	93%	96%	96%
2	Yakutat Uplands	24,811	11,614	11,103	2,408	2,192	94%	92%	92%	83%	81%
3	East Chichagof Island	439,307	178,124	114,262	47,335	36,883	90%	84%	80%	73%	71%
4	West Chichagof Isld	72,038	17,223	13,795	2,012	1,918	100%	100%	100%	100%	100%
5	East Baranof Island	101,840	37,072	29,024	5,894	5,397	87%	77%	74%	33%	34%
6	West Baranof Island	231,999	64,001	49,692	9,036	8,488	93%	83%	80%	46%	44%
7	Admiralty Island	598,419	307,613	184,803	100,755	68,011	99%	98%	97%	98%	96%
8	Lynn Canal	158,538	63,368	37,892	13,355	9,417	97%	95%	93%	88%	86%
9	North Coast Range	317,898	132,654	65,270	22,536	13,773	100%	100%	100%	100%	100%
10	Kupreanof/Mitkof Isld	341,588	121,135	73,158	29,920	22,505	90%	81%	76%	65%	64%
11	Kuiu Island	322,569	174,993	121,702	44,945	28,952	91%	90%	87%	82%	75%
12	Central Coast Range	252,179	107,789	66,361	21,854	16,777	97%	96%	94%	91%	89%
13	Etolin Island	254,781	99,193	61,367	22,847	15,739	86%	77%	72%	54%	48%
14	North Central POW	698,394	343,711	231,880	171,375	128,734	74%	66%	62%	69%	68%
15	Revilla Isl/Cleveld Pen	548,748	241,884	123,115	45,095	26,869	92%	88%	84%	71%	65%
16	Southern Outer Islds	128,589	52,674	38,826	17,200	12,957	88%	82%	79%	74%	71%
17	Dall Island and Vicin.	68,355	33,260	23,189	8,018	5,937	99%	99%	99%	99%	98%
18	South POW	165,389	78,369	55,383	44,283	34,589	98%	97%	97%	98%	98%
19	North Misty Fiords	199,929	67,130	38,864	13,164	9,693	99%	99%	98%	97%	96%
20	South Misty Fiords	309,900	97,509	61,530	14,142	11,210	100%	100%	100%	100%	100%
21	Ice Fields	119,204	39,039	18,296	6,965	4,764	97%	93%	89%	83%	80%
	Forest-wide	5,405,872	2,299,369	1,450,310	669,321	490,903	92%	87%	84%	80%	78%

[1] Original POG is defined in this EIS as the POG that existed, outside of towns, prior to all mapped timber harvest. About 300 acres were mapped as harvested in the 1700s and 1800s and about 16,000 acres are from the first half of the 1900s. The vast majority (about 438,000 acres) has occurred since 1950. To estimate original high volume and SD67 POG, an estimate was made of the percentage of past harvest in these categories using timber type mapping from the mid-1980s. Based on this analysis, prior harvest on NFS lands was estimated to have been 29% SD67 and 64% high volume (see Appendix B).
[2] High-volume POG contains the largest tree types (SD5S, SD5N, SD67).

the highest rate of past harvest. Ten provinces have had less than 5 percent harvest and six provinces have had 1 percent or less. Significant among these is Admiralty, which had nearly 600,000 acres of original POG and only about 1 percent harvest on NFS lands.

Approximately 454,724 acres of old growth have been harvested on the Tongass National Forest, with 96 percent (435,039 acres) having been harvested since 1954, when industrial-scale logging began. The two decades with the greatest amount of harvest were the 1960s and the 1970s; these two decades account for 50 percent of all Tongass old-growth harvest (Table 3.9-8).

Harvest practices and regulations on the Tongass have varied substantially over the years. The amount of harvest is categorized in Table 3.9-9 according to specific periods of relatively consistent land management.

Table 3.9-8
Past Harvest by Decade on the Tongass National Forest

Decade	Harvest Acres	Percent of All Harvest
2000-2006	15,507	3%
1990-1999	80,846	18%
1980-1989	87,946	19%
1970-1979	117,645	26%
1960-1969	109,544	24%
1950-1959	26,994	6%
1940-1949	6,456	1%
1930-1939	1,502	0%
1920-1929	5,064	1%
1910-1919	2,669	1%
<1910	550	0%
Total	**454,724**	**100%**

Table 3.9-9
Past Harvest Relative to Management Practices on the Tongass National Forest

Period	Harvest Acres	Period Description
1997-2006	29,218	Represents the current period under the 1997 Forest Plan (as amended); high level of resource protection
1991-1996	52,266	TTRA had passed and Forest Plan was under revision; proportional harvest for long-term contracts and stream buffers required
1979-1990	115,401	1979 Forest Plan was in effect, but prior to TTRA amendment
1954-1978	237,154	Prior to the first Forest Plan – initial period of industrial-scale logging; relatively few restrictions
1750-1953	20,685	Prior to the first Forest Plan and before industrial-scale logging began
Total	**454,724**	

In general, the more recent the harvest the more protections were in place. Approximately 57 percent of the harvest on the Tongass occurred prior to the protections adopted by the first Forest Plan in 1979. Another 25 percent was harvested after the first Forest Plan, but before the additional riparian protections and proportionality requirements of TTRA (see below). An additional 12 percent of the harvest took place after TTRA, but before the current Forest Plan was adopted, which implemented extensive harvest restrictions. Thus, only 6 percent of the old-growth harvest on the Tongass has taken place under the current Forest Plan, which offers the greatest protections.

Past harvest on the Tongass has disproportionately targeted the larger POG types. Early logging in particular, especially prior to the 1990s, extensively harvested the larger tree types. These types were not only the highest timber volume types, but they also often grew at lower elevations in the easiest areas to access (e.g., valley bottoms and lower slopes). When TTRA was passed, the harvest of the largest tree categories was limited as a proportion of total harvest. This applied only to the long-term contracts, which were in effect at the time and extended into the late 1990s.

In this discussion, larger POG types are defined by two categories: 1) large tree POG, also referred to as SD67, is the type with the largest average diameter tree diameter sizes and 2) high-volume POG, which includes the three largest types (SD67, SD5N, and SD5S), and represents the types with the highest average timber volume. Both of these categories are of high value for wildlife and aesthetics, but the large-tree POG is considered of highest value.

The proportion of harvest in these larger POG types was estimated based on timber type mapping conducted in the mid-1980s. As a result, we estimate that 31 percent of all harvest on NFS lands conducted prior to 1992 (when the proportionality requirement of TTRA began to be implemented) consisted of large-tree POG and 66 percent consisted of high-volume POG. From 1992 to the present, these percentages dropped to approximately 17 percent for large-tree POG and 52 percent for high-volume POG. The original composition of POG on the Tongass National Forest is estimated to have included 12 percent large-tree POG and 43 percent high-volume POG. Averaging all past harvest together, the weighted average harvest of large-tree and high-volume POG was 29 and 64 percent of the harvest. As a result of the cumulative disproportionate harvest on NFS lands over the years, the overall proportion of larger tree types on the Tongass have been reduced to 11 percent for large-tree POG and 41 percent for high-volume POG.

The composition of recent past harvest (under the current Forest Plan) by SDM category is summarized in the Tongass 2006 Annual Monitoring Report (USDA Forest Service 2007h). Of the 17,202 acres harvested during the period, 1998 through 2003, approximately 14 percent was from the large tree type (SD67) and 48 percent occurred in high-volume POG (SD5S, SD5N, and SD67), indicating that harvest has been slightly disproportionate during this period as well. However, this has been a period of relatively poor economics and only a small percentage of the total harvest allowed under the Forest Plan has been implemented.

Table 3.9-7 displays the original amount of POG and the percent remaining in different categories by biogeographic province. This table also provides an indication of the rate of past harvest for different types. For example, 87 percent of the original high-volume POG and 80 percent of the original large-tree POG are remaining Forest-wide. As noted above, the larger tree types were targeted for logging, especially at lower elevations. As a result, 84 percent of the original high-volume POG and 78 percent of the large-tree POG below 800 feet are remaining today.

Three provinces – East Baranof, Etolin, and North Central Prince of Wales – have had more than 20 percent of their high-volume POG harvested. Conversely, 13 provinces have had 10 percent or less of their high-volume POG harvested. Five provinces – East Baranof, West Baranof, Kupreanof/Mitkor, Etolin, North Central

Prince of Wales have had more than 30 percent of their large-tree POG harvested and 9 provinces have had 10 percent or less removed.

At low to intermediate elevations, the same limestone soils that produce karst topography and caves are very productive and produce some of the largest tree forests on the Tongass. As a result, POG forests on karst terrain have been harvested at a very high rate. Overall, 31 percent of all POG growing on karst soils of the Tongass has been harvested (95,000 acres harvested out of 303,000 original acres). Approximately 38 percent of the low elevation (less than 800 feet) POG growing on karst soils of the Tongass has been harvested (81,000 out of 216,000 acres). Over half of this harvest has occurred in the North Central Prince of Wales province where karst terrain is most well developed.

Overview of Past Harvest on Non-National Forest System Lands

Many of the non-NFS lands in Southeast Alaska are also available for timber harvest and much harvest has occurred on these lands, which cumulatively affects old-growth forest resources (see the *Timber* section in this chapter). The non-NFS landowners include the Alaska native corporations, the State of Alaska, and other private landowners and local governments within the Tongass boundary. Areas within Southeast Alaska, but outside the Forest boundary are managed by the National Park Service (Glacier Bay National Park), the Bureau of Land Management, the State of Alaska, and private landowners and local governments.

The major landowners that harvest timber on non-NFS lands within the Tongass boundary are the Alaska native corporations, including Sealaska, the regional corporation, and 12 village corporations. Together, the native corporations own and manage approximately 579,000 acres within the Tongass boundary (see Table 3.11-1 in the *Lands* section). In addition, the State of Alaska owns and manages 454,000 acres of lands within the Tongass boundary, and an additional 513,000 acres of lands north and west of Haines in and adjacent to the Haines State Forest. A portion of these state lands are managed for timber harvest. Other private landowners and local governments own and manage another 227,000 acres of lands within the Tongass boundary and a limited acreage outside the boundary; some of these acres are managed for timber.

Past old-growth harvest on non-NFS lands within the Tongass boundary consists of approximately 301,000 acres on native corporation lands (some of which is partial harvest), 35,000 acres on state lands, and 14,000 acres on other lands. Outside the Forest boundary, primarily in the Haines area, an additional 21,000 acres have been harvested. Thus, the total non-NFS harvest of old growth within the Tongass Forest boundary is approximately 351,000 acres and an estimated total of 371,000 acres have been harvested on non-NFS lands throughout Southeast Alaska.

Intensive harvest on non-NFS lands started later than on NFS lands, beginning in earnest in the late 1970s. High rates of harvest began in the early 1980s, peaking in the early 1990s, and decreasing to a lower level at present. The decades with the highest harvest were the 1980s and 1990s.

As a result of the timing of past harvest, a large majority (about 94 percent) of the second growth on non-NFS lands is less than 25 years old and is currently in the stand initiation stage. Only about 6 percent is currently in the early stages of the stem exclusion stage.

The Alaska Forest Resources and Practices Act (FRPA) (Alaska Statute 41.17) governs how timber harvesting, reforestation, and timber access can occur on state, private, and municipal land. The FRPA was originally adopted in 1978. Major revisions were adopted in 1990 to address riparian management on private land and other issues. Additional changes to the stream classification system and riparian management standards for coastal forests were adopted in 1999. Approximately 48 percent of the harvest on non-NFS lands in Southeast Alaska occurred prior to the major protective revisions to the FRPA in 1990. However, the majority of the harvest (52 percent) occurred after the FRPA revisions were adopted.

Disproportionate past harvest has occurred at a higher rate for large-tree POG and at approximately the same rate for high-volume POG on non-NFS lands compared with NFS lands. Overall, 37 percent of the non-NFS harvest acres consisted of large-tree POG and 62 percent consisted of high-volume POG. As a result of past harvest on non-NFS lands within the Forest boundary, the proportion of larger tree types has been reduced to 6 percent for large-tree POG and 37 percent for high-volume POG. Counting all non-NFS lands within Southeast Alaska, the percentages are 7 percent for large-tree POG and 56 percent for high-volume POG. The higher percentages for high-volume POG are because of the prevalence of these types and the low rate of harvest in the Glacier Bay and Chilkat River complex biogeographic provinces.

Cumulative Past Harvest

Overview

Cumulatively, of the 6.13 million acres of POG that originally existed on all lands within the Tongass Forest boundary (outside of that occupied by towns), approximately 805,000 acres or 13 percent has been harvested. When considering all of Southeast Alaska, including Glacier Bay National Park and the lands around Haines and Skagway, approximately 826,000 acres, or 13 percent, have been harvested out of 6.5 million acres of original POG. Approximately 92 percent of the original POG is present on the Tongass and 66 percent is estimated to remain on non-NFS lands. The percent of total POG remaining for all of Southeast Alaska is estimated to be 87 percent.

Timber harvest has occurred in a spatially clumped fashion within Southeast Alaska, with activity concentrated on islands, such as Prince of Wales, northeast Chichagof, northern Kuiu, and Zarembo. Very little activity has occurred on some other islands and much of the mainland (e.g., within the 19 designated Wilderness Areas and National Monuments and 12 legislated LUD II areas). Table 3.9-10 displays the land area, acreage of remaining POG and POG harvested, and percentage of POG remaining by land category for all lands in Southeast Alaska by biogeographic province. The percentage of the original POG forest no longer in an old-growth condition can serve as a general indicator of the potential effect on several biodiversity aspects, including structural (within-stand) diversity, connectivity (unfragmented, continuous old-growth blocks), and age and species composition (including understory species).

Some harvest has occurred in 20 of the 23 biogeographic provinces in Southeast Alaska; however, 13 provinces have over 90 percent of their original POG remaining (Table 3.9-10). Over 30,000 acres have been harvested in 6 biogeographic provinces (Table 3.9-10); the harvest in these 6 provinces accounts for about 75 percent of all harvest in Southeast Alaska. Only 2 provinces, North Central Prince of Wales and Dall Island and Vicinity, have had 20 percent or more of their original POG harvested.

Disproportionate Past Harvest

Across the Tongass and Southeast Alaska in general, timber harvest has been concentrated in the larger tree types and the higher timber volume classes. While approximately 87 percent of all POG remains across Southeast Alaska, about 82 percent of high-volume POG remains unharvested, and about 68 percent of large-tree POG remains. To a lesser extent, timber harvest has also been concentrated at the lower elevations (e.g., approximately 84 percent of the high-volume, low-elevation old growth remains unharvested on NFS lands compared with 87 percent of high-volume POG on NFS lands in general) (Table 3.9-7).

Large-tree stands found in alluvial river bottoms and karst areas were the target of early clearcut logging throughout Southeast Alaska (especially in the 1950s through the 1970s); some clearcuts were extensive and in many cases trees were harvested to the stream banks. With growing concerns over fisheries protection and proportionality, buffer restrictions were instituted in the 1990s.

As timber harvest moved away from streams and further inland, large-tree karst forests began to receive more logging pressure than did the riparian and alluvial fan forests due to their excellent drainage and the ease of road-building on these low, rolling landscapes (Albert and Schoen 2007, Chapter 2).

Most harvested POG was high-volume POG and a high proportion of this harvest was the largest tree category (SD67). Approximately 10 percent of the remaining POG in Southeast Alaska is mapped as the largest tree category (SD67); 42 percent of the remaining POG is mapped as high volume. The greatest concentrations of POG in the largest tree categories are in the North Central Prince of Wales and the Admiralty Island Biogeographic Provinces. These two biogeographic provinces account for 40 percent of the remaining large-tree POG inside the Forest boundary and 38 percent of the remaining large-tree POG in Southeast Alaska (Tables 3.9-7 and 3.9-10). These values serve as baselines for comparison with potential changes under the alternatives considered in this analysis.

Albert and Schoen (2007) estimate that, although approximately 10 percent of all POG is represented by large-tree forests, it has been harvested at a rate of nearly three times its availability on the landscape. Furthermore, harvest of these large-tree stands has primarily occurred at low elevations, particularly within valley floor (flood plain) areas and on karst lands. Albert and Schoen (2007) estimate that low elevation karstland forests make up only 2.7 percent of the region's POG, but these types have also been the focus of timber harvest in Southeast Alaska, accounting for approximately 15 percent of all timber harvest in Southeast Alaska (Chapter 2, Table 4).

Harvest of POG growing on karst terrain may be the most disproportionate example of the types of past harvest. Karst mapping covers 458,000 acres of the Tongass, 303,000 acres (66 percent) of which was originally covered by POG. Although limited amounts of karst POG occur in almost all provinces of Southeast Alaska, the majority is found in five provinces: North Central Prince of Wales, Southern Outer Islands, Dall Island and Vicinity, East Chichagof, and Admiralty Island.

Today, 208,000 acres (69 percent) of the original POG on karst terrain remains. Therefore, 31 percent of the original POG on NFS karst terrain has been harvested, compared with 8 percent of POG in general. Karst POG at low elevations were targeted by early harvest activity at an even higher rate. Of the 216,000 acres of karst POG originally found at low elevations (less than 800 feet) on NFS lands, 81,000 acres or 38 percent have been harvested.

Table 3.9-10
Existing POG, Past Harvest, and Percent of Original POG Remaining for NFS, Non-NFS and All Lands by Biogeographic Province for Southeast Alaska

		Existing POG			Part Harvest of POG			% of Original POG Remaining			% of Original High Volume POG Remaining			% of Original SD67 POG Remaining		
No.	**Biogeographic Unit**	**NFS**	**Non-NFS**	**All Lands**	**NFS**	**Non-NFS**	**All Lands**	**NFS**	**Non-NFS**	**All Lands**	**NFS**	**Non-NFS**	**All Lands**	**NFS**	**Non-NFS**	**All Lands**
1	Yakutat Forelands	47,770	41,456	89,226	3,627	13,991	17,618	93%	75%	84%	93%	66%	81%	96%	16%	81%
2	Yakutat Uplands	23,399	0	23,400	1,411	0	1,411	94%	--	94%	92%	--	92%	83%	--	83%
3	East Chichagof Island	395,100	34,935	430,035	44,208	37,503	81,711	90%	48%	84%	84%	34%	76%	73%	16%	58%
4	West Chichagof Island	72,038	331	72,369	0	0	0	100%	100%	100%	100%	100%	100%	100%	--	100%
5	East Baranof Island	88,311	1,027	89,338	13,530	2	13,531	87%	100%	87%	77%	99%	77%	33%	0%	33%
6	West Baranof Island	215,021	12,731	227,753	16,978	2,354	19,332	93%	84%	92%	83%	69%	82%	46%	38%	44%
7	Admiralty Island	589,823	7,800	597,623	8,595	20,135	28,730	99%	28%	95%	98%	21%	94%	98%	15%	91%
8	Lynn Canal	153,160	16,254	169,414	5,378	549	5,927	97%	97%	97%	95%	95%	95%	88%	88%	88%
9	North Coast Range	317,677	38,786	356,463	221	20,561	20,782	100%	65%	94%	100%	57%	92%	100%	33%	77%
10	Kupreanof/Mitkof Island	305,846	29,258	335,104	35,742	35,026	70,768	90%	46%	83%	81%	28%	71%	65%	8%	47%
11	Kuiu Island	294,075	1,855	295,929	28,494	144	28,639	91%	93%	91%	90%	84%	90%	82%	58%	82%
12	Central Coast Range	245,701	5,258	250,959	6,479	1,433	7,912	97%	79%	97%	96%	69%	95%	91%	24%	89%
13	Etolin Island	218,714	13,390	232,104	36,066	4,476	40,543	86%	75%	85%	77%	61%	76%	54%	20%	51%
14	North Central Prince of Wales	514,268	84,377	598,645	184,125	135,406	319,532	74%	38%	65%	66%	24%	56%	69%	12%	55%
15	Revilla Isl./Cleveland Pen.	503,091	70,123	573,213	45,658	24,906	70,563	92%	74%	89%	88%	62%	84%	71%	9%	59%
16	Southern Outer Islands	113,451	4,887	118,338	15,138	5,827	20,964	88%	46%	85%	82%	33%	77%	74%	16%	67%
17	Dall Island and Vicinity	67,986	31,635	99,621	369	32,916	33,285	99%	49%	75%	99%	33%	68%	99%	8%	42%
18	South Prince of Wales	162,097	11,077	173,174	3,292	14,536	17,828	98%	43%	91%	97%	43%	88%	98%	48%	88%
19	North Misty Fiords	198,559	2,261	200,820	1,370	841	2,211	99%	73%	99%	99%	58%	98%	97%	18%	95%
20	South Misty Fiords	309,900	276	310,176	0	0	0	100%	100%	100%	100%	100%	100%	100%	100%	100%
21	Ice Fields	115,160	113	115,273	4,044	0	4,044	97%	100%	97%	93%	100%	93%	83%	100%	83%
	Total within Forest Boundary[1]	**4,951,148**	**407,829**	**5,358,976**	**454,724**	**350,606**	**805,331**	**92%**	**54%**	**87%**	**87%**	**40%**	**81%**	**80%**	**17%**	**68%**
	Chilkat River Complex	0	145,104	145,104	0	20,637	20,637	--	88%	88%	--	89%	89%	--	73%	73%
	Glacier Bay/Fairweather Range	0	170,840	170,840	0	200	200	--	100%	100%	--	100%	100%	--	--	--
	Total Southeast Alaska	**4,951,148**	**723,773**	**5,674,921**	**454,724**	**371,443**	**826,168**	**92%**	**66%**	**87%**	**87%**	**64%**	**82%**	**80%**	**26%**	**68%**

[1] Includes Annette Island and all of the Ice Fields province, although they are not entirely within the Forest boundary.

Although only 26,000 acres of mapped karst POG originally occurred on non-NFS lands, harvest rates are higher if non-NFS lands are considered as well. Assuming that 50 percent of all non-NFS karst POG and 75 percent of all non-NFS low elevation karst POG have been harvested, the overall harvest rate for karst POG in Southeast Alaska was estimated at 33 percent overall, and 41 percent for low elevation karst.

Current Conditions by Biogeographic Province

This section summarizes the affected environment in each biogeographic province, with respect to past harvest and other past developments on NFS and non-NFS lands. The primary sources for this information include the Tongass GIS layers, GIS layers provided by the State of Alaska, GIS layers provided by Sealaska Corporation, interpretation of aerial photographs and orthophotography to create new GIS layers, GIS layers developed by The Nature Conservancy based on satellite imagery (Albert and Schoen 2007), and the State's FRPA detailed plan of operation database of harvest activities on non-NFS lands. A tabular summary of past harvest information is presented as a catalogue of past harvest in Appendix E.

A description of the climate, topography, vegetation, and other factors related to biodiversity is provided for the 23 biogeographic provinces in Southeast Alaska in Table 3.9-1. In addition, a description of the natural history for 22 biogeographic provinces (some of these provinces follow different boundaries) in Southeast Alaska is presented by Carstensen et al. (2007). Some of the key relevant information from both of these sources is also summarized here.

In addition, these sections summarize the effects of past harvest on the biodiversity and old-growth habitats of Southeast Alaska. The effects of past harvest are differentially discussed for NFS and non-NFS lands, as well as cumulatively. A similar analysis of the current condition of old-growth integrity and biodiversity within the biogeographic provinces of Southeast Alaska is presented by Carstensen et al. (2007).

<u>Yakutat Forelands</u>

The Yakutat Forelands biogeographic province is a very young and nearly flat landscape at the northern end of Southeast Alaska that supports a complex mosaic of forest and wetlands. Approximately 65 percent of the province is in congressionally protected land designations (mostly in the Yakutat Forelands LUD II and Glacier Bay National Park). Private and State of Alaska lands comprise about 5 percent of the province and consist primarily of Yak-Tat Kwaan Village Corporation lands (4 percent of the province). State of Alaska lands also comprise a significant percentage (1 percent of the province).

A relatively low percentage of NFS POG has been harvested (about 4,000 acres). As a result, approximately 93 percent of the original POG on NFS land remains today. The native corporation and state lands in the province (mostly near Yakutat), have experienced relatively high harvest (about 14,000 acres); however, essentially no harvest has occurred in Glacier Bay National Park within the province. As a result, about 75 percent of the original POG remains on non-NFS lands. Most of the harvest took place in the mid-1980s or earlier, so the young growth that resulted is primarily at the end of the stand initiation stage or the beginning of the stem exclusion stage (Appendix E). Overall, 84 percent of the original POG on all lands within the province remains today. Harvest of larger tree types has occurred at a rate slightly higher than the overall rate and it is estimated that the percentage of high-volume and large-tree POG remaining today is 81 percent for both categories.

One very large block of large-tree POG exists in the upper Situk River and adjacent small watersheds, near the northeastern edge of the province. As a result of this large block and other patches, 51 percent of the existing POG in the province is mapped as high volume and 29 percent is mapped as large-tree POG. These percentages are among the highest of the provinces in Southeast Alaska, although the province includes only 89,000 acres of existing POG. However, this province is prone to extensive windthrow events, and the extensive large-tree POG in this area is susceptible to blowdown as well as future harvesting.

Past harvest has not significantly affected the biodiversity of the province or the integrity of the old-growth ecosystem, except on native corporation lands in a relatively confined area east of Yakutat where extensive harvest has taken place. Although POG has been locally harvested intensively, the overharvest of large-tree or high-volume POG has not been a significant factor in this province. Past blowdown events have also reduced the extent of old growth within the province. However, because the landscape of the Yakutat Forelands is so geologically young, this natural reduction of old growth by wind is compensated somewhat, by the natural succession of large acreages of younger forest that have colonized fresh substrates.

Yakutat Uplands

This rugged and mountainous province includes extensive active glaciers, fiords, and mountains rising from sea level to more than 10,000 feet. Approximately 38 percent of the province is in congressionally protected land designations (primarily the Russell Fiord Wilderness). Aside from a few acres of private lands (less than 0.1 percent), the province is virtually 100 percent within the Tongass National Forest.

Slightly over 1,000 of the 25,000 original acres of POG in the province have been harvested; therefore, 94 percent of the original POG remains today. Harvest of larger tree types has occurred at a higher rate so it is estimated that the percentage of high-volume and large-tree POG remaining today is 92 and 83 percent, respectively.

High-volume POG makes up almost half of the POG in the province (46 percent). However, large-tree POG comprises only 9 percent because of the lack of highly productive sites. The province contains only about 23,000 acres of existing POG. Portions of the province are prone to extensive windthrow events, as is the case for the Yakutat Forelands province.

Because past harvest has been so low in this province, little effect on the biodiversity or old-growth ecosystem integrity of the province has occurred. As is the case for the Yakutat Forelands province, wind may play the role of diminishing existing old growth, while primary succession of natural young-growth forests will contribute to the extent of POG over time.

East Chichagof Island

This rugged province is characterized by steep, U-shaped valleys and rounded mountains and is deeply dissected into three peninsulas. Karst terrain occupies high elevations and steep sideslopes, mostly above the POG, but the U-shaped valleys contain a substantial amount of valley floor POG, including large-tree types. Approximately 31 percent of the province is in congressionally protected land designations (25 percent in four LUD II areas and 6 percent in the West Chichagof-Yakobi Wilderness). Non-NFS lands comprise about 8 percent of the province, and consist primarily of Sealaska lands (5 percent of the province) and Huna Totem

Village Corporation lands (2 percent of the province). It includes the town of Hoonah and several smaller settlements including Tenakee Springs and Pelican.

Approximately 10 percent of the original POG on NFS lands has been harvested (about 44,000 acres). Most of this harvest took place in the 1970s, 1980s, and 1990s (Appendix E). On native corporation lands and other non-NFS lands in the province, approximately 38,000 additional acres or 52 percent have been harvested, primarily in the past 25 years. As a result, about 90 percent of the original POG on NFS lands, about 48 percent of the original POG on non-NFS lands, and about 84 percent of the original POG on all lands remains today. The vast majority of all harvest has taken place within the last 25 years and, therefore, the resulting young growth is in the stand initiation stage of succession. Harvest of the larger tree types (especially large-tree POG) occurred at a high rate relative to other POG types in this province, and it is estimated that 76 percent of the high-volume types and 58 percent of the large-tree types remain today.

Most high-volume and large-tree POG occurred along the shoreline and within valley bottoms in the province, and this POG was targeted by past harvest. Although only about 16 percent of all POG has been harvested in the province, approximately 42 percent of all large-tree POG and 24 percent of all high-volume POG has been harvested. This province also originally contained about 46,000 acres of POG on karst terrain. About 17 percent of this karst POG has been harvested.

Past harvest has had a substantial effect on old-growth ecosystems in some watersheds of this province. This has occurred in many of the watersheds on NFS lands of northeast and southeast Chichagof, and on native corporation lands to the south, southeast, and west of Hoonah. As noted above, overharvest of high-volume POG, and especially large-tree POG, has occurred and floodplain/valley bottom large-tree POG was targeted in the past in many of these watersheds. Because of the rugged topography of this province, the largest tree forests and the easiest access for logging were concentrated in these valley bottom areas. The rate of disproportionate harvest on NFS lands was substantially reduced with the passage of the Tongass Timber Reform Act in 1990 (which had a proportionality requirement for high vs. low volume Forest-wide) and with the adoption of the 1997 Forest Plan, which incorporates large portions of the floodplain areas on Chichagof Island within riparian buffers; however, most past harvest was conducted prior to the 1990s (Appendix E).

One area of particular concern is the narrow neck of land that connects northeast Chichagof to the main body of the island. This “pinch-point” or “bottleneck” may constrain wildlife movements and genetic interchange for other plants and animals because of the relatively narrow corridors of habitat between saltwater areas. This area has experienced some past harvest and could be significantly affected if substantial future harvest in this area were to occur. A second area of concern is the pinch-point connecting Lisianski Inlet with the North Arm of Peril Strait in the western portion of the province. However, this area lies completely within congressionally protected land designations. See the *Wildlife* section for a description of pinch-points and an analysis of the effects of additional development in these areas on wildlife movements.

<u>West Chichagof Island</u>

This province has a very wet climate and is exposed to outer coastal storms. It has a highly irregular shoreline with hundreds of small islands. Topography is gentler than the mountains of Baranof Island. Approximately 87 percent of the province is within congressionally protected land designations, mostly within the West

Chichagof – Yakobi Wilderness. Non-NFS lands comprise less than 0.5 percent of the province.

As a result of the high proportion of congressionally protected areas and the relatively low productivity of the province, no known harvest has taken place, either on NFS lands or on non-NFS lands. Therefore, the original percentage of high-volume and large-tree POG remain today. Approximately 24 percent of the POG in the province is high volume and 3 percent is large-tree POG. The province includes about 72,000 total acres of POG.

East Baranof Island

The East Baranof Island province is rugged and steep to saltwater, with relatively few flat lands. It includes among the highest and most rugged topography found on the islands of Southeast Alaska. Approximately 23 percent of its land area lies within the South Baranof Wilderness. Less than 1 percent of the province is comprised of non-NFS lands (the majority of which is state-owned).

Approximately 13 percent of the original POG on all lands has been harvested (about 14,000 acres), resulting in 87 percent of the original POG remaining. The majority of the harvest in this province was conducted in the 1960s (Appendix E), when relatively few restrictions on harvesting were in place. About 77 percent of the original high-volume POG and about 33 percent of the original large-tree POG remains today, indicating a high disproportionate harvest, particularly of large-tree POG.

The remaining large-tree POG is relatively scattered in small patches, often occurring in valley bottoms. However, high-volume POG occurs in many areas and along shorelines and within river valleys.

As is the case for East Chichagof, past harvest in the East Baranof Island province has had a substantial effect on old-growth ecosystems of several watersheds in the northern portion of the province. As noted for East Chichagof, overharvest of high-volume POG, and especially large-tree POG, occurred in floodplain/valley bottom areas, which were targeted because of the presence of large trees and the rugged topography elsewhere. Also as noted for East Chichagof, the rate of disproportionate harvest on NFS lands was substantially reduced with the passage of the Tongass Timber Reform Act in 1990, and with the adoption of the 1997 Forest Plan; however, most past harvest was conducted prior to the 1990s (Appendix E).

West Baranof Island

This province is similar to the West Chichagof Island Province with the exception of southern Baranof, which has exceptionally high precipitation. Baranof Island is the most rugged of all the islands in Southeast Alaska. Approximately 31 percent of the province is protected within the South Baranof Wilderness or the Enacted Municipal Watershed of Sitka. Non-NFS lands comprise about 4 percent of the province and consist of lands owned by the city and borough of Sitka, the State of Alaska, Shee Atika Village Corporation, and a variety of other private owners.

Approximately 7 percent of the original POG on NFS lands has been harvested (about 17,000 acres). On the State of Alaska and other non-NFS lands, 16 percent (2,000 acres) has been harvested. Overall, this results in 92 percent of the original POG on all lands remaining today. The vast majority of these acres were harvested 30 to 40 years ago and they are now in the stem exclusion stage of succession (Appendix E). High-volume POG was harvested at a rate higher than the overall harvest rate; 82 percent of all high-volume POG remains. Large-tree POG has been harvested at a much higher rate; an estimated 44 percent of all large-tree POG remains today.

Most remaining high-volume and large-tree POG is distributed along the shoreline and in river valleys. On all land ownerships combined, 25 percent of all POG is high volume, but only 2 percent is large-tree POG.

Although the overall rate of past harvest within the province is relatively low, the rate for the northern portion of the province is relatively high and the effects of past harvest on some watersheds in this area has also been relatively high. As noted for East Chichagof and East Baranof, overharvest of large-tree POG has occurred in floodplain/valley bottom areas, which were targeted because of the presence of large trees and the rugged topography elsewhere. As a result, less than half of the original large-tree POG in the province remains today.

Admiralty Island

The Admiralty Island Province has relatively gentle topography and moderate rainfall. Forest productivity is high. Approximately 90 percent of the province is protected within the Admiralty National Monument (Kootznoowoo Wilderness). Non-NFS lands in the province represent 4 percent of the land area and primarily consist of Shee Atika Village Corporation lands near Cube Cove, as well as lesser amounts of Sealaska Regional Corporation and State of Alaska lands and other ownerships. The village of Angoon occurs on the west side of the island and the Greens Creek mine at the north end of the island. The Greens Creek mine is the largest operating mine on the Tongass; however, it only occupies about 320 acres for facility development (see *Minerals* section).

Admiralty Island province ranks second in POG acreage relative to all other provinces in Southeast Alaska (598,000 acres). Before commercial timber harvest was initiated, it ranked third in POG acreage. Although 99 percent of the original POG on NFS lands remains today, about 72 percent (20,000 acres) of the POG on non-NFS lands has been harvested and only 28 percent is remaining. Because of the dominance of NFS lands in the province, 95 percent of the original POG remains on all lands combined. High-volume and large-tree POG have been harvested at a rate slightly higher than the overall POG harvest rate; 94 percent of all high-volume POG and 91 percent of all large-tree POG remain today.

High-volume and large-tree POG are abundant throughout the province. On all lands combined, approximately 51 percent of POG is high volume and 17 percent consists of large-tree POG. This province also originally contained about 38,000 acres of POG on karst terrain. Only about 3 percent of this karst POG has been harvested.

Although most of the province has experienced little to no past harvest, the area on native corporation lands near Cube Cove in the northwest portion of the province has been extensively harvested. Because the majority of all POG in three major adjacent drainages and adjacent areas near Cube Cove has been harvested, effects on the biodiversity and old-growth integrity in this local area have been substantial. However, the vast majority of Admiralty Island remains intact and, as a result of the abundance of POG in this province, including high-volume and large-tree POG, it represents a massive reserve and reservoir for biological diversity in Southeast Alaska.

Lynn Canal

The Lynn Canal province is characterized by rugged and glaciated topography and relatively low precipitation. The southern portion of the Chilkat Peninsula is more similar to the East Chichagof Island Province than to the rest of the province. Approximately 22 percent of the province is included within congressionally protected land designations (15 percent wilderness and 6 percent LUD II). Non-

NFS lands comprise about 4 percent of the province; the State of Alaska manages the majority of this land. The cities of Juneau and Douglas occur on the east side of Lynn Canal within the province.

Approximately 169,000 acres of POG currently exists in the province and 6,000 acres have been harvested. As a result, approximately 97 percent of the original POG remains today. High-volume POG and large-tree POG have both been harvested at a higher rate than other POG; 95 percent of high-volume POG remains, but only 88 percent of large-tree POG remains today.

The overall effects of past harvest on the biodiversity and old-growth ecosystem integrity within the province have been relatively low, because of the relatively low harvest rates. However, localized pockets of high harvest have occurred on the west side of Lynn Canal.

Northern Coast Range

The Northern Coast Range covers the rugged and glaciated coastal mountains of the northern mainland. It is characterized by deep fiords, tidewater glaciers, and active glacial rivers, including the Taku and Whiting Rivers, which extend into Canada. It also includes some less rugged topography on Douglas Island, Cape Fanshaw, and other locations. Approximately 23 percent of the province is in a congressionally protected land designation (wilderness) and an additional 1 percent is in a research natural area. Approximately 10 percent of the province (103,000 acres) is non-NFS lands, with the largest landowners being Goldbelt Village Corporation (35,000 acres), the State of Alaska (19,000 acres), and the city and borough of Juneau (19,000 acres)

Approximately 356,000 acres of POG currently exists in the province and about 21,000 acres have been harvested. Overall, 94 percent of the POG, 77 percent of the large-tree POG, and 92 percent of the high-volume POG remains today. However, almost all of the past harvest in the province is from non-NFS lands owned by Goldbelt in the vicinity of Hobart Bay. As a result, 65 percent of all POG on non-NFS lands remains and only 33 percent and 57 percent of the large-tree and high-volume POG types remains today on these lands, respectively.

On all lands combined, 7 percent of all POG is large-tree POG and 42 percent is high volume. Remaining larger tree types are well distributed at lower elevations throughout the province, except in the vicinity of Hobart Bay.

Although only about 6 percent of the original POG in the province has been harvested, as noted above, it is concentrated in the vicinity of Hobart Bay. Approximately two-thirds of the POG and a higher percentage of the larger tree types have been removed in this area on non-NFS lands. Thus, the effects of past harvest in the watersheds of this area have been relatively high.

Kupreanof/Mitkof Island

This province covers Kupreanof and Mitkof Islands in the center of Southeast Alaska and represents the province with the greatest extent of low-lying, muskeg wetlands. Because of the less rugged relief in the province, it is not as topographically fragmented as most other provinces; however, natural fragmentation of old growth does occur, due to the extensive wetlands. Approximately 6 percent of the lands of the Kupreanof/Mitkof Island province are in congressionally protected land designations; this is one of the lowest percentages in Southeast Alaska. Another 1 percent is protected in municipal watershed status. Non-NFS lands cover 90,000 acres, or 11 percent of the province. The State of Alaska is the largest individual landowner (31,000 acres), followed by Sealaska Regional Corporation (27,000 acres) and Kake Village Corporation (24,000 acres). Petersburg, Kake, and a few smaller settlements occur within this province.

POG currently exists on 335,000 acres and there has been about 71,000 acres of harvest in the province. Overall, 83 percent of the original POG remains today; however, 90 percent of NFS POG and 46 percent of non-NFS POG remains. Disproportionate harvest of larger tree types has occurred on NFS lands; about 65 percent of the original large-tree POG and 81 percent of the original high-volume POG remains. Disproportionate harvest has occurred even more intensively on non-NFS lands; only 8 percent of the original large-tree POG and 28 percent of the original high-volume POG remains. As a result of past disproportionate harvest and the relatively low original proportion of larger tree types in this province, large-tree POG and high-volume POG make up only about 6 percent and 32 percent of existing POG, respectively.

Harvest has occurred in many areas throughout the province and the remaining POG is also distributed throughout. However, the northwest corner of Kupreanof Island, near Kake, has been the most extensively harvested. The heavy POG harvest, especially of the larger tree types, has likely negatively affected biodiversity in this area.

One area of particular concern in this province is the narrow area between Lindenburg Peninsula and the remainder of Kupreanof Island. This pinch-point may constrain wildlife movements and genetic interchange for other plants and animals because of the relatively narrow corridors of habitat between saltwater areas. These areas have experienced some past harvest and could be significantly affected if substantial future harvest were to occur in this area. However, this area is largely protected by the Petersburg Creek-Duncan Salt Chuck Wilderness. See the *Wildlife* section for a description of pinch-points and an analysis of the effects of additional development in these areas on wildlife movements.

<u>Kuiu Island</u>

The Kuiu Island province has gentle topography relative to adjacent Baranof Island or the mainland. Kuiu Island is deeply dissected, creating several prominent peninsulas and obstacles to wildlife movements. Approximately 27 percent of the province is in congressionally protected land designations (mostly wilderness). The province is 99 percent NFS lands; only a few thousand acres are owned by others.

Approximately 296,000 acres of POG, containing about 12 percent large-tree POG and 53 percent high-volume POG, remains in the province. This compares with an estimated 325,000 original acres of POG, containing about 14 percent large-tree POG and 54 percent high-volume POG, indicating a slightly higher rate of past harvest of the larger tree types for all lands combined. Overall, 91 percent of all POG, 90 percent of high-volume POG, and 82 percent of large-tree POG remains today.

Most past harvest occurred in this province during the 1970s and 1980s (Appendix E). Although logging has occurred in many portions of the province, the southern two-thirds of the province has experienced relatively low rates of harvest. In contrast, the northern one-third of the island has undergone fairly extensive harvest, which began relatively intensively in the late 1960s. Because much of this logging occurred in the early years, prior to the implementation of many Forest Plan protections, some fairly extensive tracts are now in the stem exclusion stage of succession. Some of these watersheds with extensive early harvest have experienced relatively high old-growth fragmentation and effects on biodiversity.

One area of particular concern in this province is the narrow neck of land between the Bay of Pillars and Port Camden and the portage between Port Camden and

Threemile Arm, which connect the northern and eastern parts of the island to the rest of Kuiu Island. These pinch-points may constrain wildlife movements and genetic interchange for other plants and animals because of the relatively narrow corridors of habitat between saltwater areas. These areas have experienced some past harvest and could be significantly affected by substantial future harvest, if it were to occur. See the *Wildlife* section for a description of pinch-points and an analysis of the effects of additional development in these areas on wildlife movements.

Central Coast Range

The Central Coast Range covers the rugged and glaciated coastal mountains of the central mainland. It is similar to the Northern Coast Range, although it is less precipitous and warmer. The Stikine River system traverses the center of this province and has a major continental influence on it. Approximately 37 percent of the province is protected within the large Stikine-LeConte Wilderness. NFS lands comprise 97 percent of the province, State of Alaska lands cover 2 percent, and there are no other landowners with more than a few hundred acres.

POG currently exists on 251,000 acres and there has been about 8,000 acres of past harvest. Overall, 97 percent of the original POG remains today. Disproportionate harvest of larger tree types has occurred to some degree; about 95 percent of high-volume POG and 89 percent of large-tree POG remains today. High-volume and large-tree POG represent about 42 percent and 8 percent of the remaining POG, respectively.

The majority of the watersheds in the province have experienced no past harvest to very minor effects from past timber harvest. Exceptions are watersheds in the Thomas Bay area and the Bradfield River drainage. Relatively high rates of past harvest, including large-tree harvest, have had some negative effects on old-growth integrity and biodiversity in these watersheds.

Etolin Island and Vicinity

The Etolin Island and Vicinity province includes Etolin, Wrangell, Zarembo, and smaller islands. It is similar to the Kupreanof/Mitkof province and is subject to continental influence from the mainland and the Stikine River. Congressionally protected land designations (South Etolin Wilderness) cover 16 percent of the province and 95 percent of the province is under national forest management. The State of Alaska manages almost 5 percent of the province and the city of Wrangell owns almost 1 percent.

Approximately 232,000 acres of POG, containing about 35 percent high-volume POG and 6 percent large-tree POG, remains in the province. This compares with an estimated 273,000 original acres of POG, containing 39 percent high-volume POG and 9 percent large-tree POG, indicating a higher rate of past harvest of the larger tree types. Overall, 85 percent of all POG, 76 percent of high-volume POG, and 51 percent of large-tree POG remains today. Although disproportionate harvest has occurred on all ownerships, non-NFS lands have had the highest rate of disproportionate harvest; the 4,000 acres of past harvest on non-NFS lands included 39 percent of the high-volume and 80 percent of the large-tee POG.

Most harvest in this province occurred in the 1970s and 1980s (Appendix E). Harvest has occurred throughout the province, but especially on northern Etolin and Zarembo Islands, central Wrangell Island, and many of the smaller islands in the province. Watersheds containing the highest rates of past harvest include those on northwest Zarembo Island and the majority of Vank and Sokolof Islands. Past harvest in these areas and on some state lands has had negative effects on local biodiversity.

North Central Prince of Wales Island

The North Central Prince of Wales Island province covers the northern and central portions of Prince of Wales Island and some adjacent islands. It has relatively gentle topography and extensive areas of karst and limestone soils. Approximately 8 percent of the province is protected in congressional land designations (wilderness and LUD II) and approximately 79 percent of the province is under national forest management. Other major landowners include: Sealaska Regional Corporation (11 percent), State of Alaska (5 percent), Kavilco Village Corporation (2 percent), Klawock-Heenya Village Corporation (2 percent); Shan-Seet Village Corporation (1 percent); and Haida Village Corporation (1 percent). A number of small towns and settlements occur within the province including Craig, Klawock, Thorne Bay, Hydaburg, Coffman Cove, Hollis, and others.

The North Central Prince of Wales Island province originally contained more POG than any other province in Southeast Alaska and, after half a century of commercial timber harvest, it still does. The province currently contains 599,000 acres of POG; about 320,000 acres or 35 percent of the original POG have been harvested. Approximately 74 percent of the original POG remains on NFS lands and 38 percent remains on non-NFS lands. For high-volume POG, an estimated 66 percent remains on NFS lands and 24 percent remains on non-NFS lands. Similarly, for large-tree POG, an estimated 69 percent remains on NFS lands and only 12 percent remains on non-NFS lands.

Almost all of the past harvest on NFS lands took place in the 1960s through the 1990s, with the majority occurring in the 1960s and 1970s. On non-NFS lands, most of the harvest took place in the 1980s and 1990s, with substantial acreage harvested in the current decade as well (Appendix E). Therefore, a mixture of age groups occurs and the young growth in this province is split between the stand initiation and stem exclusion stages of plant succession.

This province originally contained about 152,000 acres of karst POG, or almost half of the karst POG within the Forest boundary in Southeast Alaska. About 72,000 acres, or 47 percent, has been harvested. This percentage climbs to about 52 percent if only karst POG at low elevations (less than 800 feet) is considered.

On NFS lands, 44 percent of the existing POG is high volume and 23 percent is large tree POG. On non-NFS lands, 31 percent of existing POG is high volume and 8 percent is large tree POG. Overall, 42 percent of the remaining POG on all lands is high volume and 20 percent is large tree POG. Because of its abundance, POG is still well distributed within the province; however, there are many areas of past intensive harvest where negative effects on biodiversity have likely occurred. These areas include parts of northern Prince of Wales Island; the Staney Creek, Thorne Bay, Big Salt, Craig/Klawock, and Hollis areas of central Prince of Wales Island; and much of Kosciusko and Tuxekan Islands.

One area of particular concern in this province is the Neck Lake area, which is a relatively narrow piece of land between Whale Passage and El Capitan Passage connecting the extreme northern Prince of Wales to the remainder of the island. This pinch-point could constrain wildlife movements and genetic interchange for other plants and animals because of the relatively narrow corridors of habitat between saltwater areas. In addition, this area has experienced relatively high past harvest and could be significantly affected by substantial future harvest, if it were to occur. See the *Wildlife* section for a description of pinch-points and an analysis of the effects of additional development in these areas on wildlife movements.

In addition, Sulzer Portage, a relatively narrow neck of land on Prince of Wales Island connecting West Arm Cholmondeley Sound and Portage Bay at the head of Hetta Inlet. It joins the North Central Prince of Wales and the South Prince of Wales Island provinces and has had considerable past timber harvest. Due to recent land selections, the immediate portage is entirely on non-NFS lands. Substantial future harvest, if it were to occur, could substantially affect ecological connectivity. See the *Wildlife* section for a description of pinch-points and an analysis of the effects of additional development in these areas on wildlife movements.

Revilla Island/Cleveland Peninsula

This province includes Revillagedo (Revilla), Gravina, Annette, Duke, and smaller islands, as well as the Cleveland Peninsula portion of the mainland. Approximately 23 percent of the province is in congressionally protected land designations (wilderness national monument and LUD II) and an additional 1 percent is in a municipal watershed status. About 85 percent of the province is under national forest management. The Annette Island Indian Reservation is the second largest ownership with 7 percent of the province, the State of Alaska is the third largest landowner with 5 percent, followed by Cape Fox Village Corporation at 2 percent, and Sealaska Regional Corporation at 1 percent. The cities of Ketchikan, Saxman, and Metlakatla occur within the province.

This province has the third largest number of acres of POG among all Southeast Alaska provinces. Approximately 573,000 acres of POG currently exist in the province, and 70,000 acres have been harvested. The remaining POG consists of 41 percent high-volume POG and 6 percent large-tree POG. Originally, 44 percent of the POG was high volume and 9 percent was large-tree POG, indicating a higher rate of past harvest of larger tree types. Overall, 89 percent of all POG, 84 percent of high-volume POG, and 59 percent of large-tree POG remains today. Although disproportionate harvest occurred on all ownerships, non-NFS lands had the highest rate of disproportionate harvest: the 25,000 acres of past harvest on non-NFS lands included 38 percent of the high-volume and 91 percent of the large-tree POG.

Harvest on NFS lands in this province has been relatively evenly distributed over time beginning in the 1950s, with the highest decadal harvest in the 1990s (Appendix E). Harvest on non-NFS lands has generally occurred in the more recent decades. Relatively high concentrations of past harvest have occurred at a number of areas along Behm Canal, George Inlet, Carroll Inlet, and near Ketchikan on Revilla Island and on northern Annette Island. In many of these areas, biodiversity has been affected due to the intensity of past harvest and the higher reductions in larger tree POG types.

Southern Outer Islands

The Southern Outer Islands is a small, isolated province subject to strong oceanic influences. Topography is low-lying and gentle and the islands are relatively rich in endemic vertebrate species. Almost half (49 percent) of the province is in congressionally protected land designations (wilderness and LUD II) and 94 percent of the province consists of NFS lands. Other major landowners include: Shaan-Seet Village Corporation (3 percent); State of Alaska (2 percent); and Sealaska Regional Corporation (1 percent).

The province contains a high proportion of POG relative to its size. It contains about 118,000 acres of existing POG and 21,000 acres of harvest have occurred; thus, the remaining POG represents 85 percent of the original POG acreage. The majority of the islands in the province have had little or no past harvest; harvest has been concentrated on Heceta Island, and to a lesser extent on San Juan Batista and Suemez Islands. Most NFS harvest was conducted in the 1960s through the 1980s

(Appendix C). Heceta Island is mostly covered with karst terrain and limestone soils and originally contained fairly extensive stands of large-tree karst POG; most of these stands have been cut. Today, about 38 percent of the existing POG within the province is high-volume and 11 percent is large-tree POG. On NFS lands, 88 percent of the original POG remains, while on non-NFS lands only 46 percent remains. About 82 percent of the original NFS high-volume POG remains compared with only 33 percent of the original high-volume POG on non-NFS lands. Similarly, 74 percent of the original large-tree POG exists today on NFS lands, while only 16 percent of original large-tree POG remains on non-NFS lands. This province originally contained about 39,000 acres of POG on karst terrain. To date, about 36 percent of this karst POG has been harvested.

Effects of past harvest have been slight to non-existent on most portions of most of the islands in the province. However, extensive past harvesting on Heceta Island, on both NFS and non-NFS lands, have affected the biodiversity in a number of the watersheds.

Dall Island and Vicinity

This province is located at the extreme southwestern corner of Southeast Alaska and, like the Southern Outer Islands province, is subject to strong oceanic influences. Unlike the Southern Outer Islands province, the topography of the Dall Island and Vicinity province is rugged and dissected with abundant limestone outcrops. The province includes Dall Island and Long Island along with numerous small islands. Approximately 3 percent of the province is in congressionally protected land designations and only 56 percent of the province consists of Tongass National Forest lands. This province has the lowest proportion of NFS lands of any province within the Tongass Forest boundary. Other major landowners include: Sealaska Regional Corporation (29 percent); Klukwan Village Corporation (11 percent); Haida Village Corporation (1 percent); and the State of Alaska (1 percent).

The Dall Island and Vicinity province contains approximately 100,000 acres of POG and has experienced 33,000 acres of harvest, almost all of which is on non-NFS lands. Almost all of this harvest was conducted either in the 1980s or in the last 10 years (Appendix E), so the majority of the young growth is still in the stand initiation successional stage. Approximately 99 percent of the original POG remains on NFS lands, along with 99 percent of the original high-volume POG and 99 percent of the original large-tree POG. On non-NFS lands, 49 percent of the original POG is remaining, while 33 percent of the original high-volume POG and 8 percent of the original large-tree POG remains today, indicating substantial disproportionate harvest of large-tree POG. This province originally contained about 12,000 acres of POG on karst terrain. To date, at least 10 percent of this karst POG has been harvested.

Much of the past harvest took place on private lands on Long Island, where extensive stands of large-tree POG originally existed. The province is believed to have originally contained the best representation of large-tree karst forest in Southeast Alaska (Carstensen et al. 2007). The biodiversity of watersheds on much of northern Long Island has been substantially modified due to expansive harvesting in this area. This level of modification has also occurred in some watersheds on eastern Dall Island.

South Prince of Wales Island

The South Prince of Wales Island biogeographic province covers the southern quarter of Prince of Wales Island and is characterized by steep and rugged topography and a highly dissected coastline. It is relatively warm and wet and provides habitat for plant species that do not grow further north. Approximately 28 percent of the province is in congressionally protected land designations (South Prince of Wales Wilderness and Nutkwa LUD II) and the majority of the province is roadless. Non-NFS lands comprise about 8 percent of the land area, about two-thirds of which is owned and managed by Kootznoowoo Village Corporation. Haida Village Corporation, the State of Alaska, and other parties comprise the remaining owners.

The province currently contains about 173,000 acres of POG and has had about 18,000 acres of past harvest. With the exception of the Chasina Peninsula in the northeast, relatively little past harvest has occurred on NFS lands in the province (about 3,000 acres). As a result, approximately 98 percent of the original POG on NFS land remains. Non-NFS lands have been relatively heavily harvested (approximately 14,000 acres) with approximately 43 percent of the original POG remaining. Counting all ownerships, 91 percent of the original POG remains. Harvest is concentrated in the northern portion of the province on the Chasina Peninsula and along Cholmondeley Sound. Although high-volume and large-tree POG have been harvested at higher rates than smaller tree types, it is estimated that 88 percent of both high-volume and large-tree POG remains in the province on all lands combined. However, the percent of these types remaining is much lower in local areas with the highest rates of harvest (e.g., Chasina Peninsula and Cholmondeley Sound).

Extensive tracts of high-volume POG, including large-tree forests, occur within the northwestern portion of the province and are mostly protected within the Nutkwa LUD II area. Because of these tracts and other areas of high-volume and large-tree POG, these types make up high percentages of the existing POG relative to other Southeast Alaska provinces (51 and 29 percent, respectively).

One area of particular concern on the edge of this province is the Sulzer Portage, a relatively narrow neck of land on Prince of Wales Island connecting West Arm Cholmondeley Sound and Portage Bay at the head of Hetta Inlet. It joins the North Central Prince of Wales and the South Prince of Wales Island provinces and has had considerable past timber harvest. Due to recent land selections, the immediate portage is entirely on non-NFS lands. Substantial future harvest, if it were to occur, could substantially affect ecological connectivity. See the *Wildlife* section for a description of pinch-points and an analysis of the effects of additional development in these areas on wildlife movements.

North Misty Fiords

The North Misty Fiords province has considerable topographic relief and a cold, mainland-type climate with many glaciers. Vegetation occurs in long, narrow strips along river valleys and lower slopes of fiords. The province is 99 percent NFS lands and 82 percent of the province is protected within the Misty Fiords National Monument, which is in wilderness status. The State of Alaska is the only other major landowner with 1 percent of the province.

The province contains 201,000 acres of existing POG and only 2,000 acres of past harvest. Thus, 99 percent of the original POG, 98 percent of the original high-volume POG, and 95 percent of the original large-tree POG remains today. High-volume and large-tree POG represent 33 percent and 6 percent of the existing POG, respectively. Because of the low degree of past harvest, their effects are relatively minor throughout the province.

South Misty Fiords

The South Misty Fiords province has lower topographic relief and is warmer than the North Misty Fiords province, but otherwise it is typical of the other mainland provinces. Forest vegetation is more diverse than the other coastal provinces, and vegetation is less fragmented by rock and ice than the North Misty Fiords province. The southwestern portion of the province is rolling, nearly continuous muskeg with conifer forests in the bottoms and flats. Approximately 99 percent of the province is in congressionally protected land designations (Misty Fiords National Monument) and nearly 100 percent is on NFS lands. The State of Alaska is the only other major landowner with less than 1 percent of the province.

The province contains 310,000 acres of existing POG and no measurable past harvest. Thus, 100 percent of the original POG, 100 percent of the original high-volume POG, and 100 percent of the original large-tree POG remains today. High-volume and large-tree POG represent 31 percent and 5 percent of the existing POG, respectively. Because of the lack of past harvest, no effects from past timber harvest have occurred within the province.

Ice Fields

The Ice Fields province covers the highest mountains along the eastern boundary of Southeast Alaska with Canada. It is dominated by permanent ice fields, active glaciers, and nunataks (mountain peaks between glaciers). Approximately 33 percent of the province is in congressionally protected land designations (wilderness or national monument) and nearly 100 percent is on NFS lands. The State of Alaska is the only other major landowner with less than 1 percent of the province.

The province contains 115,000 acres of existing POG in narrow bands along mountain valleys, and 4,000 acres of past harvest. Thus, 97 percent of the original POG, 93 percent of the original high-volume POG, and 83 percent of the original large-tree POG remains today. High-volume and large-tree POG represent 32 percent and 5 percent of the existing POG, respectively. Because of the low level of past harvest in this province, the effects of past harvest are localized and relatively minor throughout the province.

Chilkat River Complex

The Chilkat River Complex lies at the northern end of the Inside Pasage and is outside the Tongass Forest boundary. It consists of tall ridge systems, large glacial rivers, and includes glaciers and snowfields. Many of the rivers and drainage basins extend across the international boundary into Canada. Because of the overlap of coastal and interior floras and faunas, the province contains Alaska's highest vascular plant species richness and the highest mammalian diversity in Southeast Alaska (Carstensen et al. 2007). The province is located outside the Tongass Forest boundary and has 2 percent of its lands in a congressionally protected status. Although an additional 10 percent is administratively protected, the province has the lowest overall percentage of lands in a status that restricts development of all Southeast Alaska provinces. Approximately 59 percent of the province consists of state lands, including the 286,000-acre Haines State Forest, the 45,000-acre Chilkat Bald Eagle Preserve, and 242,000 acres of other state lands. The Bureau of Land Management manages about 39 percent of the province, small edges of Glacier Bay National Park represent about 1 percent, and other landowners, including the cities and boroughs of Haines and Skagway, comprise the remaining 1 percent.

The province contains about 145,000 acres of POG and about 21,000 acres have been harvested. The result is that approximately 88 percent of the original POG in the province remains today. Large-tree POG has been harvested at a higher rate; about 73 percent remains. However, about 89 percent of the original high-volume POG is estimated to remain, indicating a non-disproportionate harvest for the high-volume POG types as a group.

Although only about 13 percent of the original POG in the province has been harvested, about 27 percent of the large-tree POG has been logged and harvest has been concentrated within the Haines State Forest near the confluences of the Chilkat River with the Klehini and Kelsall Rivers. Thus, the effects of past harvest in these local areas have been relatively high.

Glacier Bay/Fairweather Range

The Glacier Bay/Fairweather Range province is the largest province in Southeast Alaska (2.5 million acres), but the vast majority of it is high mountains and glaciers and the majority is non-vegetated. The highest peaks are in the Fairweather Range along the western edge of the province, with Mt. Fairweather at over 15,000 feet. A large flat, foreland, the Gustavus Foreland, occurs in the area around Gustavus and to the north in the Bartlett River valley. Lowlands are also fairly extensive along the Dundee River and other smaller drainages on the southwest side of Glacier Bay. Glacier Bay National Park protects virtually the entire province (97 percent), except for about 75,000 acres in the vicinity of Gustavus. There are no NFS lands in the province.

Although approximately 171,000 acres of POG exist in the lowlands of the province, only a small fraction (< 0.5 percent) has been harvested. High-volume POG makes up the vast majority of the POG in the province (an estimated 92 percent), but large-tree POG is relatively rare (< 1 percent).

The effects of past harvest on the biodiversity and old-growth ecosystem integrity of the province has been insignificant because of the insignificant amount of past harvest. Primary succession of natural young-growth forests will contribute to the extent of POG over time.

Fragmentation

The Tongass National Forest is characterized by fragmentation on many scales and this fragmentation is the result of different processes. Fragmentation occurs when large blocks of habitat are broken into smaller parcels by natural (e.g., wind throw, landslides, soil slumping, erosion, insects and diseases, and avalanches) or human induced (e.g., roads or timber harvest operations) forces. From a regional perspective, the Tongass National Forest is highly fragmented due to numerous islands and dramatic topographic relief. At a landscape level across the project area, the natural distribution of POG forest is quite patchy and is linear in many areas, with fragmentation created by muskeg, forested wetlands, and alpine areas.

On a small scale, single-tree gaps within a 400-year-old Sitka spruce stand provide habitat for forest interior birds such as the hairy woodpecker. On a broader scale, large patches of wind disturbance of 10 acres or more may create nesting habitat for migratory songbirds, or increase the growth of understory forage for some species such as deer.

Timber harvest operations, including road-building, add to the level of fragmentation or edge that occurs naturally. The effect of timber-harvest varies with the placement of units and their proximity to large existing forest blocks. Simulation studies have indicated that when 50 percent of a watershed is harvested with a staggered setting design, little if any interior forest remains. As habitat becomes fragmented, residual habitat patches become smaller and more isolated from each other. Whether a particular patch pattern and degree of fragmentation is beneficial or deleterious depends largely on the characteristics of the species using the landscape (Morrison et al. 1992). Some species, particularly those with limited mobility such as small mammals may view open spaces (natural or human-induced) as travel barriers. Fragmentation may increase the risk of predation by avian, and mammalian carnivores, or increase isolation between other subpopulations which in turn may increase the risk of local extirpation.

Timber harvest tends to increase forest fragmentation and the amount of forest edge. The edges between different forest types, and between forested and non-forested areas, can affect the environment close to the edge. For example, forest edges tend to be warmer in the summer and cooler in the winter than interior forests (Franklin 1993). Some species increase in abundance close to an edge while others decrease in abundance. Species associated with interior forests but not with forest edges are of concern since timber harvest tends to decrease the amount of interior forest. Concannon (1995) noted that the edge effect or depth-of-edge influence distance varied by such factors as forest type, tree density, site aspect, slope, solar insolation, aspect, slope, latitude, season, and edge type (e.g., peatland, shoreline). Edge effects ranged from 30 to over 200 meters (from approximately 100 feet to over 660 feet) from an edge. Edge effects change as forest grows; however, there is little information on how that may reduce overall effects over time.

Patches of old-growth forest sometimes serve as the only habitat in a landscape for many lichens, fungi, bryophytes, plants, and small-bodied animals, all of which contribute to the biodiversity and productivity of the forest ecosystem. These patches may be critical for species that are locally endemic, occur only in very specific conditions of forest structure or soil, or have limited dispersal capabilities. These issues are typically assessed in detail during project-level analysis.

The framework of the old-growth forest conservation strategy in the current Forest Plan consists of a network of small, medium, and large old-growth reserves (OGRs), specifically designed to conserve habitats of the species that have the most viability concerns. It was designed, in part, to recognize and account for current conditions within each biogeographic province, and to better maintain future old-growth forest in provinces where past harvest has been high. A second component of the old-growth forest conservation strategy in the 1997 Forest Plan is the set of standards and guidelines that protect specific areas (e.g., 1,000-foot-wide beach fringe) and provide habitat connectivity in those areas with LUD allocations that permit commercial timber harvest.

To preserve the integrity of the old-growth ecosystem on the Tongass National Forest, project-level analyses are conducted at the landscape scale to identify blocks of contiguous old-growth forest within already identified large and medium reserves and other natural setting LUDs. Landscape connectivity among these blocks is evaluated during this analysis (see Chapter 4 of the Forest Plan, Landscape Connectivity Standard and Guideline).

Intact Watersheds

Another way of evaluating fragmentation and biodiversity in general is through considering the degree to which areas have been modified or developed by humans on a large watershed scale and then assessing effects on the watersheds that have undergone little if any previous modification. For this analysis, the VCU is used to define large watersheds. VCUs are Tongass land divisions with boundaries that typically follow watershed divides and encompass one or more stream systems. There are about 945 VCUs on the Tongass and they average about 18,000 acres in size.

Intact watersheds are defined here as those having less than 5 percent of their POG harvested, which is consistent with a similar analysis conducted by Audubon Alaska and The Nature Conservancy (Albert and Schoen 2007). This measure provides land managers with a means to assess the extent to which the Tongass consists of intact, undeveloped, and fully functional landscapes (a measure of conservation representation), and provides a means of assessing future changes expected under various management alternatives. Fully functional landscapes are defined as areas that maintain focal species, communities, and/or systems, and their supporting ecological processes within their natural ranges of variability (Poiani et al. 2000). Thus, functional landscapes are an important element in the conservation of biodiversity and can be used as a means to identify areas of biological importance. The use of a 5 percent POG harvest criterion for this classification is not meant to imply that a watershed must exceed this threshold to be fully functional. It is highly likely that many watersheds remain fully functional at harvest levels significantly above this level. It is used simply to provide an index or a measure of the proportion of watersheds that are intact and in relatively pristine condition.

Table 3.9-11 summarizes the number and acreage of intact large watersheds within each biogeographic province inside the Tongass Forest boundary. Overall, approximately 67 percent of the large watersheds and 72 percent of the acreage are estimated to be intact. Biogeographic provinces with the highest acreages of intact watersheds include the six biogeographic provinces along the mainland south of Skagway and the Admiralty Island province. Others that contain at least 0.5 million acres in intact watersheds include the East Chichagof, West Baranof, and Lynn Canal provinces. Those provinces with less than 50 percent of their large watersheds considered to be intact include Kupreanof/Mitkof, Etolin Island and Vicinity, and North Central Prince of Wales. Audubon Alaska and The Nature Conservancy (Albert and Schoen 2007) conducted a similar comparison of watersheds with greater than 95 percent of POG intact for all of Southeast Alaska. They found that approximately 71 percent of the landbase in Southeast Alaska still exists within these intact landscapes, and that much of this area was concentrated along the rugged mainland coast and Glacier Bay.

Table 3.9-11
Number and Acreage of Existing Intact* Large Watersheds (VCUs) by Biogeographic Province within the Tongass Forest Boundary

	Biogeographic Province	Total Number of Large Watersheds (VCUs) 1/	Percent of Intact Large Watersheds (VCUs) 1/	Approximate Total Acreage in Large Watersheds	Percent of Acreage in Intact Large Watersheds
1	Yakutat Forelands	24	83%	344,231	80%
2	Yakutat Uplands	26	96%	916,929	99%
3	East Chichagof Island	87	53%	1,129,840	49%
4	West Chichagof Island	31	100%	287,518	100%
5	East Baranof Island	22	55%	394,381	60%
6	West Baranof Island	43	65%	797,901	69%
7	Admiralty Island	60	88%	1,085,689	85%
8	Lynn Canal	50	76%	671,845	80%
9	North Coast Range	49	90%	1,111,396	94%
10	Kupreanof/Mitkof Island	35	37%	842,334	39%
11	Kuiu Island	30	73%	493,252	60%
12	Central Coast Range	29	79%	729,163	85%
13	Etolin Island	27	33%	518,932	30%
14	North Central Prince of Wales	116	24%	1,488,826	17%
15	Revilla Island/Cleveland Peninsula	84	68%	1,347,381	71%
16	Southern Outer Islands	20	50%	223,986	64%
17	Dall Island and Vicinity	35	71%	200,222	53%
18	South Prince of Wales	36	78%	395,076	75%
19	North Misty Fiords	32	94%	975,904	96%
20	South Misty Fiords	54	100%	906,047	100%
21	Ice Fields	57	93%	3,006,309	94%
	Total	**947**	**69%**	**17,867,163**	**74%**

[1] Intact is defined here as those watersheds having less than 5 percent of their POG harvested and not containing other major disturbances (e.g., large mines, communities, major roads).

Endemism

Endemic species are species that are isolated to islands or specific geography that potentially have an increased risk of adverse effects associated with management or natural disturbance. For example, these species may not be able to travel between islands or may be adapted to living in a very specific habitat that has a limited distribution. Species tied to island archipelagos are more sensitive to the effects of introduced non-natives, including pathogens and disease, and natural events, such as climate change, than other managed landscapes due to their limited mobility and isolation from other subpopulations (Cook et al. 2006). Therefore, there is a higher probability of extinction on islands. Risk assessment panels, convened prior to the 1997 Forest Plan, determined that endemic mammals were the most sensitive of all wildlife species to future landscape disturbances, such as that resulting from timber harvesting (Swanston et al. 1996). Such disturbances affect the likelihood of maintaining viable, well-distributed populations of endemic mammals across the Forest.

Southeast Alaska has been found to be a region with an especially high degree of endemism in its small mammal fauna, principally because of its archipelago geography combined with highly dynamic glacial history and resulting natural “pinch points” or "bottle-necks" where natural features (e.g., mountains or water bodies) or human caused features (e.g., roads and harvest units) constrain potential movement by wildlife to narrow bands of habitat. For example, some islands do not support particular species even though suitable habitat exists (e.g., there are no brown bears on Prince of Wales Island or wolves on Admiralty, Baranof, or Chichagof islands). Other species have restricted habitat requirements. Small mammals appear to be most diverse in scrub and herbaceous habitat associations and were least abundant and diverse in closed-canopy, even-aged (young growth) coniferous forest types and pine muskegs (MacDonald and Cook 2000). Between 1990 and 2005, 111 islands on the Tongass were surveyed for mammals, though much of this effort occurred prior to 2000 (Tongass Conservation Strategy Review Workshop 2006). This has resulted in the documentation of new distributions, new species, and distinct populations that also suggest a high level of endemism on the Tongass (see the *Wildlife* section for additional discussion). There continue to be gaps in knowledge about the natural history, ecology, and distribution of wildlife subspecies indigenous to Southeast Alaska (Hanley et al. 2005), and continued research will help to fill current gaps for some species. Additional species-specific discussion can be found in this chapter under the *Wildlife*, *Plant*, and *Fish* sections.

Invasive Species

Alaska has, until recently, been relatively isolated from invasive species, due to climatic conditions, large undeveloped areas, limited transportation routes, and sparse human population centers (Fay 2002). Schrader and Hennon (2005) assessed the current status of invasive species in Alaska's ecosystems, which include non-native plants, fish, wildlife, and other species, emphasizing the Chugach and Tongass National Forests. More than 130 non-native plant species have been recorded in Alaska through 2005 (AKEPIC 2006). Eighty-eight species of non-natives have been recorded on the Tongass, 46 have an invasiveness ranking according to their invasive characteristics and threat to Alaska, with 29 of those species identified as having a greater potential threat to Alaska. Fifteen of the species found on the Tongass are among the species that pose a greater potential threat (see the *Plant* section in this chapter for additional discussion on non-native plants).

Although many non-native wildlife species have been introduced or transplanted in Alaska, with the exception of rats in coastal ecosystems and possibly slugs in estuaries, none is considered invasive at the present. Additional discussion on terrestrial wildlife invasives are discussed in the *Wildlife* section of this chapter.

Schrader and Hennon (2005) identified 11 aquatic species in their assessment. Six species have already established breeding populations in National Forest lands and other areas in Alaska and include northern pike (*Esox lucius* Linnaeus), yellow perch (*Perca flavescens*), redlegged frog (*Rana aurora*), Pacific chorus frog (*Pseudacris regilla*), rainbow trout (*Oncorhynchus mykiss* Walbaum), and brook trout (*Salvelinus fontinalis*). The other five species are not established in Alaska yet, but cause widespread problems in the lower 48 states and could become problematic in Alaska. These species of concern are the Atlantic salmon (*Salmo salar)*, Chinese mitten crab (*Eriocheir sinesis*), New Zealand mudsnail (*Potamopyrgus antipodarum* Gray), goldfish (*Carassius auratus*), and the signal crayfish (*Pacifacstacus leniusculus*). In Alaska, established populations of northern pike (with the exception of Pike Lakes on the Yakutat Ranger District) pose the greatest immediate concern, while the Atlantic salmon, Chinese mitten crab, and New Zealand mudsnail species are likely to invade Alaska in coming years (Fay 2002). Invasive tree pathogens are not currently damaging Alaskan ecosystems, but there are numerous species that could cause widespread tree mortality if introduced.

Four introduced insects are currently established in Alaska: the larch sawfly, alder woolly aphid, spruce aphid, and amber-marked birch leafminer. These insects can cause widespread tree defoliation and mortality. A number of exotic insects pose a potential threat and are related primarily to transport of infested plant and wood products.

Managing invasive species on the Tongass National Forest will likely be challenging in the future. Increased public awareness at all levels coupled with interagency cooperation and development of cooperative management partnerships is needed to limit invasive species populations at current levels in Alaska.

The Forest Service is addressing invasive plant management through the Alaska Region Invasive Plant Strategy (USDA Forest Service 2005a) and the Tongass National Forest Invasive Plant Management Guides (Lerum and Krosse 2005). Within the Forest Service, various approaches are in place to address four action elements (prevention, early detection and rapid response, control, and restoration) in the National Strategy and Implementation Plan for Invasive Species Management (USDA Forest Service 2004f). See the *Plants* section in this chapter for more information on management of non-native plant species.

Environmental Consequences

Old-growth forests, which cover more than half of the 16.8 million acres of the Tongass, provide the primary habitat for the majority of terrestrial plant and animal species. They also represent ecosystems with uniquely defined characteristics and are the habitat types most affected by timber management activities; therefore, they are the most affected ecosystems on the Tongass, and the following discussion focuses on general effects on old-growth forest ecosystems.

Direct and Indirect Effects

This analysis of effects on biodiversity is subdivided into a number of sections. The first section focuses on effects associated with anticipated changes to old-growth forest representation over time, related to timber harvest. Associated with the evaluation of the effects on representation, are the effects on the elements of the old-growth forest conservation strategy for each alternative, including the coarse-filter (forest-wide system of old growth reserves) and fine-filter (standards and guidelines) components. Smaller sections address the effects on fragmentation and intact watersheds, endemics, and invasive species. The final section of this analysis evaluates the cumulative effects on biodiversity of the proposed Forest Plan adjustment in conjunction with past, present, and reasonably foreseeable activities on both NFS) and non-NFS lands (including private, state, and other ownerships).

Measurement of Effects

To quantify potential effects on biodiversity, the alternatives can be compared in terms of their ability to maintain a functional and interconnected old-growth ecosystem. Functional refers to the ability of an ecosystem to maintain or contribute to the maintenance of populations that use it, and to contribute to the diversity and productivity of other ecosystems. Examples of ecosystem functions include providing habitat for organisms, climatic buffering, soil development, and the maintenance of soil productivity through inputs of coarse woody debris, nitrogen fixation, spread of biotic and abiotic disturbance through landscapes, and nutrient cycles.

The interconnectedness of an ecosystem is a measure of the extent to which the landscape pattern of the old-growth ecosystem provides for biological and ecological flows to sustain old-growth associated animal and plant species across the Tongass and Southeast Alaska. Connectivity does not necessarily mean that old-growth areas need to be physically joined in space, because most associated species can disperse across areas that are not in old-growth ecosystem conditions. Landscape features affecting connectivity of old-growth ecosystems include the distances between old-growth reserve areas and forest conditions in the areas between the reserve areas (matrix lands).

Given that Southeast Alaska consists of many islands, connectivity issues should include landscape level connections between individual islands as well as between islands and the mainland portion of Southeast Alaska; however, current and future forest management activities are expected to have a greater influence on within-island conditions than between islands. Forest management areas require measures that ensure wildlife movement patterns and habitat diversity are protected over time. This is an important consideration when analyzing functional landscape connectivity and the maintenance of well-distributed, viable populations. Several “pinch-points“ or "bottle-necks" where natural features or human-caused features (e.g., roads and clearcuts) constrain potential movement by wildlife to narrow bands of habitat have been identified on the Tongass and are discussed in greater detail in other places within this section and under the *Wildlife* section of this chapter.

Fragmentation associated with habitat loss results in smaller sizes of habitat patches available to a species, increased distances among habitat patches, increased amounts of matrix conditions in which habitat patches are embedded, and altered spatial distribution of habitat types (Haufler 2006). These factors are strongly tied to the structural and functional connectivity of the landscape, and thus the ability of the landscape to support well-distributed and viable wildlife populations.

By maintaining a functional and interconnected old-growth ecosystem, it can be assumed that various components of biodiversity, including structural diversity (within-stand and landscape level), connectivity (unfragmented, contiguous blocks of old growth), stand age and species composition (including understory species), and ecological processes (e.g., tree establishment, disturbance, and nitrogen fixation) will also be maintained. The amount and distribution of POG after 100 years of Forest Plan implementation can serve as a relative indicator of the functioning and interconnectedness of the old-growth ecosystem and the potential effects on biodiversity under each alternative.

In addition, effects on biodiversity can be measured by the degree of change expected to occur in the composition and distribution of the old-growth ecosystem relative to its historic composition and distribution. It can be assumed that the more an alternatives change the natural distribution and composition of old-growth ecosystems, the greater are its effects on biodiversity. Therefore, the effects of the alternatives on the distribution and composition of old-growth forests can be evaluated by examining the representation of POG and specific types of POG across the Tongass, with reference to historical representation. At the same time the analysis examines the old-growth conservation strategy of each alternative and the degree to which it maintains old-growth function, interconnectedness, and representation.

Another measure of the effects of the alternatives on landscape fragmentation can be obtained by evaluating the degree to which the alternatives would result in converting large, relatively pristine watersheds to a modified state (see *Intact Watersheds* in the *Affected Environment* part of this section). For this analysis, VCUs are used to define large watersheds and intact large watersheds are defined as those having less than 5 percent of their POG harvested and not containing other major disturbances. The use of VCUs and a 5-percent threshold are not based on specific criteria for defining intact large watersheds. Therefore, this measure should be viewed as one measure or an index of ecosystem fragmentation.

Finally, one additional tool is used in the comparison of the alternatives. The 1997 Forest Plan Revision Final EIS biodiversity analysis (U.S. Forest Service 1997a) relied in part upon expert panel evaluations of alternatives in terms of the estimated relative risks to the old-growth ecosystem (DeGayner 1996). This old-growth panel assessment is referred to below, where appropriate. Although the alternatives evaluated by the panel evaluations do not exactly correspond to the alternatives evaluated here (the old-growth reserve system and many new standards and guidelines were being developed and evaluated during the 1997 Forest Plan Revision), useful inference about the relative risks of the current alternatives can be made. Panel assessments were also conducted for wildlife and fish species and these are discussed in the *Wildlife* and *Fish* environmental effects sections.

Conservation Strategy Overview

An integrated old-growth conservation strategy was developed and incorporated into the 1997 Forest Plan (Appendix D). This strategy has two basic components. The first is a forest-wide reserve network that protects the integrity of the old-growth forest by retaining blocks of intact, largely undisturbed habitat. The old-growth reserves include a system of large, medium, and small Habitat Conservation Areas allocated to the Old-growth Habitat Land Use Designation (LUD), and full protection of all islands less than 1,000 acres in size. The reserve network also includes all other non-development LUDs. These include Wilderness, National Monument, Legislated LUD II, Wild River, Remote and Semi-remote Recreation, Research Natural Area, Municipal Watershed, and all other LUDs that essentially maintain the integrity of the old-growth ecosystem. The old-growth reserves were specifically designed to conserve habitats of the species that have the greatest viability concerns. They were designed, in part, to recognize and account for current conditions within each biogeographic province, and to better maintain future old-growth forest in provinces where past harvest has been high. The second component of the old-growth habitat conservation strategy is management of the matrix, e.g., the lands with LUD allocations where commercial timber harvest may occur. Within the matrix, components of the old-growth ecosystem are maintained by standards and guidelines to protect important areas and provide old-growth forest habitat connectivity. This component includes the beach and estuary fringe, riparian buffers, and a variety of other categories where timber harvest is not permitted. Matrix lands play a vital role in providing functional connectivity across fragmented landscapes (Szacki 1999). A detailed description of the rationale and components of the strategy is provided in Appendix D.

Research since 1997 has provided much new information on plant and wildlife populations and habitat relationships in Southeast Alaska; however, there continue to be gaps in knowledge about the ecology and distribution of many species making direct correlations between land management activities and their habitats and/or population impacts difficult. The conservation strategy itself is a step toward addressing this uncertainty by maintaining an extensive network of reserves and landscape connectivity on the Tongass; however, the effectiveness of the reserves and buffers in relation to their size, landscape pattern, and geographic distribution has yet to be scientifically tested (Powell et al. 1997). Smith (2005) noted that for many species, it is unknown whether the current reserve design is capable of supporting well-distributed, viable populations or providing sufficient connectivity to enable the flow of individuals between reserves. In addition to the unknowns related to the reserve network, there is also a need to explicitly define future desired conditions of matrix lands which provide life requisites for many species and to determine the optimal way to manage young-growth to benefit wildlife (*Workshop Integration Session*, Tongass Conservation Strategy Review Workshop 2006); new approaches to stand management that offer alternatives to clearcutting are also being evaluated.

The conservation strategy developed for the 1997 Forest Plan Revision is incorporated directly in Alternative 5, which represents the current Forest Plan. Each alternative incorporates a variation of the current old-growth conservation strategy by maintaining some level of old-growth reserves and providing additional old-growth protection within the matrix. These variations in the strategy are evaluated below.

General Overview of Effects

An overview of the degree to which old-growth forest protection is afforded by the old-growth strategy of each alternative is provided by examining the amount and percent of POG that occurs in reserves (areas where old-growth harvest is generally not permitted) versus the amount and percent in the matrix (areas where forests are actively managed). Table 3.9-12 presents a detailed summary of this information for each alternative. This table also identifies the composition of POG in various categories by summarizing all POG, high-volume POG, and large-tree POG.

Table 3.9-12
Estimated Acreage and Percentage of All Existing POG, High-Volume POG, and SD67 POG in Reserves[1] and Matrix[2] Lands (minimum protected vs. maximum harvested) by Alternative[3]

		Amount in Reserves[1]		Amount in Matrix[2] Minimum Protected		Amount in Matrix[2] Maximum Harvested[4]		Total Existing POG	
Alt.	POG Category	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
1	All POG	4,615,995	93%	249,182	5%	85,972	2%	4,951,148	100%
	High-Volume POG	1,862,441	93%	104,444	5%	41,460	2%	2,008,345	100%
	SD67 POG	477,813	89%	43,253	8%	16,385	3%	537,451	100%
2	All POG	4,167,367	84%	569,270	11%	214,511	4%	4,951,149	100%
	High-Volume POG	1,674,500	83%	232,318	12%	101,529	5%	2,008,346	100%
	SD67 POG	425,744	79%	77,417	14%	34,291	6%	537,451	100%
3	All POG	3,866,467	78%	771,255	16%	313,426	6%	4,951,148	100%
	High-Volume POG	1,572,277	78%	294,628	15%	141,440	7%	2,008,345	100%
	SD67 POG	401,011	75%	90,844	17%	45,596	8%	537,451	100%
4	All POG	2,965,670	60%	1,329,005	27%	656,473	13%	4,951,148	100%
	High-Volume POG	1,203,702	60%	511,928	25%	292,714	15%	2,008,345	100%
	SD67 POG	307,863	57%	145,418	27%	84,169	16%	537,451	100%
5	All POG	3,518,425	71%	970,176	20%	462,556	9%	4,951,156	100%
	High-Volume POG	1,431,634	71%	378,068	19%	198,647	10%	2,008,349	100%
	SD67 POG	364,183	68%	113,501	21%	59,767	11%	537,451	100%
6	All POG	3,563,600	72%	942,445	19%	445,103	9%	4,951,148	100%
	High-Volume POG	1,458,202	73%	352,379	18%	197,760	10%	2,008,342	100%
	SD67 POG	375,671	70%	103,085	19%	58,696	11%	537,451	100%
7	All POG	2,807,478	57%	1,336,275	27%	807,396	16%	4,951,148	100%
	High-Volume POG	1,143,122	57%	502,283	25%	362,940	18%	2,008,345	100%
	SD67 POG	287,295	53%	144,188	27%	105,968	20%	537,451	100%

[1] Reserves include all Non-Development LUDs (e.g., Old-Growth Habitat, Semi-Remote Recreation, Remote Recreation, Wilderness, National Monument, etc.).
[2] Matrix includes all Development LUDs (Timber Production, Modified Landscape, Scenic Viewshed, and Experimental Forest).
[3] Numbers may not appear to sum correctly due to rounding.
[4] Maximum harvested assumes the maximum allowed by the Allowable Sale Quantity is harvested each decade. The estimate assumes all scheduled suitable POG is harvested [calculated by subtracting alternative-specific reduction factors for the Model Implementation Reduction Factor (MIRF) and scheduling from the mapped suitable acreage under each alternative (see the *Timber* section)].

The alternatives cover a wide range of old-growth effects from minimal effects associated with Alternative 1, which has a maximum old-growth harvest of 86,000 acres, to substantially greater effects associated with Alternative 7, which has a maximum old-growth harvest of 807,000 acres. This broad range results in from 57 to 93 percent of the existing POG on the Tongass being maintained within reserves, with an additional amount of POG being protected from harvest by standards and guidelines in the matrix. Maximum POG harvest would range from 2 percent to 16 percent of existing POG. Harvest of high-volume and large-tree POG would range from 2 to 18 percent and from 3 to 20 percent, respectively. Placing the alternatives in order from lowest to highest maximum POG harvest results in the following ranking: Alternatives 1, 2, 3, 6, 5, 4, and 7.

Table 3.9-13
Estimated Acreage and Percentage of Young Growth[1] in Reserves[2] and in Matrix[3] Lands (minimum protected vs. maximum harvested) by Alternative[4]

Alternative	Amount in Reserves[2]		Amount in Matrix[3] Minimum Protected		Amount in Matrix[3] Maximum Harvested[5]		Total Existing Young Growth	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
1	189,528	42%	208,624	46%	56,573	12%	454,724	100%
2	96,452	21%	189,840	42%	168,432	37%	454,724	100%
3	88,097	19%	182,289	40%	184,339	41%	454,724	100%
4	55,024	12%	187,627	41%	212,073	47%	454,724	100%
5	72,930	16%	176,753	39%	205,037	35%	454,724	100%
6	83,045	18%	171,601	38%	200,075	44%	454,724	100%
7	35,426	8%	183,700	40%	235,599	52%	454,724	100%

[1] Young growth in this table includes only young growth originating from past timber harvest. It does not include natural young growth (e.g., from blowdown), which is assumed to either be harvested or converted back to young growth naturally.
[2] Reserves include all non-development LUDs (e.g., Old-Growth Habitat, Semi-Remote Recreation, Remote Recreation, Wilderness, National Monument, etc.).
[3] Matrix includes all development LUDs (Timber Production, Modified Landscape, Scenic Viewshed, and Experimental Forest).
[4] Numbers may not appear to sum correctly due to rounding.
[5] Maximum harvested assumes the maximum allowed by the Allowable Sale Quantity is harvested each decade. The estimate assumes all scheduled suitable young growth is harvested [calculated by subtracting alternative-specific reduction factors for the Model Implementation Reduction Factor (MIRF) and scheduling from the mapped suitable acreage under each alternative (see the *Timber* section)].

In addition, to the harvest of POG, each alternative designates a portion of the existing young growth to be set aside and not harvested. Table 3.9-13 summarizes these areas and the amounts to be included in reserves, in the matrix, and the amount potentially harvested. There would be a range of approximately 219,000 to 398,000 acres of existing productive young growth that would not be harvested and that would eventually develop into mature forest and then POG. Based on the fact that most of this young growth is currently 20 to 40 years old (see Table 3.9-8), after about 70 years when the majority of the POG harvest has taken place, this young growth will be maturing and potentially beginning to take on some older forest characteristics, particularly if subjected to thinning or other types of stand management. Based on the historical overharvest of high-volume and large-tree POG (see *Affected Environment* part of this section), a high proportion of this young growth will be on high-site index lands, indicating faster than average growth rates.

The future and historical distribution of POG harvest by biogeographic province is represented in Table 3.9-14, which shows the percent of existing POG relative to the original POG, and the percent of original POG remaining after 100+ years of implementation for each alternative. In addition, Table 3.9-14 shows the percent of original POG that would be remaining, after 100+ years, inside reserves designated by the Forest Plan for each alternative. POG harvest would occur in 18 of the 21 provinces in at least one alternative. The range of the alternatives is 9 provinces containing some harvest under Alternative 1 to 18 provinces containing harvest under Alternative 7. Most of harvest in all alternatives would come from four biogeographic provinces in the south-central portion of the Tongass (North Central Prince of Wales Island, Kupreanof/Mitkof Island, Revilla Island/Cleveland Peninsula, and Etolin Island).

Table 3.9-14
Estimated Percent of Original POG Remaining Forest-wide (1st number) and in Reserves (2nd number) in 100+ Years Assuming Maximum POG Harvest[1] under Each Alternative by Biogeographic Province

No.	Biogeographic Province	POG Original Acres	POG % Remaining in 2006	% of Original POG Remaining After 100+ Years (Forest-wide/In Reserves) by Alternative 1	2	3	4	5	6	7
1	Yakutat Forelands	51,398	93	93/93	89/82	84/70	81/59	83/70	83/70	81/59
2	Yakutat Uplands	24,811	94	94/94	94/93	94/92	93/91	94/92	94/92	93/91
3	East Chichagof Island	439,307	90	88/81	85/66	83/60	76/34	80/49	81/52	72/27
4	West Chichagof Island	72,038	100	100/100	100/100	100/100	100/100	100/100	100/100	100/100
5	East Baranof Island	101,840	87	87/87	81/60	80/57	72/31	77/50	78/53	71/31
6	West Baranof Island	231,999	93	93/93	91/83	89/79	83/57	89/78	89/79	82/56
7	Admiralty Island	598,419	99	99/99	99/99	99/99	99/99	99/98	99/99	99/99
8	Lynn Canal	158,538	97	96/93	94/82	92/77	83/50	88/67	89/68	82/50
9	North Coast Range	317,898	100	100/100	100/100	99/95	87/51	91/65	91/67	85/51
10	Kupreanof/Mitkof Island	341,588	90	85/74	80/61	75/48	64/25	69/35	70/36	60/19
11	Kuiu Island	322,569	91	91/91	85/76	84/77	72/42	79/62	79/63	69/42
12	Central Coast Range	252,179	97	97/97	97/94	91/76	83/49	86/67	87/68	81/60
13	Etolin Island & Vicinity	254,781	86	81/70	74/45	71/40	60/18	69/40	69/40	56/17
14	North Central Prince of Wales	698,394	74	69/53	67/47	65/41	60/33	63/38	63/39	53/21
15	Revilla Island/ Cleveland Pen.	548,748	92	90/84	86/73	85/68	75/47	81/62	81/62	71/43
16	Southern Outer Islands	128,589	88	85/78	83/73	82/71	80/64	81/70	81/70	76/62
17	Dall Island and Vicinity	68,355	99	99/99	99/99	98/96	93/82	95/85	95/86	90/80
18	South Prince of Wales	165,389	98	98/97	96/87	91/73	80/48	87/63	87/65	77/48
19	North Misty Fiords	199,929	99	99/99	98/97	98/93	97/88	98/93	98/93	96/88
20	South Misty Fiords	309,900	100	100/100	100/100	100/100	100/100	100/100	100/100	100/100
21	Ice Fields	119,204	97	97/94	96/89	95/81	93/76	93/82	94/81	93/76
Forest-wide		**5,405,872**	**92**	**90/85**	**88/77**	**86/72**	**79/55**	**83/65**	**83/66**	**77/52**
Additional Mature or Older Second Growth (110-160 yrs), Protected Forest-wide[3]			**0**	**7/4**	**5/2**	**5/2**	**4/1**	**5/1**	**5/2**	**4/1**

[1] The estimated suitable POG incorporates a reduction factor for the Model Implementation Reduction Factor (MIRF) and scheduling, which reduces mapped suitable acres to the estimated scheduled acres for each biogeographic province (see the *Timber* section).
[2] Percentage of original POG. Harvest of suitable old growth is estimated to occur until approximately until the year 2105
[3] Expressed as a percent of original POG

Effects on the largest tree categories of old growth and on old-growth growing on karstlands are of particular concern because past timber harvest has concentrated in these stands. In the following discussion the largest tree categories are represented in two ways: high-volume and large-tree POG. High-volume POG includes the three (out of seven) SDM classes that generally represent the most productive sites, produce the highest timber volumes, and contain the largest trees (SD5N, SD5S, and SD67). Large-tree POG is defined as the SD67 class (typically the type with the highest density of large trees) by itself. Tables 3.9-15 and 3.9-16 present information similar to Table 3.9-14, but for high-volume POG and large-tree POG relative to the original amounts of each of these POG categories by biogeographic province. Harvest of karstlands is summarized in Table 3.9-17, which shows the percent of existing karst POG relative to the original karst POG acres, and the percent of original karst POG remaining after 100+ years of implementation for each alternative. Impacts on biodiversity could be expected to be greatest in those areas that have the highest cumulative harvest percentages of the various POG categories, because they are more susceptible to greater losses of biodiversity components associated with POG forests.

Under all alternatives, long-term POG representation by ecological subsection would be maintained by protecting at least 41 percent of original POG in all 73 subsections (Table 3.9-18). At least 90 percent of original POG would be maintained in 25 (Alternative 7) to 51 (Alternative 1) of the 73 subsections and at least 75 percent would be maintained in 45 (Alternative 7) to 69 (Alternative 1) out of the 73 subsections.

The effects of the alternatives on the number, acreage, and percentage of intact large watersheds are summarized in Table 3.9-19. An intact watershed is defined, for the purpose of this ananlysis as one in which less than 5 percent of the original POG has been harvested. Currently, 69 percent of the large watersheds on the Tongass, which converts to 74 percent of the acreage, are considered intact. After 100+ years of implementation of the alternatives, giving consideration to additional harvest on non-NFS lands, these percentages would range from 60 percent of the watersheds (68 percent of the acreage) under Alternative 1 to 47 percent of the watersheds (57 percent of the acreage) under Alternative 7. Approximately 8 percent of the drop in percentage of intact watersheds and 5 percent of the drop in acreage would be due to additional development on non-NFS lands.

Table 3.9-15
Estimated Percent of Original High-Volume POG Remaining Forest-wide (1st number) and in Reserves (2nd number) in 100+ Years Assuming Maximum POG Harvest[1] under Each Alternative by Biogeographic Province

No.	Biogeographic Province	POG Original Acres	POG % Remaining in 2006	% of Original POG Remaining After 100+ Years (Forest-wide/In Reserves) by Alternative 1	2	3	4	5	6	7
1	Yakutat Forelands	31,015	93	93/93	87/78	79/61	75/56	78/61	78/61	74/56
2	Yakutat Uplands	11,614	92	92/92	92/90	91/89	90/87	91/89	91/89	90/87
3	East Chichagof Island	178,124	84	83/75	79/61	78/56	70/31	75/47	76/50	67/25
4	West Chichagof Island	17,223	100	100/100	100/100	100/100	100/100	100/100	100/100	100/100
5	East Baranof Island	37,072	77	77/77	70/49	69/46	63/24	66/39	67/42	60/24
6	West Baranof Island	64,001	83	83/83	81/75	80/71	74/49	79/71	79/71	72/49
7	Admiralty Island	307,613	98	98/98	98/98	98/98	98/98	98/97	98/98	98/98
8	Lynn Canal	63,368	95	94/92	91/78	89/74	78/42	85/64	86/66	77/42
9	North Coast Range	132,654	100	100/100	100/100	99/95	85/49	90/66	91/68	84/48
10	Kupreanof/Mitkof Island	121,135	81	76/66	71/53	67/45	56/25	61/35	61/36	51/19
11	Kuiu Island	174,993	90	90/90	82/72	80/68	69/43	75/59	75/59	66/43
12	Central Coast Range	107,789	96	96/96	95/92	89/74	82/58	86/66	86/68	81/59
13	Etolin Island & Vicinity	99,193	77	72/62	65/40	63/36	53/17	61/36	61/36	48/16
14	North Central Prince of Wales	343,711	66	60/46	58/40	56/37	51/29	55/34	54/35	44/20
15	Revilla Island/ Cleveland Pen.	241,884	88	86/80	83/70	81/67	71/45	79/61	79/62	67/42
16	Southern Outer Islands	52,674	82	78/69	75/62	74/61	71/52	73/59	73/60	67/50
17	Dall Island and Vicinity	33,260	99	99/99	99/99	99/97	95/86	96/89	96/89	92/83
18	South Prince of Wales	78,369	97	97/96	95/85	91/73	78/44	86/62	86/63	74/44
19	North Misty Fiords	67,130	99	99/99	97/95	97/91	95/85	97/91	97/91	94/85
20	South Misty Fiords	97,509	100	100/100	100/100	100/100	100/100	100/100	100/100	100/100
21	Ice Fields	39,039	93	93/91	93/87	92/81	90/76	90/80	91/81	90/76
Forest-wide		**2,299,369**	**87**	**86/81**	**83/73**	**81/68**	**75/52**	**79/62**	**79/63**	**72/50**
Additional Mature or Older Second Growth (110-160 yrs) on High-Volume Sites, Protected Forest-wide[3]			**0**	**11/5**	**8/3**	**8/2**	**7/2**	**7/2**	**7/2**	**6/1**

[1] The estimated suitable POG incorporates a reduction factor for the Model Implementation Reduction Factor (MIRF) and scheduling, which reduces mapped suitable acres to the estimated scheduled acres for each biogeographic province (see the *Timber* section).
[2] Percentage of original POG. Harvest of suitable old growth is estimated to occur until approximately until the year 2105
[3] Expressed as a percent of original High-Volume POG

Table 3.9-16
Estimated Percent of Original Large-Tree POG (SD67) Remaining Forest-wide (1st number) and in Reserves (2nd number) in 100+ Years Assuming Maximum POG Harvest[1] under Each Alternative by Biogeographic Province

		POG		% of Original POG Remaining After 100+ Years (Forest-wide/In Reserves) by Alternative						
No.	**Biogeographic Province**	**Original Acres**	**% Remaining in 2006**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	Yakutat Forelands	26,181	96	96/96	90/80	82/61	78/59	80/61	80/61	78/59
2	Yakutat Uplands	2,408	83	83/83	80/74	80/73	75/65	79/73	79/73	74/65
3	East Chichagof Island	47,335	73	72/65	71/55	70/52	64/31	69/47	70/49	62/26
4	West Chichagof Island	2,012	100	100/100	100/100	100/100	100/100	100/100	100/100	100/100
5	East Baranof Island	5,894	33	33/33	32/24	32/21	31/15	31/18	31/20	31/15
6	West Baranof Island	9,036	46	46/46	45/42	44/40	43/29	44/40	44/40	43/29
7	Admiralty Island	100,755	98	98/98	98/98	98/98	98/98	98/96	98/98	98/98
8	Lynn Canal	13,355	88	88/86	86/75	84/71	74/33	80/58	81/61	72/33
9	North Coast Range	22,536	100	100/100	100/100	99/96	81/33	88/61	91/65	78/33
10	Kupreanof/Mitkof Island	29,920	65	62/54	58/45	55/39	47/21	51/28	51/30	43/15
11	Kuiu Island	44,945	82	82/82	67/49	65/47	56/26	61/40	62/41	52/26
12	Central Coast Range	21,854	91	91/91	90/85	84/71	76/50	81/62	80/60	75/52
13	Etolin Island & Vicinity	22,847	54	50/41	46/29	44/27	36/12	42/26	43/27	33/11
14	North Central Prince of Wales	171,375	69	62/45	60/40	59/38	54/30	57/34	57/37	47/21
15	Revilla Island/ Cleveland Pen.	45,095	71	68/62	65/52	64/51	57/34	61/45	62/47	54/32
16	Southern Outer Islands	17,200	74	69/57	67/52	65/51	61/40	64/48	64/51	57/39
17	Dall Island and Vicinity	8,018	99	99/99	99/99	97/95	96/93	97/94	97/94	95/91
18	South Prince of Wales	44,283	98	98/96	94/83	91/74	78/41	87/62	87/64	73/41
19	North Misty Fiords	13,164	97	97/97	95/89	95/89	93/84	94/88	94/88	93/84
20	South Misty Fiords	14,142	100	100/100	100/100	100/100	100/100	100/100	100/100	100/100
21	Ice Fields	6,965	83	83/81	83/80	83/78	82/73	81/74	83/78	81/73
Forest-wide		669,321	80	78/71	75/64	73/60	68/46	71/54	72/56	64/43
Additional Mature or Older Second Growth (110-160 yrs) on SD67 Sites, Protected Forest-wide[3]			**0**	**17/8**	**12/4**	**12/4**	**11/2**	**11/3**	**11/4**	**9/2**

[1] The estimated suitable POG incorporates a reduction factor for the Model Implementation Reduction Factor (MIRF) and scheduling, which reduces mapped suitable acres to the estimated scheduled acres for each biogeographic province (see the *Timber* section).
[2] Percentage of original POG. Harvest of suitable old growth is estimated to occur until approximately until the year 2105
[3] Expressed as a percent of original SD67 POG

Table 3.9-17
Estimated Percent of Original Karst POG Remaining Currently and in 100+ Years Assuming Maximum POG Harvest[1] under Each Alternative

	Karst POG		% of Original Karst POG Remaining After 100+ Years by Alternative						
	Original Acres	**% Remaining in 2006**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Low Elevation (<800 feet)	215,708	62%	58%	56%	55%	52%	54%	55%	47%
Moderate-High Elevation (>800 feet)	87,791	84%	82%	79%	78%	73%	76%	77%	70%
Total	**303,499**	**69%**	**65%**	**63%**	**62%**	**58%**	**60%**	**61%**	**54%**
Additional Mature or Older Second Growth (110-160 yrs) on Karst, Protected from Future Harvest[3]		0%	26%	17%	16%	14%	14%	15%	12%

[1] The estimated suitable POG incorporates a reduction factor for the Model Implementation Reduction Factor (MIRF) and scheduling, which reduces mapped suitable acres to the estimated scheduled acres (see the *Timber* section).
[2] Percentage of original POG. Harvest of suitable old growth is estimated to occur until approximately until the year 2105
[3] Expressed as a percent of original SD67 POG

Effects by Alternative

The following subsections summarize the biodiversity effects associated with each alternative with reference to the data presented in Tables 3.9-12, 3.9-13, 3.9-14, 3.9-15, 3.9-16, 3.9-17, 3.9-18, and 3.9-19.

Alternative 1

Alternative 1 would have the lowest effect on biodiversity among the alternatives, primarily because it would result in the lowest harvest and the highest POG acreage in reserves. Although this alternative was not specifically evaluated in the 1996 panel assessment, based on its level of harvest and other factors considered in the assessment, it is clear that the assessment would have confirmed this ranking.

Alternative 1 would maintain 93 percent of the existing POG within reserves and an additional 5 percent would be protected in the matrix by standards and guidelines or not scheduled for harvest. As a result, only 2 percent or 86,000 acres would be subject to harvest (Table 3.9-12). Long-term maximum harvest of high-volume and large-tree POG are also projected to be in the 2 to 3 percent range. In addition, there would be about 398,000 acres of existing productive young growth that would not be harvested and that would eventually develop into mature forest and then POG (Table 3.9-13). This represents about four times as much as the maximum POG harvest.

Assuming maximum harvest over 100+ years, approximately 90 percent of the original POG would remain Forest-wide; 85 percent of the original POG would be in reserves (Table 3.9-14). Harvest would be conducted in 9 out of 21 provinces occupied by the Tongass, but only 5 provinces would have potential harvest exceeding 5,000 acres. At least 15 of the 21 provinces would have more than 90 percent of their original POG remaining after 100+ years, and only 1 province, North Central Prince of Wales, would have less than 75 percent remaining (Table 3.9-14).

Table 3.9-18
Estimated Percentage of Original POG Remaining Forest-wide in 100+ Years Assuming Maximum POG Harvest[1] under Each Alternative by Ecological Subsection

Ecological Section (Bold) and Subsection Names	Original POG Acres	Remaining POG in 2006 as a Percent of Original POG	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
St. Elias-Fairweather Icefields									
St. Elias-Fairweather Icefields	9,147	93%	93%	93%	93%	83%	85%	87%	80%
Puget Peninsula Metasediments	7,290	100%	100%	100%	100%	100%	100%	100%	100%
Northern Gulf Forelands									
Yakutat-Lituya Forelands	63,945	92%	92%	89%	85%	82%	83%	83%	81%
Chilkat River Complex									
Chilkat Complex	1,759	100%	100%	100%	100%	100%	100%	100%	100%
Boundary Ranges									
Boundary Ranges Icefields	247,947	98%	98%	97%	97%	94%	96%	96%	93%
Stikine-Taku River Valleys	33,612	100%	100%	100%	100%	100%	100%	100%	100%
Glacier Bay Fiordlands									
Wachusett-Adams Hills	229	100%	100%	100%	100%	100%	100%	100%	100%
Berg Bay Complex	5,223	100%	100%	100%	100%	100%	100%	100%	100%
Chilkat Peninsula Carbonates	81,944	94%	94%	89%	89%	75%	83%	83%	73%
Baranof-Chichagof Fiordlands									
North Chichagof Granitics	99,381	97%	97%	96%	95%	91%	94%	94%	90%
Outer Coast Wave-cut Terraces	37,756	100%	100%	100%	100%	99%	100%	100%	99%
West Chichagof Complex	29,885	100%	100%	100%	100%	100%	100%	100%	100%
Ushk-Patterson Bay Granitics	44,015	96%	95%	95%	95%	87%	88%	89%	86%
Peril Strait Granitics	112,526	90%	90%	86%	83%	72%	77%	78%	70%
North Baranof Complex	65,323	82%	82%	75%	74%	63%	69%	70%	61%
Sitka Sound Complex	82,921	91%	90%	87%	85%	70%	84%	84%	67%
Mount Edgecumbe Volcanics	27,352	86%	86%	82%	79%	76%	78%	78%	74%
Central Baranof Metasediments	42,324	89%	89%	88%	86%	82%	85%	85%	82%
Necker Bay Granitics	40,686	100%	100%	100%	100%	100%	100%	100%	100%
South Baranof Sediments	36,320	100%	100%	100%	100%	100%	100%	100%	100%
Northeast Chichagof Fiordlands									
Point Adolphus Carbonates	43,858	95%	95%	90%	89%	76%	88%	88%	75%
Freshwater Bay Carbonates	114,959	86%	81%	75%	75%	69%	72%	73%	60%
Kook Lake Carbonates	59,098	82%	80%	76%	73%	65%	70%	71%	64%
Kootznoowoo Fiordlands									
Stephens Passage Glaciomarine Terraces	129,536	100%	100%	99%	98%	96%	95%	97%	95%
North Admiralty Complex	126,913	100%	100%	100%	100%	100%	100%	100%	100%
Stephens Passage Volcanics	49,914	97%	96%	96%	96%	93%	96%	96%	96%
Thayer Lake Granitics	45,630	100%	100%	100%	100%	100%	100%	100%	100%
Mitchell-Hasselborg Till Lowlands	62,653	100%	100%	100%	100%	100%	100%	100%	100%
Hood-Gambier Bay Carbonates	144,261	100%	100%	100%	100%	100%	100%	100%	100%
South Admiralty Volcanics	102,890	97%	95%	95%	95%	95%	95%	95%	95%

Table 3.9-18 (continued)
Estimated Percentage of Original POG Remaining Forest-wide in 100+ Years Assuming Maximum POG Harvest[1] under Each Alternative by Ecological Subsection

Ecological Section (Bold) and Subsection Names	Original POG Acres	Remaining POG in 2006 as a Percent of Original POG	Alternative 1	2	3	4	5	6	7
Inside Passage Fiordlands									
Holkham Bay Complex	258,587	100%	100%	100%	98%	86%	90%	90%	84%
Cape Fanshaw Complex	43,579	100%	99%	99%	97%	61%	71%	75%	57%
Thomas Bay Outwash Plains	14,538	70%	70%	62%	56%	47%	54%	55%	44%
Wrangell Narrows Metasediments	160,511	85%	76%	67%	64%	56%	62%	62%	51%
Eastern Passage Complex	114,036	98%	98%	96%	85%	78%	83%	83%	76%
Stikine River Delta	25,010	89%	83%	82%	82%	82%	82%	82%	81%
Bell Island Granitics	139,862	97%	96%	94%	91%	89%	91%	91%	87%
Stikine Strait Complex	32,029	90%	86%	75%	73%	56%	72%	72%	49%
Etolin Granitics	32,088	95%	92%	84%	81%	72%	78%	80%	68%
Zimovia Strait Complex	103,961	90%	85%	79%	71%	58%	68%	69%	53%
Clarence Strait Volcanics	86,738	99%	98%	95%	94%	79%	94%	94%	75%
Ketchikan Mafics/Ultramafics	21,499	99%	98%	96%	96%	95%	84%	84%	72%
Vixen Inlet Till Lowlands	10,068	100%	100%	100%	100%	82%	84%	83%	66%
Traitors Cove Metasediments	162,948	86%	81%	77%	76%	62%	70%	70%	58%
Behm Canal Complex	92,329	94%	92%	90%	90%	85%	89%	89%	84%
Kuiu-Prince of Wales Fiordlands									
Kuiu-POW Granitics	85,962	95%	93%	92%	90%	83%	89%	89%	80%
Rowan Sediments	109,770	85%	85%	72%	71%	66%	69%	69%	64%
North POW-Kuiu Carbonates	190,444	58%	52%	50%	49%	45%	48%	48%	41%
Alvin Bay Sediments	57,548	99%	98%	98%	98%	79%	88%	88%	74%
Affleck Canal Till Lowlands	27,386	100%	100%	100%	100%	82%	100%	100%	77%
North POW Complex	50,227	85%	82%	81%	80%	78%	77%	77%	72%
Elevenmile Till Lowlands	14,899	98%	97%	88%	88%	75%	87%	86%	69%
Gulf of Esquibel Till Lowlands	14,828	100%	100%	100%	100%	100%	100%	100%	100%
Klawock Inlet Till Lowlands	755	88%	88%	88%	88%	88%	88%	88%	88%
Soda Bay Till Lowlands	40,933	99%	99%	99%	94%	90%	88%	89%	80%
Kupreanof Lowlands									
Kake Volcanics	40,175	83%	77%	71%	69%	62%	65%	67%	59%
Duncan Canal Till Lowlands	83,581	91%	86%	80%	76%	65%	69%	70%	58%
Sumner Strait Volcanics	167,966	93%	90%	88%	81%	64%	71%	71%	60%
Central POW Till Lowlands	133,163	75%	69%	69%	68%	66%	67%	67%	59%
Kasaan Peninsula Volcanics	4,197	100%	93%	93%	92%	91%	92%	91%	59%
Skowl Arm Till Lowlands	21,442	94%	92%	87%	79%	73%	79%	77%	67%
Outer Islands Fiordlands									
Outer Islands Complex	19,013	100%	100%	100%	100%	100%	100%	100%	100%
Dall-Outside Complex	125,992	99%	97%	97%	95%	91%	93%	92%	89%
Prince of Wales Mountains									
Central POW Volcanics	244,092	72%	66%	64%	61%	56%	60%	60%	48%
Hetta Inlet Metasediments	85,030	85%	82%	77%	76%	64%	71%	71%	59%
Moira Sound Complex	57,828	100%	100%	99%	91%	81%	88%	87%	77%

Table 3.9-18 (continued)
Estimated Percentage of Original POG Remaining Forest-wide in 100+ Years Assuming Maximum POG Harvest[1] under Each Alternative by Ecological Subsection

Ecological Section (Bold) and Subsection Names	Original POG Acres	Remaining POG in 2006 as a Percent of Original POG	Alternative 1	2	3	4	5	6	7
Dixon Entrance Lowlands									
South POW Granitics	244,092	100%	100%	100%	97%	92%	96%	97%	91%
Duke Island Till Lowlands	85,030	100%	97%	97%	97%	97%	97%	97%	97%
Thorne Arm Granitics	57,828	91%	88%	81%	81%	80%	80%	80%	78%
Princess Bay Volcanics	244,092	83%	79%	76%	75%	73%	76%	75%	71%
Foggy Bay Till Lowlands	85,030	100%	100%	100%	100%	100%	100%	100%	100%
Boca De Quadra Complex	57,828	100%	100%	100%	100%	100%	100%	100%	100%
Coast Mountain Batholith Fiordlands									
Misty Fiords Granitics	388,315	100%	100%	100%	100%	100%	100%	100%	100%
Totals	**5,405,873**	**92%**	**90%**	**88%**	**86%**	**79%**	**83%**	**83%**	**77%**

[1] The estimated suitable POG incorporates a reduction factor for the Model Implementation Reduction Factor (MIRF) and scheduling, which reduces mapped suitable acres to the estimated scheduled acres for each ecological subsection (see the *Timber* section).

Relative to the largest tree categories, after 100+ years of maximum implementation of Alternative 1, 86 percent of the original high-volume POG and 78 percent of the original large-tree POG would remain, with the vast majority of these acres in reserves (Tables 3.9-15 and 3.9-16). At least 13 of the provinces would maintain 90 percent or more of their original high-volume POG and 2 provinces would maintain less than 75 percent (minimum = 60 percent for North Central Prince of Wales) (Table 3.9-15). Relative to large-tree POG, at least 9 provinces would maintain 90 percent or more of their original acres and 8 provinces would have less than 75 percent (minimum = 33 percent for East Baranof) (Table 3.9-16).

Implementation of Alternative 1 would result in a maximum reduction of the karst POG on the Tongass from 69 percent of the original karst POG at present, to 65 percent after 100+ years. Low elevation karst POG would be reduced from 62 percent currently, to 58 percent (Table 3.9-17).

Long-term POG representation by ecological subsection would be maintained under Alternative 1 by protecting at least 52 percent of the original POG on NFS lands in all 73 subsections (Table 3.9-18). At least 90 percent of original POG would be maintained in 51 of the 73 subsections and at least 75 percent would be maintained in 69 out of the 73 subsections.

If one considers the regrowth of current young growth that would be protected under this alternative (Table 3.9-13), after 100+ years the equivalent of an additional 7 percent of the original POG acres would be in mature forest stands and some stands would be at the beginning stages of exhibiting older forest characteristics (Table 3.9-14). Similarly, an additional 11 percent of the original high-volume POG, 17 percent of the original large-tree POG, and 26 percent of the original karst POG would be in mature forest stages (Tables 3.9-15, 3.9-16, and 3.9-17, respectively). In summary, after 100+ years of implementation under Alternative 1, 97 percent of the original POG would be remaining as POG or in mature forest stages. Likewise, 97 percent of the original high-volume POG would still be in high-volume POG or in mature forest stages, 95 percent of the original large-tree POG would be remaining as large-tree POG or in mature forest stages, and 91 percent of the original karst POG would be remaining as POG or in mature forest stages.

Alternative 1 would result in the additional conversion of intact large watersheds to a modified condition. After 100+ years of implementation under maximum harvest, the percentage of intact watersheds would be reduced from 69 percent to 60 percent of the Tongass. Similarly, the percentage of the land area of the Tongass in intact watersheds would be reduced from 74 percent to 68 percent (Table 3.9-19).

However, the majority of this reduction would occur as a result of additional development on non-NFS lands, even if no additional Tongass harvest occurred. Approximately 8 percentage points of the drop in percentage of intact watersheds and 5 percentage points of the drop in acreage are due to additional development on non-NFS lands.

Table 3.9-19
Estimated Percent of All Large Watersheds[1] in each Biogeographic Province Defined as Intact[2] After 100+ Years[3] of Forest Plan Implementation under Each Alternative

No.	Biogeographic Province	Number and Acreage of All Large Watersheds		% of All Large Watersheds Defined as Intact Under Existing Conditions and After 100+ Years by Alternative (% of number of watersheds/% of acreage)								
		No.	Acres	Existing	1	2	3	4	5	6	7
1	Yakutat Forelands	24	344,231	83/80	67/73	63/72	58/71	58/71	58/71	58/71	58/71
2	Yakutat Uplands	26	916,929	96/99	96/99	96/99	96/99	96/99	96/99	96/99	96/99
3	East Chichagof Island	87	1,129,840	53/49	52/47	51/45	48/43	33/27	37/29	41/34	31/26
4	West Chichagof Island	31	287,518	100/100	97/99	97/99	97/99	97/99	97/99	97/99	97/99
5	East Baranof Island	22	394,381	55/60	45/49	45/49	45/49	45/49	45/49	45/49	45/49
6	West Baranof Island	43	797,901	65/69	58/65	58/65	56/64	47/54	53/57	53/57	47/54
7	Admiralty Island	60	1,085,689	88/85	82/80	82/80	82/80	82/80	82/80	82/80	82/80
8	Lynn Canal	50	671,845	76/80	56/64	56/64	50/59	32/45	42/51	44/53	32/45
9	North Coast Range	49	1,111,396	90/94	67/80	67/80	67/80	31/54	39/59	39/59	31/54
10	Kupreanof/Mitkof Island	35	842,334	37/39	31/30	29/29	20/20	9/8	11/11	11/11	9/8
11	Kuiu Island	30	493,252	73/60	73/60	73/60	73/60	47/34	67/55	67/55	47/34
12	Central Coast Range	29	729,163	79/85	72/77	66/73	52/57	38/53	38/51	38/51	38/51
13	Etolin Island & Vicinity	27	518,932	33/30	26/23	22/19	19/17	11/12	19/17	19/17	11/12
14	North Central Prince of Wales	116	1,488,826	24/17	20/13	19/13	16/10	12/8	12/9	12/10	10/6
15	Revilla Island/ Cleveland Pen.	84	1,347,381	68/71	55/60	51/58	49/57	37/44	39/47	39/47	33/43
16	Southern Outer Islands	20	223,986	50/64	50/64	45/60	45/60	45/59	45/60	45/60	45/59
17	Dall Island and Vicinity	35	200,222	71/53	34/19	34/19	31/16	29/15	29/15	29/15	29/15
18	South Prince of Wales	36	395,076	78/75	72/69	69/65	56/51	47/45	50/46	50/46	47/45
19	North Misty Fiords	32	975,904	94/96	94/96	91/93	88/91	88/91	88/91	88/91	88/91
20	South Misty Fiords	54	906,047	100/100	100/100	100/100	100/100	100/100	100/100	100/100	100/100
21	Ice Fields	57	3,006,309	93/94	88/92	86/91	84/90	84/89	82/89	84/90	82/88
Forest-wide		947	17,867,163	69/74	60/68	59/67	56/65	48/58	50/60	51/60	47/57

[1] Large watersheds are defined here as VCUs.
[2] Intact is defined here as having less than 5 percent of original POG harvested and not containing other major disturbances.
[3] Considers past and future harvest on private and other non-NFS lands.

Alternative 2

Alternative 2 would rank second lowest in terms of effects on biodiversity primarily because it would result in the second lowest POG harvest and the second highest POG acreage in reserves. Although this alternative was not specifically evaluated in the 1996 panel assessment, based on its level of harvest and other factors considered in the assessment, it is clear that the assessment would have confirmed this ranking.

Under Alternative 2, approximately 84 percent of all existing POG would be maintained within reserves. Standards and guidelines would protect an additional 11 percent of the existing POG from harvest and the maximum POG potentially harvested would be approximately 215,000 acres or 4 percent (Table 3.9-12). Long-term maximum harvest of high-volume and large-tree POG are projected to be in the 4 to 5 percent range. In addition, there would be about 286,000 acres of existing productive young growth that would not be harvested and that would eventually develop into mature forest and then POG (Table 3.9-13). This represents a long-term replacement for over 100 percent of the future maximum POG harvest.

Assuming maximum harvest over 100+ years, approximately 88 percent of the original POG would remain Forest-wide; 77 percent of the original POG would be in reserves (Table 3.9-14). Harvest would be spread over 18 out of 21 provinces occupied by the Tongass, but only 8 provinces would have potential harvest exceeding 5,000 acres. At least 12 of the 21 provinces would have 90 percent or more of their original POG remaining after 100+ years, and only 2 provinces (North Central Prince of Wales and Etolin & Vicinity) would have less than 75 percent remaining (Table 3.9-14).

Relative to the largest tree categories, after 100+ years of maximum implementation of Alternative 2, 83 percent of the original high-volume POG and 75 percent of the original large-tree POG would remain, with the vast majority of these acres in reserves (Tables 3.9-15 and 3.9-16). At least 11 of the provinces would maintain 90 percent or more of their original high-volume POG and 4 provinces would maintain less than 75 percent (minimum = 58 percent for North Central Prince of Wales) (Table 3.9-15). Relative to large-tree POG, at least 9 provinces would maintain 90 percent or more of their original acres and 9 provinces would have less than 75 percent (minimum = 32 percent for East Baranof) (Table 3.9-16).

Implementation of Alternative 2 would result in a maximum reduction of the karst POG on the Tongass from 69 percent of the original karst POG at present, to 63 percent after 100+ years. Low elevation karst POG would be reduced from 62 percent currently, to 56 percent (Table 3.9-17).

Long-term POG representation by ecological subsection would be maintained under Alternative 2 by protecting at least 50 percent of original POG in all 73 subsections (Table 3.9-18). At least 90 percent of original POG would be maintained in 43 of the 73 subsections and at least 75 percent would be maintained in 66 out of the 73 subsections.

If one considers the regrowth of current young growth that would be protected under this alternative (Table 3.9-13), after 100+ years the equivalent of an additional 5 percent of the original POG acres would be in mature forest stands and some stands would be at the beginning stages of exhibiting older forest characteristics (Table 3.9-14). Similarly, an additional 8 percent of the original high-volume POG, 12 percent of the original large-tree POG, and 17 percent of the original karst POG would be in mature forest stages (Tables 3.9-15, 3.9-16, and 3.9-17, respectively). In summary, after 100+ years of implementation under Alternative 2, 93 percent of the original POG would be remaining as POG or in mature forest stages. Likewise, 91 percent of the original high-volume POG would still be in high-volume POG or in mature forest stages, 87 percent of the original large-tree POG would be remaining as large-tree POG or in mature forest stages, and 80 percent of the original karst POG would be remaining as POG or in mature forest stages.

Alternative 2 would result in the additional conversion of intact large watersheds to a modified condition. After 100+ years of implementation under maximum harvest, the percentage of intact watersheds would be reduced from 69 percent to 59 percent of the Tongass. Similarly, the percentage of the land area of the Tongass in intact watersheds would be reduced from 74 percent to 67 percent (Table 3.9-19). However, the majority of this reduction would occur as a result of additional development on non-NFS lands, even if no additional Tongass harvest occurred. Approximately 8 percentage points of the drop in percentage of intact watersheds and 5 percentage points of the drop in acreage are due to additional development on non-NFS lands.

Alternative 3

Alternative 3 would rank third lowest in terms of effects on biodiversity primarily because it would result in the third lowest POG harvest and the third highest POG acreage in reserves. Although this alternative was not specifically evaluated in the 1996 panel assessment, based on its level of harvest and other factors considered in the assessment, it is clear that the assessment would have confirmed this ranking.

Alternative 3 would maintain approximately 78 percent of all existing POG would be maintained within reserves. Standards and guidelines would protect an additional 16 percent of the existing POG from harvest and the maximum POG potentially harvested would be approximately 313,000 acres or 6 percent (Table 3.9-12). Long-term maximum harvest of high-volume and large-tree POG are projected to be in the 7 to 8 percent range. In addition, there would be about 270,000 acres of existing productive young growth that would not be harvested and that would eventually develop into mature forest and then POG (Table 3.9-13). This represents a long-term replacement for over 86 percent of the future maximum POG harvest.

Assuming maximum harvest over 100+ years, approximately 86 percent of the original POG would remain Forest-wide; 72 percent of the original POG would be in reserves (Table 3.9-14). Harvest would be spread over 18 out of 21 provinces occupied by the Tongass, but only 12 provinces would have potential harvest exceeding 5,000 acres. At least 11 of the 21 provinces would have 90 percent or more of their original POG remaining after 100+ years, and only 2 provinces (North Central Prince of Wales and Etolin & Vicinity) would have less than 75 percent remaining (Table 3.9-14).

Relative to the largest tree categories, after 100+ years of maximum implementation of Alternative 3, 81 percent of the original high-volume POG and 73 percent of the original large-tree POG would remain, with the vast majority of these acres in reserves (Tables 3.9-15 and 3.9-16). At least 9 of the provinces would maintain 90 percent or more of their original high-volume POG and 5 provinces would maintain less than 75 percent (minimum = 56 percent for North Central Prince of Wales) (Table 3.9-15). Relative to large-tree POG, at least 7 provinces would maintain 90 percent or more of their original acres and 9 provinces would have less than 75 percent (minimum = 32 percent for East Baranof) (Table 3.9-16).

Implementation of Alternative 3 would result in a maximum reduction of the karst POG on the Tongass from 69 percent of the original karst POG at present, to 62 percent after 100+ years. Low elevation karst POG would be reduced from 62 percent currently, to 55 percent (Table 3.9-17).

Long-term POG representation by ecological subsection would be maintained under Alternative 3 by protecting at least 49 percent of original POG in all 73 subsections (Table 3.9-18). At least 90 percent of original POG would be maintained in 41 of the 73 subsections and at least 75 percent would be maintained in 62 out of the 73 subsections. The one subsection with less than 50 percent of its original POG, North POW-Kuiu Carbonates, would still maintain about 94,000 acres of POG.

If one considers the regrowth of current young growth that would be protected under this alternative (Table 3.9-13), after 100+ years the equivalent of an additional 5 percent of the original POG acres would be in mature forest stands and some stands would be at the beginning stages of exhibiting older forest characteristics (Table 3.9-14). Similarly, an additional 8 percent of the original high-volume POG, 12 percent of the original large-tree POG, and 16 percent of the original karst POG would be in mature forest stages (Tables 3.9-15, 3.9-16, and 3.9-17, respectively). In summary, after 100+ years of implementation under Alternative 2, 91 percent of the original POG would be remaining as POG or in mature forest stages. Likewise, 89 percent of the original high-volume POG would still be in high-volume POG or in mature forest stages, 85 percent of the original large-tree POG would be remaining as large-tree POG or in mature forest stages, and 78 percent of the original karst POG would be remaining as POG or in mature forest stages.

Alternative 3 would result in the additional conversion of intact large watersheds to a modified condition. After 100+ years of implementation under maximum harvest, the percentage of intact watersheds would be reduced from 69 percent to 56 percent of the Tongass. Similarly, the percentage of the land area of the Tongass in intact watersheds would be reduced from 74 percent to 65 percent (Table 3.9-19). However, the majority of this reduction would occur as a result of additional development on non-NFS lands, even if no additional Tongass harvest occurred. Approximately 8 percentage points of the drop in percentage of intact watersheds and 5 percentage points of the drop in acreage are due to additional development on non-NFS lands.

Alternative 4

With several important exceptions, Alternative 4 is similar to most aspects of the current Forest Plan (Alternative 5). Most importantly, however, it would have fewer old-growth reserves. The Old-Growth Habitat LUD is used in only four provinces (plus a few individual reserves), but other non-development LUDs provide some reserves in all provinces. It also includes additional requirements of maintaining 33 percent of the old growth in each VCU and not harvesting more than 50 percent of the POG within a 50-year period. However, there is no requirement to consider spacing, location, size, shape, or composition in the design of the retained acres; as a result, Alternative 4 would not provide as much protection to the conservation of biodiversity if the retained acres are widely distributed, in small parcels, linear in shape, or do not protect important habitat features (e.g., important deer winter range, under-represented forest plant associations, or suspected goshawk nesting habitat). Alternative 4 would have the same beach and estuary fringe and riparian buffers as Alternative 5 that would enhance connectivity within the matrix, but would not include the goshawk and marten or the legacy forest structure standards and guidelines that require retention trees in harvest units within specific VCUs.

Alternative 4 is based on, and is similar to, the 1997 Alternative 6, which was evaluated in the 1997 Forest Plan Revision FEIS (see Chapter 2); therefore, the conclusions of the 1997 old-growth panel assessment can be extended to the current Alternative 4. The panel assessment concluded that this alternative was ranked in the middle group of the alternatives evaluated by the panel. As such, it ranked better than our 2007 Alternative 7 but, through comparisons with acreage harvested and other alternative components, it would have ranked worse than all of the other 2007 alternatives in terms of effects on biodiversity. In addition to the acres of harvest, the primary factor associated with this ranking is the absence of reserves over relatively large areas of the Tongass. The old-growth network was specifically designed to ensure the maintenance of well-distributed viable populations of all old-growth associated wildlife species across the Tongass. The 1996 panel assessment concluded that alternatives that did not emphasize the old-growth reserve network had the highest potentials to create biodiversity concerns within biogeographic provinces over the long term.

Moreover, the old-growth network was specifically designed to ensure the maintenance of well-distributed viable populations of all old-growth associated wildlife species across the Tongass. The 1997 FEIS panel assessment concluded that alternatives that did not include the OGR system have the highest potentials to create biodiversity concerns within biogeographic provinces over the long term. Therefore, by default, the reduction of this component of the conservation strategy under Alternative 4 would be expected to result in a greater loss of biodiversity relative to the current Forest Plan. This is particularly relevant in the Etolin and Revilla Island/Cleveland Peninsula biogeographic provinces where a substantial amount of timber harvest is proposed but where no reserve system or a very limited reserve system would be in place, respectively.

Alternative 4 would include 60 percent of the existing POG within reserves and an additional 27 percent would be protected within the matrix by standards and guidelines or not scheduled for harvest. As a result, about 13 percent, or 656,000 acres, would be subject to harvest (Table 3.9-12). Long-term maximum harvest of existing high-volume and large-tree POG are projected to be in the 15 to 16 percent range. In addition, there would be about 243,000 acres of existing productive young growth that would not be harvested and that would eventually develop into mature forest and then POG (Table 3.9-13). This represents a long-term replacement for about 37 percent of the future maximum POG harvest.

Assuming maximum harvest over 100+ years, approximately 79 percent of the original POG would remain Forest-wide; 55 percent of the original POG would be in reserves (Table 3.9-14). Harvest would be spread over 20 out of the 21 provinces, and 15 provinces would have potential harvest exceeding 5,000 acres. At least 7 of the 21 provinces would have more than 90 percent of their original POG remaining after 100+ years, and 5 provinces (North Central Prince of Wales, Kupreanof/Mitkof, Etolin & Vicinity, Kuiu, and East Baranof) would have less than 75 percent remaining (Table 3.9-14).

Relative to the largest tree categories, after 100+ years of maximum implementation of Alternative 4, 75 percent of the original high-volume POG and 68 percent of the original large-tree POG would remain, with the majority of these acres in reserves (Tables 3.9-15 and 3.9-16). At least 7 provinces would maintain 90 percent or more of their original high-volume POG and 9 provinces would maintain less than 75 percent (minimum = 51 percent for North Central Prince of Wales) (Table 3.9-15). Relative to large-tree POG, at least 5 provinces would maintain 90 percent or more of their original acres and 10 provinces would have less than 75 percent (minimum = 31 percent for East Baranof) (Table 3.9-16).

Implementation of Alternative 4 would result in a maximum reduction of the karst POG on the Tongass from 69 percent of the original karst POG at present, to 58 percent after 100+ years. Low elevation karst POG would be reduced from 62 percent currently, to 52 percent (Table 3.9-17).

Long-term POG representation by ecological subsection would be maintained under Alternative 4 by protecting at least 45 percent of original POG in all 73 subsections

(Table 3.9-18). At least 90 percent of original POG would be maintained in 29 of the 73 subsections and at least 75 percent would be maintained in 51 out of the 73 subsections. Two subsections, North POW-Kuiu Carbonates and Thomas Bay Outwash Plains, would have with less than 50 percent of their original POG remaining after 100+ years. North POW-Kuiu Carbonates would maintain about 86,000 acres of POG and Thomas Bay Outwash Plains would maintain about 7,000 acres of POG.

If one considers the regrowth of current young growth that would be protected under this alternative (Table 3.9-13), after 100+ years the equivalent of an additional 4 percent of the original POG acres would be in mature forest stands and some stands would be at the beginning stages of exhibiting older forest characteristics (Table 3.9-14). Similarly, an additional 7 percent of the original high-volume POG, 11 percent of the original large-tree POG, and 14 percent of the original karst POG would be in mature forest stages (Tables 3.9-15, 3.9-16, and 3.9-17, respectively). In summary, after 100+ years of implementation under Alternative 4, 83 percent of the original POG would be remaining as POG or in mature forest stages. Likewise, 82 percent of the original high-volume POG would still be in high-volume POG or in mature forest stages, 79 percent of the original large-tree POG would be remaining as large-tree POG or in mature forest stages, and 72 percent of the original karst POG would be remaining as POG or in mature forest stages.

Alternative 4 would result in the additional conversion of intact large watersheds to a modified condition. After 100+ years of implementation under maximum harvest, the percentage of intact watersheds would be reduced from 69 percent to 48 percent of the Tongass. Similarly, the percentage of the land area of the Tongass in intact watersheds would be reduced from 74 percent to 58 percent (Table 3.9-19). However, a portion of this reduction would occur as a result of additional development on non-NFS lands, even if no additional Tongass harvest occurred. Approximately 8 percentage points of the drop in percentage of intact watersheds and 5 percentage points of the drop in acreage are due to additional development on non-NFS lands.

Alternative 5

Alternative 5 represents the current Forest Plan. Although this alternative was not specifically evaluated in the 1996 panel assessment, based on its level of harvest and other factors considered in the assessment, it is clear that it would rate as having a lower effect on biodiversity than Alternatives 4 and 7 and a higher effect than Alternatives 1, 2, 3, or 6.

Alternative 5 would maintain 71 percent of the existing POG within reserves and an additional 20 percent would be protected within the matrix by standards and guidelines or not scheduled for harvest. As a result, about 9 percent, or 463,000 acres, would be subject to harvest (Table 3.9-12). Long-term maximum harvest of high-volume and large-tree POG are projected to be in the 10 to 11 percent range. In addition, there would be about 250,000 acres of existing productive young growth that would not be harvested and that would eventually develop into mature forest and then POG (Table 3.9-13). This represents a long-term replacement for about 54 percent of the future maximum POG harvest.

Assuming maximum harvest over 100+ years, approximately 83 percent of the original POG would remain Forest-wide; 65 percent of the original POG would be in reserves (Table 3.9-14). Harvest would be spread over 19 out of the 21 provinces, but only 14 provinces would have potential harvest exceeding 5,000 acres. At least 8 of the 21 provinces would have more than 90 percent of their original POG remaining after 100+ years, and 3 provinces (North Central Prince of Wales, Kupreanof/Mitkof, and Etolin & Vicinity) would have less than 75 percent remaining (Table 3.9-14).

Relative to the largest tree categories, after 100+ years of maximum implementation of Alternative 5, 79 percent of the original high-volume POG and 71 percent of the original large-tree POG would remain, with the majority of these acres in reserves (Tables 3.9-15 and 3.9-16). At least 8 provinces would maintain 90 percent or more of their original high-volume POG and 5 provinces would maintain less than 75 percent (minimum = 55 percent for North Central Prince of Wales) (Table 3.9-15). Relative to large-tree POG, at least 5 provinces would maintain 90 percent or more of their original acres and 9 provinces would have less than 75 percent (minimum = 31 percent for East Baranof) (Table 3.9-16).

Implementation of Alternative 5 would result in a maximum reduction of the karst POG on the Tongass from 69 percent of the original karst POG at present, to 60 percent after 100+ years. Low elevation karst POG would be reduced from 62 percent currently, to 54 percent (Table 3.9-17).

Long-term POG representation by ecological subsection would be maintained under Alternative 5 by protecting at least 48 percent of original POG in all 73 subsections (Table 3.9-18). At least 90 percent of original POG would be maintained in 31 of the 73 subsections and at least 75 percent would be maintained in 56 out of the 73 subsections. One subsection, North POW-Kuiu Carbonates, would have with less than 50 percent of its original POG remaining after 100+ years, but would still maintain about 91,000 acres.

If one considers the regrowth of current young growth that would be protected under this alternative (Table 3.9-13), after 100+ years the equivalent of an additional 5 percent of the original POG acres would be in mature forest stands and some stands would be at the beginning stages of exhibiting older forest characteristics (Table 3.9-14). Similarly, an additional 7 percent of the original high-volume POG, 11 percent of the original large-tree POG, and 14 percent of the original karst POG would be in mature forest stages (Tables 3.9-15, 3.9-16, and 3.9-17, respectively). In summary, after 100+ years of implementation under Alternative 5, 88 percent of the original POG would be remaining as POG or in mature forest stages. Likewise, 86 percent of the original high-volume POG would still be in high-volume POG or in mature forest stages, 82 percent of the original large-tree POG would be remaining as large-tree POG or in mature forest stages, and 74 percent of the original karst POG would be remaining as POG or in mature forest stages.

Alternative 5 would result in the additional conversion of intact large watersheds to a modified condition. After 100+ years of implementation under maximum harvest, the percentage of intact watersheds would be reduced from 69 percent to 50 percent of the Tongass. Similarly, the percentage of the land area of the Tongass in intact watersheds would be reduced from 74 percent to 60 percent (Table 3.9-19). However, over on-third of this reduction would occur as a result of additional development on non-NFS lands, even if no additional Tongass harvest occurred. Approximately 8 percent of the drop in percentage of intact watersheds and 5 percent of the drop in acreage is due to additional development on non-NFS lands. Approximately 8 percentage points of the drop in percentage of intact watersheds and 5 percentage points of the drop in acreage are due to additional development on non-NFS lands.

Alternative 6

Alternative 6 represents the proposed action and represents a modification of the current Forest Plan. It would result in slightly less POG retained within the matrix, but would expand the reserve system relative to the current Forest Plan

(Alternative 5). On balance, it would protect more POG than Alternative 5, particularly the POG in reserves and large-tree POG. Therefore, it would have a lower overall effect on biodiversity than Alternative 5. Although this alternative was not specifically evaluated in the 1996 panel assessment, based on its level of harvest and other factors considered in the assessment, it is clear that it would have a lower effect on biodiversity than Alternatives 4, 5, and 7 and a higher effect than Alternatives 1, 2, or 3.

Under Alternative 6, 72 percent of the existing POG would be included within reserves and an additional 19 percent would be protected within the matrix by standards and guidelines or not scheduled for harvest. As a result, about 9 percent, or 445,000 acres, would be subject to harvest (Table 3.9-12). Although Alternative 6 would protect 28,000 fewer acres of POG in the matrix than Alternative 5 (partly because the matrix land area would be smaller under Alternative 6), it would have 45,000 more acres of POG in reserves. Long-term maximum harvest of high-volume and large-tree POG are projected to be in the 10 to 11 percent range. Again in comparison with Alternative 5, although Alternative 6 would protect 1,000 fewer acres of large-tree POG in the matrix, it would maintain about 11,000 more acres within reserves. Alternative 6 includes a refinement of small old-growth reserve boundaries relative to Alternative 5; one of the factors this refinement emphasized was the incorporation of more large-tree POG.

In addition to the POG that would not be harvested, there would be about 255,000 acres of existing productive young growth that would not be harvested under Alternative 6 and that would eventually develop into mature forest and then POG (Table 3.9-13). This represents a long-term replacement for about 57 percent of the future maximum POG harvest.

Assuming maximum harvest over 100+ years, approximately 83 percent of the original POG would remain Forest-wide; 66 percent of the original POG would be in reserves (Table 3.9-14). Harvest would be spread over 19 out of the 21 provinces, but only 13 provinces would have potential harvest exceeding 5,000 acres. At least 8 of the 21 provinces would have more than 90 percent of their original POG remaining after 100+ years, and 3 provinces (North Central Prince of Wales, Kupreanof/Mitkof, and Etolin & Vicinity) would have less than 75 percent remaining (Table 3.9-14).

Relative to the largest tree categories, after 100+ years of maximum implementation of Alternative 6, 79 percent of the original high-volume POG and 72 percent of the original large-tree POG would remain, with the majority of these acres in reserves (Tables 3.9-15 and 3.9-16). At least 8 provinces would maintain 90 percent or more of their original high-volume POG and 5 provinces would maintain less than 75 percent (minimum = 54 percent for North Central Prince of Wales) (Table 3.9-15). Relative to large-tree POG, at least 6 provinces would maintain 90 percent or more of their original acres and 9 provinces would have less than 75 percent (minimum = 31 percent for East Baranof) (Table 3.9-16).

Implementation of Alternative 6 would result in a maximum reduction of the karst POG on the Tongass from 69 percent of the original karst POG at present, to 61 percent after 100+ years. Low elevation karst POG would be reduced from 62 percent currently, to 55 percent (Table 3.9-17).

Long-term POG representation by ecological subsection would be maintained under Alternative 6 by protecting at least 48 percent of original POG in all 73 subsections (Table 3.9-18). At least 90 percent of original POG would be maintained in 31 of the 73 subsections and at least 75 percent would be maintained in 57 out of the 73 subsections. One subsection, North POW-Kuiu Carbonates, would have with less than 50 percent of its original POG remaining after 100+ years, but would still maintain about 92,000 acres.

If one considers the regrowth of current young growth that would be protected under this alternative (Table 3.9-13), after 100+ years the equivalent of an additional 5 percent of the original POG acres would be in mature forest stands and some stands would be at the beginning stages of exhibiting older forest characteristics (Table 3.9-14). Similarly, an additional 7 percent of the original high-volume POG, 11 percent of the original large-tree POG, and 15 percent of the original karst POG would be in mature forest stages (Tables 3.9-15, 3.9-16, and 3.9-17, respectively). In summary, after 100+ years of implementation under Alternative 6, 88 percent of the original POG would be remaining as POG or in mature forest stages. Likewise, 86 percent of the original high-volume POG would still be in high-volume POG or in mature forest stages, 83 percent of the original large-tree POG would be remaining as large-tree POG or in mature forest stages, and 76 percent of the original karst POG would be remaining as POG or in mature forest stages.

Alternative 6 would result in the additional conversion of intact large watersheds to a modified condition. After 100+ years of implementation under maximum harvest, the percentage of intact watersheds would be reduced from 69 percent to 51 percent of the Tongass. Similarly, the percentage of the land area of the Tongass in intact watersheds would be reduced from 74 percent to 60 percent (Table 3.9-19). However, over on-third of this reduction would occur as a result of additional development on non-NFS lands, even if no additional Tongass harvest occurred. Approximately 8 percentage points of the drop in percentage of intact watersheds and 5 percentage points of the drop in acreage are due to additional development on non-NFS lands.

Alternative 7

Alternative 7 represents the alternative with the highest POG harvest level. It also differs from the other alternatives in that it does not designate Old-Growth Habitat LUDs, although it does include reserves associated with other non-development LUDs. In addition to the elimination of Old-Growth Habitat LUDs, Alternative 7 also proposes to reduce the beach buffer from 1,000 feet to 500 feet. This would likely reduce the effectiveness of these shoreline corridors in providing landscape linkages between habitat reserves and thus, potentially reduce the interconnectedness of the old-growth forest ecosystem. Further, it differs from all other alternatives by not requiring riparian buffers along Class III streams, which would also have some negative effect on old-growth connectivity (although Class I and II riparian buffers are most important in this regard). Finally, as in the case for Alternative 4, it would not include the goshawk and marten or the legacy forest structure standards and guidelines that require retention trees in harvest units within specific VCUs.

Alternative 7 is based on and is similar to the 1997 Alternative 2, which was evaluated in the 1997 Forest Plan Revision FEIS (see Chapter 2); therefore, the conclusions of the 1997 old-growth panel assessment can be extended to the current Alternative 7. The panel assessment concluded that this alternative was ranked in the highest risk group in terms of effects on biodiversity among the alternatives evaluated by the panel. As such, it ranked worse than our 2007 Alternative 4 and, through comparisons with acreage harvested and other alternative components, it would have ranked worse than all of the other 2007 alternatives as well. In addition to the acres of harvest, the primary factor associated with this ranking is the absence of reserves over many relatively large areas of the Tongass. Of particular concern are the North Central Prince of Wales Island, Etolin Island & Vicinity, Kupreanof/Mitkof Island, and Revilla Island/Cleveland

Peninsula biogeographic provinces, which have already been heavily affected by timber harvest. The old-growth network was specifically designed to ensure the maintenance of well-distributed viable populations of all old-growth associated wildlife species across the Tongass. The 1996 panel assessment concluded that alternatives that did not emphasize the old-growth reserve network had the highest potentials to create biodiversity concerns within biogeographic provinces over the long term.

Alternative 7 would include 57 percent of the existing POG within reserves and an additional 27 percent would be protected within the matrix by standards and guidelines or not scheduled for harvest. As a result, about 16 percent, or 807,000 acres, would be subject to harvest (Table 3.9-12). Long-term maximum harvest of existing high-volume and large-tree POG are projected to be in the 18 to 20 percent range. In addition, there would be about 219,000 acres of existing productive young growth that would not be harvested and that would eventually develop into mature forest and then POG (Table 3.9-13). This represents a long-term replacement for about 27 percent of the future maximum POG harvest.

Assuming maximum harvest over 100+ years, approximately 77 percent of the original POG would remain Forest-wide; 52 percent of the original POG would be in reserves (Table 3.9-14). Harvest would be spread over 20 out of the 21 provinces, and 16 provinces would have potential harvest exceeding 5,000 acres. At least 7 of the 21 provinces would have at least 90 percent of their original POG remaining after 100+ years, and 7 provinces (North Central Prince of Wales, Kupreanof/Mitkof, Etolin & Vicinity, Revilla/Cleveland, Kuiu, East Chichagof, and East Baranof) would have less than 75 percent remaining (Table 3.9-14).

Relative to the largest tree categories, after 100+ years of maximum implementation of Alternative 7, 72 percent of the original high-volume POG and 64 percent of the original large-tree POG would remain, with the majority of these acres in reserves (Tables 3.9-15 and 3.9-16). At least 7 provinces would maintain 90 percent or more of their original high-volume POG and 11 provinces would maintain less than 75 percent (minimum = 44 percent for North Central Prince of Wales) (Table 3.9-15). Relative to large-tree POG, at least 5 provinces would maintain 90 percent or more of their original acres and 12 provinces would have less than 75 percent (minimum = 31 percent for East Baranof) (Table 3.9-16).

Implementation of Alternative 7 would result in a maximum reduction of the karst POG on the Tongass from 69 percent of the original karst POG at present, to 54 percent after 100+ years. Low elevation karst POG would be reduced from 62 percent currently, to 47 percent (Table 3.9-17).

Long-term POG representation by ecological subsection would be maintained under Alternative 7 by protecting at least 41 percent of original POG in all 73 subsections (Table 3.9-18). At least 90 percent of original POG would be maintained in 25 of the 73 subsections and at least 75 percent would be maintained in 45 out of the 73 subsections. Four subsections, North POW-Kuiu Carbonates, Central POW Volcanics, Stikine Strait Complex, and Thomas Bay Outwash Plains, would have with less than 50 percent of their original POG remaining after 100+ years. These subsections would have 78,000, 79,000, 16,000, and 6,000 acres of POG, respectively.

If one considers the regrowth of current young growth that would be protected under this alternative (Table 3.9-13), after 100+ years the equivalent of an additional 4 percent of the original POG acres would be in mature forest stands and some stands would be at the beginning stages of exhibiting older forest characteristics (Table 3.9-14). Similarly, an additional 6 percent of the original high-volume POG, 9 percent of the original large-tree POG, and 12 percent of the original karst POG would be in mature forest stages (Tables 3.9-15, 3.9-16, and 3.9-17, respectively). In summary, after 100+ years of implementation under Alternative 7, 81 percent of the original POG would be remaining as POG or in mature forest stages. Likewise, 78 percent of the original high-volume POG would still be in high-volume POG or in mature forest stages, 71 percent of the original large-tree POG would be remaining as large-tree POG or in mature forest stages, and 66 percent of the original karst POG would be remaining as POG or in mature forest stages.

Alternative 7 would result in the additional conversion of intact large watersheds to a modified condition. After 100+ years of implementation under maximum harvest, the percentage of intact watersheds would be reduced from 69 percent to 47 percent of the Tongass. Similarly, the percentage of the land area of the Tongass in intact watersheds would be reduced from 74 percent to 57 percent (Table 3.9-19). However, a portion of this reduction would occur as a result of additional development on non-NFS lands, even if no additional Tongass harvest occurred. Approximately 8 percentage points of the drop in percentage of intact watersheds and 5 percentage points of the drop in acreage are due to additional development on non-NFS lands.

Endemics

As noted in the Endemism subsection of the Affected Environment part of this section, Southeast Alaska is rich in endemics, and endemic mammals and other groups are sensitive to future landscape disturbances. Because unproductive forest and non-forested ecosystems have not changed appreciably since original levels, nor are they anticipated to change under the full implementation of the Forest Plan under any of the alternatives, concerns focus on the loss of POG habitat, which is most influenced by management activities. Those species most closely associated with old growth are assumed to be at greatest risk.

The 1997 Forest Plan FEIS panel assessment for endemics evaluated 14 species or subspecies endemic to Southeast Alaska (see the *Wildlife* section of the 1997 Forest Plan Revision FEIS and the *Wildlife* section in this chapter for additional information). Each of the above species occupies restricted ranges (i.e., currently known to be limited to one or a few isolated islands). Under all alternatives, the Prince of Wales flying squirrel is currently assumed to have the greatest viability concern over time.

The panel concluded that the 1997 Alternative 11 (equivalent to the current Forest Plan or the 2007 Alternative 5) ranked among the alternatives with the highest likelihood of sustaining habitat to support viable populations of endemic mammals. Under the current Forest Plan, all islands less than 1,000 acres were removed from the timber base to eliminate risk to these species associated with habitat loss or alteration from timber harvest. The 1,000-foot beach buffer, riparian corridors, and the old-growth reserve system are also features of the current Forest Plan that provide functional habitat for species with relatively small home ranges. These protective provisions would be maintained under all the action alternatives, with the exception of Alternative 7 under which the beach fringe buffer would be reduced to 500 feet, the system of old-growth reserves would be significantly contracted, and Class III stream buffers would be eliminated. Alternative 4 would also significantly reduce the old-growth reserve system in some provinces. Alternatives 1, 2, 3, and 6, which propose to harvest less timber than under the current Forest Plan, would likely continue to maintain habitat and connectivity to support viable populations of endemic mammals.

Based on the number of acres converted from the matrix to reserves, as described above, the ability to maintain viable populations of endemic mammals would be greatest under Alternative 1, followed by Alternatives 2, 3, 6, 5, 4, and 7. See the *Wildlife* section in this chapter for additional species-specific discussion.

Invasive Species

As discussed in the Affected Environment section, numerous non-native species have been introduced or transplanted in Alaska, including plants, wildlife, fish, other aquatic organisms, and insects. Managing invasive species on the Tongass National Forest must include increased public awareness at all levels coupled with interagency cooperation and development of cooperative management partnerships to monitor and limit invasive species populations at current levels in Alaska.

Currently, non-native or invasive plant species make up the vast majority of species listed as threats in Alaska. Fifteen of the species found on the Tongass are among the species that pose a greater potential threat. The areas of greatest non-native plant diversity and extent of invasion have been found around towns and the most heavily traveled areas. The areas with the lowest number of species were further from population centers or paved roads (Arhangelsky 2005). Schrader and Hennon (2005) cited several references that suggest that the highest invasive plant occurrences are in areas of disturbance such as roads, recreational areas, commercial, and industrial development. As more surveys are conducted, it is anticipated that more invasive plant species will be documented (see the Plant section in this chapter for additional discussion of effects from non-native plants).

Non-native wildlife species have been transplanted for sport hunting or other consumption opportunities such as trapping or, in some cases, accidentally introduced in Southeast Alaska; however, only the Norway rat is considered invasive at this time. Concern regarding potential range expansion of this species exists; however, measures to reduce the potential of introducing this species elsewhere on the Tongass is limited because the Forest does not have jurisdiction regarding shipping throughout Southeast Alaska waters. Because of the growing number of elk in Southeast Alaska, this species may be considered as a possible invasive species outside of Etolin and Zarembo islands, due to their effects on Sitka black-tailed deer, which have similar habitat needs (see the *Wildlife* section in this chapter).

Invasive fish and other aquatic organisms identified as threats for Alaska are discussed in more detail under the *Fish* section in this chapter. Established populations (throughout the Susitna River drainage, parts of the Kenai system) of northern pike (with the exception of Pike Lakes on the Yakutat Ranger District) pose the greatest immediate concern, while the Atlantic salmon, Chinese mitten crab, and New Zealand mudsnail are species likely to invade Alaska in coming years (Schrader and Hennon 2005). Effects of these species on native populations are currently unknown; however, based on documented impacts in other areas, species such as the Chinese mitten crab and New Zealand mudsnail quickly colonize environments and dominate the invertebrate community in aquatic ecosystems by consuming large portions of the food resources, outcompeting and physically crowding native species. This could lead to local extirpation in some areas over time.

Schrader and Hennon (2005) noted that invasive tree pathogens are not currently damaging Alaskan ecosystems, but there are numerous species that could cause widespread tree mortality if introduced. Introduced insects currently established in Alaska include the larch sawfly, alder woolly aphid, spruce aphid, and amber-marked birch leafminer, and could cause widespread tree defoliation and mortality (see the *Forest Health* section in this chapter for additional discussion of effects).

With the exception of certain fish and aquatic organisms that would not be expected to increase independent of any of the alternatives, most of the other invasive or potentially invasive species listed above would be influenced by management activities that would increase harvest and other associated management activities, such as the building of new roads. Alternatives 1, 2, and 3 designate more reserve areas than the other alternatives. Under Alternatives 4 and 7, there would be an increase in the amount of harvest and roading, relative to the current Forest Plan; more lands would be available for timber harvest activities under Alternatives 4 and 7. Although any management activity has the potential to increase the risk of introducing invasive species to a system, it is reasonable to assume that increases in harvest and roading from current levels would contribute additional source areas for invasive establishment and persistence.

None of the alternatives proposes changes to the management framework of the Tongass in relation to invasives. Most of the species identified above are not specifically addressed under the Forest Plan Monitoring section or standards and guidelines; however, the Alaska Region of the Forest Service is currently developing an invasive species strategy that will apply the principles of prevention, early detection, control, and rehabilitation in cooperation with various agencies and partners to reduce or eliminate invasive species establishment.

Cumulative Effects

When considering biodiversity and the distribution of old growth across the Tongass, it is important to consider non-NFS lands (which include private, city, state, and other federal lands. As noted in the subsections titled *Cumulative Past Harvest* and *Current Conditions by Biogeographic Province* in the *Affected Environment* portion of this section, past harvest has been more extensive on non-NFS lands than on NFS lands. The area used to assess cumulative effects on biodiversity encompasses all lands in Southeast Alaska, including all lands within the Tongass National Forest boundary, from the Yakutat area southeast to the south of Ketchikan. In addition, it includes the area of Glacier Bay National Park, and the areas around Haines and Skagway. Some resource areas may require larger or smaller areas to address cumulative effects. For example, for some resources, the extent of analysis needs only include the area within the Tongass boundary (i.e., without the Glacier Bay National Park and Haines/Skagway areas). In particular, cumulative effects are sometimes addressed within a VCU (e.g., water, fish, wetlands), or a WAA (e.g., wolves, deer), or a Biogeographic Province or an Ecological Subsection (e.g., species viability).

Under the current Forest Plan, with few exceptions (e.g., minerals production and utility corridors), only lands classified as suitable for timber production are scheduled for harvest in the future. However, other reasonably foreseeable activities that have the potential to cumulatively affect biodiversity locally and regionally include:

- Minerals extraction (e.g., Green's Creek on Admiralty Island and Kensington Gold Mine near Berners Bay north of Juneau),
- Transmission line intertie projects (e.g., Swan Lake-Lake Tyee Intertie northeast of Ketchikan),
- Hydroelectric projects (e.g., Four Dam Pool projects, other limited small hydroelectric projects such as Angoon),
- Regional transportation developments (e.g., Juneau Access Road),
- Growth in the cruise ship, guiding services, fishing/destination type lodging, and
- Human settlements (e.g., expansion of cities like Juneau and Ketchikan, recreational cabin development, and land auctions by the State of Alaska).

Because plant and wildlife populations exist across all land ownerships, addressing potential adverse effects of management activities on overall biodiversity requires agencies and other landowners to work together. A species population viability and its distribution within Southeast Alaska is influenced in part by geologic processes (e.g., island archipelago), habitat and connectivity between patches (e.g., fragmentation), and by state and federal regulatory mechanisms such as harvest limits, season length, subsistence needs, and timber harvest practices on all lands. Overall, biodiversity on the Tongass remains in good condition and are mostly dominated by old-growth forest. As development continues through timber harvest, associated activities such as road building, and community expansion, particularly in areas where extensive development has already occurred (i.e., Prince of Wales Island), maintaining connectivity and roadless refugia will become increasingly important, particularly for wide-ranging species whose distribution depends on some level of connectivity across the landscape. In addition, the management of human resources will continue to play a role in the viability and distribution of biodiversity across the Forest.

Cumulative Effects on Productive Old Growth in General

The focus of the analysis remains on changes to the old-growth ecosystem as this habitat is most affected under each of the alternatives. This section displays future projected harvest on both NFS lands and non-NFS lands by biogeographic province and ecological subsection. For assessing overall effects to biodiversity across all ownerships for Southeast Alaska, both biogeographic province and ecological subsection are appropriate scales. As stated in the *Affected Environment* section, using both biogeographic provinces and ecological subsection classifications allows additional insight into how various communities are represented at different landscape scales. Both classification systems were developed using different processes, but complement each other in terms of addressing biodiversity.

To estimate the future harvest of POG on non-NFS lands, it was assumed that 75 percent of the remaining old-growth would be harvested on Native corporation lands and 50 percent of the remaining old growth would be harvested on state lands, other private lands, and lands owned by municipalities, over the life of the Forest Plan (100+ years). The total percent harvest of POG on all lands within Southeast Alaska by biogeographic province and each ecological subsection could then be calculated.

On NFS lands, approximately 455,000 acres have been harvested. As a result, 92 percent of the original POG remains today. Additional POG harvest on NFS lands under the alternatives would range from an estimated maximum of 86,000 acres under Alternative 1 to 807,000 acres under Alternative 7, over the next 100+ years. The result would be that an estimated 90 to 77 percent of the original POG on these lands would remain indefinitely.

Approximately 371,000 acres of POG (including a small portion of helicopter partial harvest acres) have been harvested on non-NFS lands, with the majority of the harvest occurring in the last 25 years. With this harvest, 51 percent of the original POG is estimated to remain on these lands. Future harvest on non-NFS lands over the next 100+ years is estimated to be as high as 295,000 additional acres. Therefore, after the total cumulative harvest on non-NFS lands an estimated 19 percent is expected to remain (considered to be a conservatively high estimate).

Considering NFS and non-NFS lands combined, 87 percent of the area originally occupied by POG remains unharvested today. The percent of original POG that would remain after full implementation of the Forest Plan and future non-NFS harvest (after 100+ years) would range from 82 percent under Alternative 1 to 71 percent under Alternative 7 (Table 3.9-20). This does not include approximately 3 to

6 percent additional that would be represented by mature second growth that is protected from harvest, some of which would be beginning to take on older forest characteristics.

Past harvest activities have concentrated, and future harvest will continue to concentrate under most alternatives, primarily in three biogeographic provinces: the North Central Prince of Wales, Kupreanof/Mitkof, and Revilla/Cleveland provinces. These three provinces account for about 56 percent of the past harvest and will account for 44 to 74 percent of future harvest, depending on the alternative.

North Central Prince of Wales is the province with the most extensive past and future harvest and development. Currently, 65 percent of the original POG remains in the province (Table 3.9-20). After 100+ years, the minimum amount remaining would range from 44 to 55 percent, depending on the alternative.

In addition to the three provinces mentioned above, relatively high rates of POG removal have occurred, or are planned to occur, within the Etolin Island & Vicinity, East Chichagof, Southern Outer Island, Dall Island & Vicinity, and Yakutat Forelands biogeographic provinces (however, POG removal in the Yakutat Forelands province is partially due to windthrow rather than timber harvest). Under all alternatives, harvest will continue to be concentrated in matrix NFS lands and on private and state lands, and reserves will continue to exist on NFS, other federal, and some state lands. More specific descriptions of effects are presented under the *Cumulative Effects by Biogeographic Province* subsection below.

Theoretical and empirical studies suggest that the likelihood of a population persisting over time is related to some threshold level of habitat loss across the landscape (Fahrig 1997, 1999, 2003; Flather et al. 2002; Andren 1994). Reported threshold levels for the percentage of habitat maintained at which the rate of landscape extinction increases range from 20 percent (Fahrig 1997) to 50 percent (Soule and Sanjayan 1998), depending in part on the dispersal capability of the species under consideration (see the Cumulative Effects subsection of the *Wildlife* section for further information on this topic). It is important to note that, although many plant and animal species make higher use of the larger forest types defined by high-volume and large-tree POG, few are totally restricted to these habitats. In fact, almost all species make at least some use of types other than mapped POG (e.g., unproductive old growth and older young growth forests). The thresholds of importance to an individual species depend on specific habitat requirements as well as dispersal capabilities. Existing natural fragmentation of habitats can also affect the level of additional fragmentation that can be supported. Therefore, the percentages of POG and larger tree types presented in these cumulative effects discussions represent indices of risk, which can be generally compared with theoretical and empirical thresholds, recognizing the high degree of variability among species habitat requirements, dispersal capabilities, and the natural level of fragmentation within the landscape.

Within the Tongass National Forest boundary, the Conservation Strategy was designed to address the more extensive harvest on non-NFS lands through the old-growth reserve system network and Forest-wide standards and guidelines, both of which were intended to maintain habitat components important to a variety of species and maintain connectivity across the landscape, with or without much contribution from non-NFS lands. In other words, benefits from non-NFS lands were assumed to be minimal in the design of the strategy. Therefore, the cumulative effects associated with the combination of NFS and non-NFS harvest, for those alternatives that incorporate the complete conservation strategy (i.e., Alternatives 1, 2, 3, 5, and 6), are not expected to be appreciably different than the direct and indirect effects.

Table 3.9-20
Cumulative Percent of Original POG Remaining on All Ownerships after 100+ Years of Maximum[1] Forest Plan Implementation under Each Alternative, incorporating Future Harvest on Non-NFS Lands[2] by Biogeographic Province

	Biogeographic Province	Estimated Original POG on All Ownerships (Acres)	Percent Remaining POG on All Ownerships	Percent Remaining POG after 100+ Years as a Percent of Original POG						
				Alternative						
				1	2	3	4	5	6	7
1	Yakutat Forelands	89,226	84%	77%	75%	73%	72%	72%	73%	71%
2	Yakutat Uplands	23,400	94%	94%	94%	94%	93%	94%	94%	93%
3	East Chichagof Island	430,035	84%	78%	75%	74%	67%	71%	72%	64%
4	West Chichagof Island	72,369	100%	100%	100%	100%	100%	100%	100%	100%
5	East Baranof Island	89,338	87%	86%	81%	80%	72%	76%	78%	70%
6	West Baranof Island	227,753	92%	90%	88%	86%	81%	86%	86%	80%
7	Admiralty Island	597,623	95%	95%	95%	95%	95%	95%	95%	95%
8	Lynn Canal	169,414	97%	92%	89%	88%	80%	84%	85%	79%
9	North Coast Range	356,463	94%	89%	89%	88%	77%	81%	81%	76%
10	Kupreanof/Mitkof Island	335,104	83%	74%	70%	66%	57%	61%	61%	53%
11	Kuiu Island	295,929	91%	91%	85%	83%	72%	79%	79%	69%
12	Central Coast Range	250,959	97%	96%	95%	89%	82%	85%	86%	80%
13	Etolin Island	232,104	85%	78%	71%	69%	59%	67%	67%	55%
14	North Central Prince of Wales	598,645	65%	55%	54%	52%	49%	51%	51%	44%
15	Revilla Island/ Cleveland Peninsula	573,213	89%	81%	79%	77%	69%	74%	74%	66%
16	Southern Outer Islands	118,338	85%	80%	78%	77%	75%	76%	76%	72%
17	Dall Island and Vicinity	99,621	75%	58%	58%	57%	55%	55%	55%	53%
18	South Prince of Wales	173,174	91%	87%	85%	81%	71%	77%	77%	68%
19	North Misty Fiords	200,820	99%	98%	98%	97%	96%	97%	97%	95%
20	South Misty Fiords	310,176	100%	100%	100%	100%	100%	100%	100%	100%
21	Ice Fields	115,273	97%	97%	96%	95%	93%	93%	94%	93%
22	Chilkat River Complex	145,104	88%	56%	56%	56%	56%	56%	56%	56%
23	Glacier Bay/ Fairweather Range	170,840	100%	100%	100%	100%	100%	100%	100%	100%
Total for Southeast Alaska		**5,674,921**	**87%**	**82%**	**80%**	**78%**	**73%**	**76%**	**76%**	**71%**

[1] Maximum Forest Plan implementation is defined as the maximum harvest allowed by the Allowable Sale Quantity each decade. The estimate assumes all scheduled suitable POG is harvested [calculated by subtracting alternative-specific reduction factors for the Model Implementation Reduction Factor (MIRF) and scheduling from the mapped suitable acreage under each alternative (see the Timber section)].

[2] Based on an inventory of existing harvest on non-NFS lands and the estimation of future harvest by major landowner category.

Table 3.9-21
Cumulative Percent of Original High-Volume POG Remaining on All Ownerships after 100+ Years of Maximum[1] Forest Plan Implementation under Each Alternative, incorporating Future Harvest on Non-NFS Lands[2] by Biogeographic Province

Biogeographic Province		Estimated Original High-Volume POG on All Ownerships (Acres)	Percent Remaining High-Volume POG on All Ownerships	Remaining High-Volume POG after 100+ Years as a Percent of Original POG — Alternative 1	2	3	4	5	6	7
1	Yakutat Forelands	56,525	81%	73%	70%	66%	64%	65%	65%	63%
2	Yakutat Uplands	11,614	92%	92%	92%	91%	90%	91%	91%	90%
3	East Chichagof Island	213,321	76%	69%	66%	65%	59%	63%	63%	56%
4	West Chichagof Island	17,275	100%	100%	100%	100%	100%	100%	100%	100%
5	East Baranof Island	37,246	77%	76%	70%	69%	62%	66%	67%	60%
6	West Baranof Island	68,682	82%	77%	76%	74%	69%	74%	74%	68%
7	Admiralty Island	323,390	94%	93%	93%	93%	93%	93%	93%	93%
8	Lynn Canal	69,994	95%	87%	84%	83%	73%	78%	79%	71%
9	North Coast Range	162,093	92%	83%	83%	82%	71%	76%	76%	70%
10	Kupreanof/Mitkof Island	151,400	71%	61%	57%	53%	44%	49%	49%	41%
11	Kuiu Island	175,546	90%	89%	82%	80%	69%	75%	75%	66%
12	Central Coast Range	110,637	95%	94%	93%	87%	80%	84%	84%	79%
13	Etolin Island	106,381	76%	67%	61%	59%	50%	57%	57%	45%
14	North Central Prince of Wales	453,890	56%	45%	44%	42%	39%	41%	41%	33%
15	Revilla Island/ Cleveland Peninsula	282,301	84%	74%	71%	70%	62%	68%	68%	58%
16	Southern Outer Islands	58,072	77%	70%	68%	67%	64%	66%	66%	61%
17	Dall Island and Vicinity	63,691	68%	52%	52%	51%	50%	50%	50%	48%
18	South Prince of Wales	94,158	88%	83%	81%	77%	67%	74%	73%	64%
19	North Misty Fiords	68,370	98%	97%	96%	95%	93%	95%	95%	93%
20	South Misty Fiords	97,581	100%	100%	100%	100%	100%	100%	100%	100%
21	Ice Fields	39,093	93%	93%	93%	92%	90%	90%	91%	90%
22	Chilkat River Complex	112,625	89%	60%	60%	60%	60%	60%	60%	60%
23	Glacier Bay/ Fairweather Range	157,413	100%	100%	100%	100%	100%	100%	100%	100%
Total for Southeast Alaska		**2,931,297**	**82%**	**75%**	**73%**	**72%**	**67%**	**70%**	**70%**	**65%**

[1] Maximum Forest Plan implementation is defined as the maximum harvest allowed by the Allowable Sale Quantity each decade. The estimate assumes all scheduled suitable POG is harvested [calculated by subtracting alternative-specific reduction factors for the Model Implementation Reduction Factor (MIRF) and scheduling from the mapped suitable acreage under each alternative (see the Timber section)].
[2] Based on an inventory of existing harvest on non-NFS lands and the estimation of future harvest by major landowner category.

Cumulative Effects on Specific Productive Old-Growth Types

Historically, as discussed in the *Past Old-Growth Harvest* subsection, some of the more productive forest types have been harvested at a higher rate than POG in general. These forest types have included both high-volume and large-tree POG (SD67), POG on karstlands, and low elevation POG (Albert and Schoen 2007). Tables 3.9-21 and 3.9-22 present the acreage of original high-volume and large-tree POG along with the percent currently remaining and the percent remaining after 100+ years by biogeographic province for all of Southeast Alaska.

For all ownerships across Southeast Alaska, an estimated 82 percent of high-volume POG remains today, although the percentage found in individual provinces ranges from a low of 56 percent to a high of 100 percent. After 100+ years, it is estimated that the overall amount remaining would range from a high of 75 percent under Alternative 1 to a low of 65 percent under Alternative 7 (Table 3.9-21). This does not include approximately 5 to 9 percent additional that would be represented by mature second growth growing on high-volume sites and is protected from harvest. The percent of POG remaining would range from 45 to 100 percent in individual provinces under Alternative 1 and from 33 to 100 percent under Alternative 7.

Approximately 68 percent of large-tree POG remains on all ownerships combined in Southeast Alaska. The percent remaining in individual provinces ranges from a low of 33 percent to a high of 100 percent. After 100+ years, the amount remaining would range from a high of 62 percent under Alternative 1 to a low of 52 percent under Alternative 7 (Table 3.9-22). This does not include approximately 7 to 14 percent additional that would be represented by mature second growth growing on large-tree POG sites and is protected from harvest. The percent of POG remaining would range from 32 to 100 percent in individual provinces under Alternative 1 and from 30 to 100 percent under Alternative 7.

Cumulative harvest on karst lands has affected about 34 percent of all karst POG and resulted in approximately 66 percent of all karst POG remaining unharvested. This represents about 84 percent of all karst POG at moderate to higher elevations (> 800 ft.), but only about 60 percent of all karst POG at low elevations (< 800 ft.). After 100+ years and assuming that all karst POG on non-NFS lands is harvested, the overall percent remaining would range from a high of 60 percent under Alternative 1 to a low of 50 percent under Alternative 7. In addition, from 11 to 24 percent of the original karst POG would be in mature second growth, some of which would be beginning to take on older forest characteristics.

Cumulative Effects and Climate Change

In addition to the approach and direction of management on the Tongass, there is uncertainty with regards to the cumulative effects on biodiversity associated with climate change. Warmer temperatures and decreased precipitation are anticipated to result in changes to vegetation and thus the suitability of wildlife habitat, among other impacts (see *Climate and Air* section). Although some species may benefit (e.g., greater overwinter survival of deer, and thus a greater prey base for wolves, resulting from warmer winter temperatures during normal years), habitat losses could also result from wind, increased risk of fires, insect infestations, disease, and from changes to microclimate conditions for many plant and animal species, especially those species already found in unique habitat conditions.

Table 3.9-22
Cumulative Percent of Original SD67 POG Remaining on All Ownerships after 100+ Years of Maximum[1] Forest Plan Implementation under Each Alternative, incorporating Future Harvest on Non-NFS Lands[2] by Biogeographic Province

Biogeographic Province		Estimated Original SD67 POG on All Ownerships (Acres)	Percent Remaining SD67 POG on All Ownerships	Remaining SD67 POG after 100+ Years as a Percent of Original POG — Alternative 1	2	3	4	5	6	7
1	Yakutat Forelands	32,356	81%	78%	73%	66%	63%	65%	65%	63%
2	Yakutat Uplands	2,408	83%	83%	80%	80%	75%	79%	79%	74%
3	East Chichagof Island	63,769	58%	54%	53%	52%	47%	51%	52%	46%
4	West Chichagof Island	2,012	100%	100%	100%	100%	100%	100%	100%	100%
5	East Baranof Island	5,894	33%	33%	32%	32%	31%	31%	31%	31%
6	West Baranof Island	10,434	44%	39%	39%	39%	37%	38%	38%	37%
7	Admiralty Island	109,477	91%	90%	90%	90%	90%	90%	90%	90%
8	Lynn Canal	15,109	88%	78%	76%	75%	65%	70%	71%	64%
9	North Coast Range	33,870	77%	66%	66%	66%	54%	59%	60%	52%
10	Kupreanof/Mitkof Island	43,968	47%	42%	40%	38%	32%	34%	35%	29%
11	Kuiu Island	45,073	82%	81%	67%	65%	56%	61%	61%	52%
12	Central Coast Range	22,550	89%	89%	87%	82%	73%	79%	78%	72%
13	Etolin Island	24,912	51%	46%	42%	40%	33%	39%	39%	30%
14	North Central Prince of Wales	228,477	55%	47%	45%	44%	40%	43%	43%	35%
15	Revilla Island/ Cleveland Peninsula	55,209	59%	55%	53%	52%	46%	50%	50%	44%
16	Southern Outer Islands	19,760	67%	60%	58%	57%	53%	56%	56%	49%
17	Dall Island and Vicinity	21,202	42%	37%	37%	37%	36%	37%	37%	36%
18	South Prince of Wales	54,556	88%	85%	82%	80%	69%	76%	76%	65%
19	North Misty Fiords	13,545	95%	94%	92%	92%	90%	92%	92%	90%
20	South Misty Fiords	14,147	100%	100%	100%	100%	100%	100%	100%	100%
21	Ice Fields	6,978	83%	83%	83%	83%	81%	81%	83%	81%
22	Chilkat River Complex	28,676	73%	32%	32%	32%	32%	32%	32%	32%
23	Glacier Bay/ Fairweather Range	0	--	--	--	--	--	--	--	--
Total for Southeast Alaska		**854,457**	**68%**	**62%**	**60%**	**59%**	**54%**	**57%**	**57%**	**52%**

[1] Maximum Forest Plan implementation is defined as the maximum harvest allowed by the Allowable Sale Quantity each decade. The estimate assumes all scheduled suitable POG is harvested [calculated by subtracting alternative-specific reduction factors for the Model Implementation Reduction Factor (MIRF) and scheduling from the mapped suitable acreage under each alternative (see the Timber section)].
[2] Based on an inventory of existing harvest on non-NFS lands and the estimation of future harvest by major landowner category.

The greatest concerns for plant and wildlife populations in relation to climate change, however, are the weather extremes that can be expected to occur periodically (CGC-ASR 1998). Periodic severe winter snowfalls are anticipated

(Juday et al. 1998). These events would be of greatest concern for populations that are limited in number or distribution. The predator-prey dynamic of wolves and deer provide an example of one system where these effects may be realized. Additional discussion on predator-prey dynamics can be found under the Wildlife section.

However, despite these uncertainties, the risks associated with implementation of the Forest Plan are very low. The life of this amendment is expected to be 10 to 15 years at most, by which time, much more research and monitoring information will be available and another comprehensive evaluation will be undertaken. The current levels of harvest activity are at a 5-decade low and even if timber sales are made available and the timber industry responds rapidly, there will be a period of preparation prior to the implementation of any sale. Therefore, it is estimated that a maximum of 30,000 to 150,000 acres of old-growth could be harvested over the life of this amended plan (e.g., the next 10 to 15 years). This harvest level would represent from less than 1 percent to 3 percent of the existing POG. Even when added to past harvest, cumulative harvest on NFS lands would be only 9 to 11 percent of the original POG.

Many of the gaps in information will be addressed through monitoring (See Chapter 6 in the Forest Plan). Additional studies stemming from adaptive management and known informational needs are discussed in Appendix B of the Forest Plan should assist land managers in the decision-making process to limit the degree of uncertainty and measure risk inherent in any decision into the future.

Cumulative Effects by Biogeographic Province

In the *Current Conditions by Biogeographic Province* subsection of *Affected Environment*, each biogeographic province is described with regard to past harvest and developments on both NFS and non-NFS lands of Southeast Alaska, and their effects on biodiversity. The following subsection builds on the previous subsection and discusses the cumulative effects associated with the past harvest and developments, when combined with the present and reasonably foreseeable harvest and developments on both NFS and non-NFS lands.

Yakutat Forelands

Past cumulative harvest in this biogeographic province removed 16 percent of the POG on all lands combined, resulting in 84 percent of the original POG remaining. Future harvest is expected to remove an additional 7 to 13 percent, resulting in approximately 71 to 77 percent of the original POG remaining after 100+ years (Table 3.9-20). High-volume POG is currently estimated to represent 81 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 63 to 73 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 81 percent of original acreage at present, to a minimum of 63 to 78 percent after 100+ years (Table 3.9-22).

Currently, 83 percent of the large watersheds (representing 80 percent of the acreage) in the portion of the province within the Tongass Forest boundary are considered to be in an intact condition. After 100+ years, this percentage is expected to be reduced to a minimum of 58 to 67 percent (representing 71 to 73 percent of the acreage), depending on the alternative (Table 3.9-19). If the portion of the province that extends south into Glacier Bay National Park is included, the percentage of intact watersheds existing and remaining in the province after 100+ years would be substantially greater.

Cumulative effects on biodiversity associated with Alternatives 1 and 2 are expected to be slightly higher than existing conditions and concentrated in the area around Yakutat. Under these alternatives, future harvest would be mostly associated with non-NFS lands (there would be no NFS harvest under Alternative 1). Harvest on non-NFS lands would also be higher than harvest on NFS lands under all other alternatives. However, future NFS harvest associated with the other alternatives would approach the non-NFS harvest level. The extensive area of reserves in this province, under all alternatives, would limit effects on biodiversity. This is particularly true for Alternatives 1, 2, 3, 5, and 6, which include some acreage in the Old-Growth Habitat LUD designations, in addition to the large areas in Semi-Remote Recreation and LUD II and in Glacier Bay National Park that are associated with all the alternatives (65 percent of the province is in congressionally protected land designations). Further, Alternatives 1, 2, 3, and 6 would provide additional matrix retention as a result of the application of the legacy forest structure standard and guideline in two VCUs within the province.

Yakutat Uplands

The Yakutat Uplands province has experienced only limited past harvest equivalent to 6 percent of the original POG. Future cumulative harvest under all alternatives would also be limited to no more than several hundred additional acres. Therefore, approximately 93 to 94 percent of the original POG would be remaining after 100+ years (Table 3.9-20). In addition, future development would not change the percentage of large watersheds in an intact condition; they would remain at 96 percent of the watersheds or 99 percent of the acreage (Table 3.9-19). As a result of the limited extent of future development, cumulative effects on biodiversity are expected to be insignificant under any of the alternatives.

East Chichagof Island

Approximately 16 percent of the original POG in this province has been harvested, resulting in 84 percent of the original POG remaining. Following maximum future harvest after 100+ years, the percentage of original POG remaining would range from 64 percent (Alternative 7) to 78 percent (Alternative 1) (Table 3.9-20). High-volume POG is currently estimated to represent 76 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 56 to 69 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 58 percent of original acreage at present, to a minimum of 46 to 54 percent after 100+ years (Table 3.9-22).

Currently, 53 percent of the large watersheds (representing 49 percent of the acreage) of the province are considered to be in an intact condition. After 100+ years, this percentage is expected to be reduced to a minimum of 31 to 52 percent (representing 26 to 47 percent of the acreage), depending on the alternative (Table 3.9-19). In addition to timber harvest, additional development associated with Hoonah and other communities in the province would contribute to cumulative effects.

Although specific watersheds would undergo a high cumulative percent harvest, Alternatives 1, 2, 3, 5, and 6 would result in the long-term retention of at least 71 percent of the original POG, 63 percent of the original high-volume POG, and 51 percent of the original large-tree POG. In addition, the conservation strategy in each of these alternatives would result in the spatial distribution of POG within reserves across the province. Further, Alternatives 1, 2, 3, and 6 would fully protect both pinch-points within the province by including them within reserves; Alternative 5 would fully protect one pinch-point and provide substantial protection to the second. Alternative 5 would not provide as much POG in reserves, but would provide more POG within the matrix because of the marten standards and guidelines. Alternatives 4 and 7, on the other hand, would not protect the pinch-point between northeast Chichagof and the main island. Further, because of a relatively low abundance and non-uniform distribution of reserves within the province, Alternative 7 and, to a lesser extent, Alternative 4, would likely result in gaps in the distribution of some organisms within the province and lower biodiversity.

West Chichagof Island

No past harvest has been mapped within the West Chichagof Island province and less than 200 acres (mostly on non-NFS lands) are projected to be harvested in the future. Therefore, the percentage of original POG remaining in the province after 100+ years would be almost 100 percent (Table 3.9-20). Future development is not expected to change the percentage of large watersheds in an intact condition either; currently this percentage is 100 percent. As a result, because of the very limited extent of future development, cumulative effects on biodiversity are expected to be virtually non-existent under any of the alternatives.

East Baranof Island

Past cumulative harvest in this biogeographic province has removed 13 percent of the POG on all lands combined, resulting in 87 percent of the original POG remaining. Future harvest is expected to remove an additional 1 to 17 percent, resulting in approximately 70 to 86 percent of the original POG remaining after 100+ years (Table 3.9-20). High-volume POG is currently estimated to represent 77 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 60 to 76 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 33 percent of original acreage at present, to a minimum of 31 to 33 percent after 100+ years (Table 3.9-22). Therefore, although past large-tree POG harvest has been disproportionately high, the vast majority of remaining large-tree POG is in reserves and less than 10 percent of this remaining large-tree POG would be harvested under any of the alternatives.

Currently, 55 percent of the large watersheds (representing 60 percent of the acreage) are considered to be in an intact condition. After 100+ years, this percent age is expected to be reduced to a minimum of 45 percent (representing 49 percent of the acreage), depending on the alternative (Table 3.9-19).

Cumulative effects on biodiversity associated with Alternative 1 would be similar to those associated with existing conditions, because less than 1,000 additional acres of harvest would occur (on non-NFS lands). Alternatives 2, 3, 5, and 6 would result in a maximum of 6,000 to 11,000 additional acres of POG harvest. As is the case for East Chichagof Island province, specific watersheds would undergo high cumulative harvest under these alternatives; however, the conservation strategy would provide for extensive areas in reserves, distributed across the province, resulting in the retention of a minimum of 76 percent of original POG. Alternatives 4 and 7 would result in 15,000 to 17,000 additional acres of harvest and, although the southern half of the province would substantially be in reserves, the northern half would have large areas with no reserves, resulting in higher cumulative effects on biodiversity.

West Baranof Island

Approximately 8 percent of the original POG in this province has been harvested, resulting in 92 percent of the original POG remaining. Following maximum future harvest after 100+ years, the percentage of original POG remaining would range from 80 percent (Alternative 7) to 88 percent (Alternative 1) (Table 3.9-20). High-volume POG is currently estimated to represent 82 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 68 to 77 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 44 percent of original acreage at present, to a minimum of 37 to 39 percent after

100+ years (Table 3.9-22). Therefore, as is the case for East Baranof Island province, although past large-tree POG harvest has been disproportionately high, the vast majority of remaining large-tree POG is in reserves and less than 10 percent of this remaining large-tree POG would be harvested under any of the alternatives.

Currently, 65 percent of the large watersheds (representing 69 percent of the acreage) of the province are considered to be in an intact condition. After 100+ years, this percentage is expected to be reduced to a minimum of 47 to 58 percent (representing 54 to 65 percent of the acreage), depending on the alternative (Table 3.9-19). In addition to timber harvest, additional development associated with Sitka and possible road and transmission line extensions within the province would contribute to cumulative effects.

Cumulative effects on biodiversity associated with Alternative 1 would only be associated with past harvest and non-NFS harvest because no NFS harvest would occur. Alternatives 2, 3, 5, and 6 would result in a maximum of 11,000 to 16,000 additional acres of POG harvest. As is the case for East Baranof Island province, specific watersheds would undergo high cumulative harvest under these alternatives; however, the conservation strategy would provide for extensive areas in reserves, distributed across the province, resulting in the retention of a minimum of 86 percent of original POG under these alternatives. In addition, Alternatives 1, 2, 3, and 6 would provide additional matrix retention as a result of the application of the legacy forest structure standard and guideline in four VCUs within the province. Under Alternatives 4 and 7, 28,000 to 31,000 additional acres of harvest (including non-NFS harvest) would occur and, although the southern half of the province would substantially be in reserves, the northern half would have large areas with no reserves, resulting in higher cumulative effects on biodiversity.

Admiralty Island

The Admiralty Island province has experienced 29,000 acres of past harvest; this represents only 5 percent of the original POG because of the size of the province and its extensive amount of POG. No NFS harvest would occur in the future and, although several thousand additional acres of harvest on non-NFS lands is expected to occur, the remaining POG would still be close to 95 percent of the original POG after 100+ years (Table 3.9-20). Similarly, high-volume POG is expected to change from about 94 to 93 percent and large-tree POG is expected to decrease from about 91 to 90 percent, purely as a result of non-NFS harvest.

Currently, 88 percent of the large watersheds (representing 85 percent of the acreage) of the portion of the province within the Tongass Forest boundary are considered to be in an intact condition. After 100+ years, this percentage is expected to be reduced to a minimum of 82 percent (representing 80 percent of the acreage) (Table 3.9-19). In addition to timber harvest, a proposed hydroelectric project and transmission line north of Angoon and continued operation and potential expansion of mining activity at Greens Creek would contribute to cumulative effects.

Although past and future harvest and development are concentrated in a few watersheds, which would experience relatively high effects on biodiversity, the cumulative effect on the overall biodiversity of the province is not expected to be high because of the expansive size and dominantly undeveloped nature of the province. Further, none of the future effects would be associated with NFS harvest. The vast majority of Admiralty Island would continue to remain intact under all alternatives and, as a result of the abundance of POG in this province, including high-volume and large-tree POG, it would continue to represent a massive reserve and reservoir for biological diversity in Southeast Alaska.

Lynn Canal

Past cumulative harvest in this biogeographic province has removed only 3 percent of the POG on all lands combined, resulting in 97 percent of the original POG remaining. Future harvest is expected to remove an additional 5 to 18 percent, resulting in approximately 79 to 92 percent of the original POG remaining after 100+ years (Table 3.9-20). High-volume POG is currently estimated to represent 95 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 71 to 87 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 88 percent of original acreage at present, to a minimum of 64 to 78 percent after 100+ years (Table 3.9-22).

Currently, 76 percent of the large watersheds (representing 80 percent of the acreage) are considered to be in an intact condition. After 100+ years, this percent age is expected to be reduced to a minimum of 32 to 56 percent (representing 45 to 64 percent of the acreage), depending on the alternative (Table 3.9-19). In addition to timber harvest, continued development of areas around Juneau, Skagway, and Haines, the potential development of the Kensington Mine near Berners Bay, and the proposed development of the Juneau Access Road, would contribute to cumulative effects in this province.

Alternatives 1, 2, and 3 would result in a maximum of 5,000 to 12,000 acres of additional harvest resulting in the retention of at least 88 percent of original POG. Alternatives 5 and 6 would result in a maximum of 20,000 to 23,000 additional acres of POG harvest, resulting in the retention of a minimum of 84 percent of original POG. In addition, these five alternatives would incorporate a conservation strategy that would result in the spatial distribution of reserves, which would limit effects on biodiversity. Alternatives 4 and 7 would result in a maximum of 29,000 to 31,000 additional cumulative acres of harvest, which would produce a retention of at least 79 percent of the original POG. Even though there would be large areas with no reserves, the province would have extensive reserves even under Alternatives 4 and 7, which would limit effects on biodiversity.

Northern Coast Range

Approximately 6 percent of the original POG in this province has been harvested, resulting in 94 percent of the original POG remaining. Following maximum future harvest after 100+ years, the percentage of original POG remaining would range from 76 percent (Alternative 7) to 89 percent (Alternative 1) (Table 3.9-20). High-volume POG is currently estimated to represent 92 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 70 to 83 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 77 percent of original acreage at present, to a minimum of 52 to 66 percent after 100+ years (Table 3.9-22).

Currently, 90 percent of the large watersheds (representing 94 percent of the acreage) of the province are considered to be in an intact condition. After 100+ years, this percentage is expected to be reduced to a minimum of 31 to 67 percent (representing 54 to 80 percent of the acreage), depending on the alternative (Table 3.9-19).

Harvest on NFS lands would not contribute to cumulative effects under Alternatives 1 and 2, and would contribute only in a minor way under Alternative 3. Almost all future harvest would be on non-NFS lands under these alternatives; long-term retention of POG would be about 88 to 89 percent. Under Alternatives 5 and 6, cumulative harvest would be a maximum of 48,000 to 52,000 acres; however, the conservation strategy under these two alternatives would provide for extensive areas in reserves, distributed across the province, resulting in the retention of a minimum of 81 percent of original POG. Under Alternatives 4 and 7, 65,000 to

68,000 additional acres of harvest (including non-NFS harvest) would occur and there would be large areas with no reserves, resulting in higher cumulative effects on biodiversity.

Kupreanof/Mitkof Islands

The Kupreanof/Mitkof Islands province has experienced 71,000 acres of past harvest, which represents 17 percent of the original POG; as a result, 83 percent of the original POG remains today. Following maximum future harvest after 100+ years, the percentage of original POG remaining would range from 53 percent (Alternative 7) to 74 percent (Alternative 1) (Table 3.9-20). High-volume POG is currently estimated to represent 71 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 41 to 61 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 47 percent of original acreage at present, to a minimum of 29 to 42 percent after 100+ years (Table 3.9-22).

Currently, 37 percent of the large watersheds (representing 39 percent of the acreage) of the portion of the province within the Tongass Forest boundary are considered to be in an intact condition. After 100+ years, this percentage is expected to be reduced to a minimum of 8 to 31 percent (representing 9 to 30 percent of the acreage) (Table 3.9-19). In addition to timber harvest, additional development in the Petersburg and Kake areas and proposed additional road and transmission line development (especially between Petersburg and Kake) would contribute to cumulative effects.

Projected future cumulative harvest could be as high as 35,000 (Alternative 1) to 87,000 acres (Alternative 5) under Alternatives 1, 2, 3, 5, or 6. These harvest levels would result in the retention of 61 to 74 percent of the original POG, 49 to 61 percent of the original high-volume POG, and 34 to 42 percent of the original large-tree POG. These cumulative harvest levels would result in a reduction in habitat for species that prefer older forest stages (particularly larger tree types) and increases in habitat for species that prefer younger forest stages. However, the conservation strategy employed in each of these alternatives would result in POG being distributed in reserves and within the matrix across the province so that, although local reductions in biodiversity would be expected, habitat representation across the province would be maintained. Alternative 5 would not provide as much POG in reserves as Alternatives 1, 2, 3, and 6; however, it would provide more POG within the matrix because of the marten standards and guidelines. Under Alternatives 4 and 7, harvest could be as high as 104,000 to 119,000 additional acres, resulting in the retention of 53 to 57 percent of original POG, 41 to 44 percent of original high-volume POG, and 29 to 32 percent of large-tree POG. These cumulative harvest levels would result in greater reductions in habitat for species that prefer older forest stages, but more importantly, these alternatives would result in large expanses of habitat areas without POG in reserves, particularly under Alternative 7.

Kuiu Island

Past cumulative harvest in this biogeographic province has removed 9 percent of the POG on all lands combined, resulting in 91 percent of the original POG remaining. Future cumulative harvest is expected to remove from less than 1 percent (Alternative 1) to 22 percent of additional POG acreage, resulting in approximately 69 to 91 percent of the original POG remaining after 100+ years (Table 3.9-20). High-volume POG is currently estimated to represent 90 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 66 to 89 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 82 percent of original acreage at present, to a maximum of 52 to 81 percent after 100+ years (Table 3.9-22).

Currently, 73 percent of the large watersheds (representing 60 percent of the acreage) are considered to be in an intact condition. After 100+ years, this percentage is expected to be reduced to a minimum of 47 to 73 percent (representing 34 to 60 percent of the acreage), depending on the alternative (Table 3.9-19).

Cumulative effects on biodiversity associated with Alternative 1 would only be associated with past harvest and non-NFS harvest because no NFS harvest would occur. Alternatives 2, 3, 5, and 6 would result in a cumulative maximum of 20,000 to 41,000 acres of additional harvest, resulting in the long-term retention of at least 79 to 85 percent of original POG, 75 to 82 percent of original high-volume POG, and 61 to 67 percent of original large-tree POG. In addition, these four alternatives would incorporate a conservation strategy that would result in the spatial distribution of reserves, which would limit effects on biodiversity. Alternatives 4 and 7 would result in a maximum of 62,000 to 72,000 additional cumulative acres of harvest, which would result in the retention of at least 69 to 72 percent of the original POG, 66 to 69 percent of high-volume POG, and 52 to 56 percent of large-tree POG. These two alternatives would result in large expanses of habitat areas without POG in reserves, which would increase their effects on biodiversity.

Central Coast Range

Approximately 3 percent of the original POG in this province has been harvested, resulting in 97 percent of the original POG remaining. Following maximum future harvest after 100+ years, the percentage of original POG remaining would range from 80 percent (Alternative 7) to 96 percent (Alternative 1) (Table 3.9-20). High-volume POG is currently estimated to represent 95 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 79 to 94 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 89 percent of original acreage at present, to a minimum of 72 to 89 percent after 100+ years (Table 3.9-22).

Currently, 79 percent of the large watersheds (representing 85 percent of the acreage) of the province are considered to be in an intact condition. After 100+ years, this percentage is expected to be reduced to a minimum of 38 to 72 percent (representing 51 to 77 percent of the acreage), depending on the alternative (Table 3.9-19).

Additional harvest on NFS lands would not contribute to cumulative effects under Alternative 1 and only in a limited way under Alternative 2. Under Alternatives 3, 5, and 6, additional cumulative harvest would range from 20,000 acres to 31,000 acres, resulting in long-term POG retention of 85 to 89 percent, long-term high-volume POG retention of 84 to 87 percent, and long-term large-tree POG retention of 78 to 82 percent. The conservation strategy under these alternatives would provide for extensive areas in reserves, distributed across the province. Under Alternatives 4 and 7, 39,000 to 43,000 additional acres of harvest (including non-NFS harvest) would occur, resulting in long-term POG retention of 80 to 82 percent, long-term high-volume POG retention of 79 to 80 percent, and long-term large-tree POG retention of 72 to 73 percent. There would be some large areas with no reserves, under these two alternatives, resulting in higher cumulative effects on biodiversity.

Etolin Island and Vicinity

The Etolin Island and Vicinity province has experienced 41,000 cumulative acres of past harvest representing 15 percent of the original POG; as a result, 85 percent of the original POG remains today. Following maximum future harvest after 100+ years, the percentage of original POG remaining would range from 55 percent (Alternative 7) to 78 percent (Alternative 1) (Table 3.9-20). High-volume POG is currently estimated to represent 76 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 45 to 67 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 51 percent of original acreage at present, to a minimum of 30 to 46 percent after 100+ years (Table 3.9-22).

Currently, 33 percent of the large watersheds (representing 30 percent of the acreage) of the portion of the province within the Tongass Forest boundary are considered to be in an intact condition. After 100+ years, this percentage is expected to be reduced to a minimum of 11 to 26 percent (representing 12 to 23 percent of the acreage) (Table 3.9-19). In addition to timber harvest, additional development in the Wrangell area would contribute to cumulative effects.

Projected future cumulative maximum harvest would be 19,000 acres under Alternative 1, resulting in 78 percent long-term POG retention. Under Alternatives 2, 3, 5, and 6 the cumulative maximum harvest would be 38,000 (Alternative 2) to 50,000 acres (Alternative 5). These harvest levels would result in the retention of 67 to 71 percent of the original POG, 57 to 61 percent of the original high-volume POG, and 39 to 42 percent of the original large-tree POG. These cumulative harvest levels would result in a reduction in habitat for species that prefer older forest stages (particularly larger tree types) and increases in habitat for species that prefer younger forest stages. However, the conservation strategy employed in each of these alternatives would result in POG being distributed in reserves and within the matrix across the province so that, although local reductions in biodiversity would be expected, habitat representation across the province would be maintained. The legacy forest structure standard and guideline would provide for additional POG in the matrix under Alternatives 1, 2, 3, and 6, and the marten standard and guideline would provide this for Alternative 5. Under Alternatives 4 and 7, harvest could be as high as 72,000 to 83,000 additional acres, resulting in the retention of 55 to 59 percent of original POG, 45 to 50 percent of original high-volume POG, and 30 to 33 percent of large-tree POG. These cumulative harvest levels would result in greater reductions in habitat for species that prefer older forest stages, but more importantly, these two alternatives would result in large expanses of habitat areas without POG in reserves. In addition, POG in the matrix would not be supplemented by either the legacy or the marten standard and guideline. As a result, these two alternatives would have a relatively high effect on province biodiversity.

North Central Prince of Wales Island

Approximately 35 percent of the original POG in this province has been harvested, resulting in 65 percent of the original POG remaining. Following maximum future harvest after 100+ years, the percentage of original POG remaining would range from 44 percent (Alternative 7) to 59 percent (Alternative 1) (Table 3.9-20). High-volume POG is currently estimated to represent 56 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 33 to 45 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 55 percent of original acreage at present, to a minimum of 35 to 47 percent after 100+ years (Table 3.9-22).

Currently, 24 percent of the large watersheds (representing 17 percent of the acreage) of the province are considered to be in an intact condition. After 100+

years, this percentage is expected to be reduced to a minimum of 10 to 20 percent (representing 6 to 13 percent of the acreage), depending on the alternative (Table 3.9-19). In addition to timber harvest, additional development associated with Klawock, Craig, Thorne Bay, and the many other small communities in the province would contribute to cumulative effects.

Under Alternatives 1 and 2, additional cumulative harvest would range from 89,000 acres to 104,000 acres, resulting in long-term POG retention of 54 to 55 percent, long-term high-volume POG retention of 44 to 45 percent, and long-term large-tree POG retention of 45 to 47 percent. Projected future cumulative maximum harvest would be 118,000 to 131,000 acres under Alternatives 3, 5, and 6, resulting in 51 to 52 percent long-term POG retention, 41 to 42 percent long-term high-volume POG retention, and 43 to 44 percent long-term large-tree POG retention. The conservation strategy under Alternatives 1, 2, 3, 5, and 6 would provide for extensive areas in reserves, distributed across the province. In addition, the legacy forest structure standard and guideline would provide for additional POG in the matrix under Alternatives 1, 2, 3, and 6, and the goshawk and marten standards and guidelines would provide this for Alternative 5. Alternatives 1, 2, 3, and 6 would provide reserves to maintain connectivity for the Neck Lake pinch-point, while Alternative 5 would provide for some connectivity. These alternatives also would provide a number of reserves in the Sulzer Portage pinch-point area to enhance connectivity. Under Alternatives 4 and 7, 150,000 to 198,000 additional acres of harvest (including non-NFS harvest) would occur, resulting in long-term POG retention of 44 to 49 percent, long-term high-volume POG retention of 33 to 39 percent, and long-term large-tree POG retention of 35 to 40 percent. Alternative 4 would supplement the pool of non-development LUDs in this province with an array of Old-Growth Habitat LUD areas, although the extent of reserves would be less than under Alternatives 1, 2, 3, 5, or 6. Alternative 7, on the other hand, would not include Old-Growth Habitat LUDs and would have large areas with no reserves. In addition, POG in the matrix would not be supplemented by either the legacy or the marten standard and guideline. Alternative 4 would provide for some connectivity at the Neck Lake pinch-point, but would not provide much in the way of reserves near the Sulzer Portage pinch-point. Alternative 7 would provide not provide very few acres of reserves in the vicinity of either pinch-point. As a result, Alternative 4 would have a relatively high effect on province biodiversity and Alternative 7 would have a very high effect. Alternative 7 and, to a lesser extent, Alternative 4, would likely result in gaps in the distribution of some organisms within the province and lower biodiversity.

Revilla Island/Cleveland Peninsula

The Revilla Island/Cleveland Peninsula province has had 71,000 cumulative acres of past harvest representing 11 percent of the original POG; as a result, 89 percent of the original POG remains today. Following maximum future harvest after 100+ years, the percentage of original POG remaining would range from 66 percent (Alternative 7) to 81 percent (Alternative 1) (Table 3.9-20). High-volume POG is currently estimated to represent 84 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 58 to 74 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 59 percent of original acreage at present, to 44 to 55 percent after 100+ years (Table 3.9-22).

Currently, 68 percent of the large watersheds (representing 71 percent of the acreage) of the portion of the province within the Tongass Forest boundary are considered to be in an intact condition. After 100+ years, this percentage is expected to be reduced to a minimum of 33 to 55 percent (representing 43 to 60 percent of the acreage) (Table 3.9-19). In addition to timber harvest, additional development in the Ketchikan, Saxman, and Metlakatla areas, including the Swan-Tyee transmission line (under construction), would contribute to cumulative effects.

Projected future cumulative maximum harvest would be 49,000 acres to 77,000 acres under Alternatives 1, 2, and 3, resulting in 77 to 81 percent long-term POG retention, 70 to 74 percent of the original high-volume POG retention, and 52 to 55 percent of the original large-tree POG retention. Under Alternatives 5 and 6 the cumulative maximum harvest would be 94,000 acres. These harvest levels for Alternatives 5 and 6 would result in the retention of 74 percent of the original POG, 68 percent of the original high-volume POG, and 50 percent of the original large-tree POG. These cumulative harvest levels would result in a reduction in habitat for species that prefer older forest stages (particularly larger tree types) and increases in habitat for species that prefer younger forest stages. However, the conservation strategy employed in each of these alternatives would result in POG being distributed in reserves and within the matrix across the province so that, although local reductions in biodiversity would be expected, habitat representation across the province would be maintained. The legacy forest structure standard and guideline would provide for additional POG in the matrix under Alternatives 1, 2, 3, and 6, and the marten standard and guideline would provide this for Alternative 5. Under Alternatives 4 and 7, harvest could be as high as 128,000 to 151,000 additional acres, resulting in the retention of 66 to 69 percent of original POG, 58 to 62 percent of original high-volume POG, and 44 to 46 percent of large-tree POG. These cumulative harvest levels would result in greater reductions in habitat for species that prefer older forest stages, but more importantly, these two alternatives (especially Alternative 7) would result in large expanses of habitat areas without POG in reserves. In addition, POG in the matrix would not be supplemented by either the legacy or the marten standard and guideline. As a result, these two alternatives would have a relatively high effect on province biodiversity.

Southern Outer Islands

Approximately 15 percent of the original POG in this province has been harvested, resulting in 85 percent of the original POG remaining. Following maximum future harvest after 100+ years, the percentage of original POG remaining would range from 72 percent (Alternative 7) to 80 percent (Alternative 1) (Table 3.9-20). High-volume POG is currently estimated to represent 77 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 61 to 70 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 67 percent of original acreage at present, to a minimum of 49 to 60 percent after 100+ years (Table 3.9-22).

Currently, 50 percent of the large watersheds (representing 64 percent of the acreage) of the province are considered to be in an intact condition. After 100+ years, this percentage is expected to be reduced to a minimum of 45 to 50 percent (representing 59 to 64 percent of the acreage), depending on the alternative (Table 3.9-19).

Most of the islands that make up this province are entirely in reserves under all alternatives. Harvest would be limited to Heceta and Suemez in all alternatives, as well as San Juan Bautista Islands in Alternatives 3, 5, and 6. Alternatives 1, 2, 3, 5, and 6 would result in the maximum future cumulative harvest of 7,000 to 12,000 acres, producing a long-term retention of 76 to 80 percent of the original POG, 66 to 70 percent of the original high-volume POG, and 56 to 60 percent of the original large-tree POG. The conservation strategy in each of these alternatives would result in the spatial distribution of POG within reserves across the province. Under Alternatives 4 and 7, harvest could be as high as 14,000 to 19,000 additional acres, resulting in the retention of 72 to 75 percent of original POG, 61 to 64 percent of original high-volume POG, and 49 to 53 percent of large-tree POG. These latter two alternatives would result larger habitat areas without POG in reserves.

Dall Island and Vicinity

Past cumulative harvest in this biogeographic province has removed 25 percent of the POG on all lands combined, resulting in 75 percent of the original POG remaining. Future cumulative harvest is expected to remove from less than 17 percent (Alternative 1) to 22 percent of additional POG acreage, resulting in approximately 53 to 58 percent of the original POG remaining after 100+ years (Table 3.9-20). The vast majority of this future harvest is on non-NFS lands under all alternatives. High-volume POG is currently estimated to represent 77 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 61 to 70 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 42 percent of original acreage at present, to a minimum of 36 to 37 percent after 100+ years (Table 3.9-22). The great majority of this retention would be in reserves.

Currently, 71 percent of the large watersheds (representing 53 percent of the acreage) are considered to be in an intact condition. After 100+ years, this percentage is expected to be reduced to a minimum of 29 to 34 percent (representing 15 to 19 percent of the acreage), depending on the alternative (Table 3.9-19).

The maximum cumulative future harvest would be 23,000 to 29,000 acres under all of the alternatives, with 23,000 acres of harvest on non-NFS lands and from 0 to 6,000 acres on NFS lands. At least 80 percent of the original POG on NFS lands would be in reserves under all alternatives. The only area on NFS harvest would be at the extreme northwestern corner of Dall Island with no harvest planned on Long Island. The reserves on Dall Island stretch the entire length of the island on the west side. Therefore, although a substantial portion of the non-NFS POG is expected to be harvested, the contribution by NFS harvest would be relatively small.

South Prince of Wales

The South Prince of Wales Island province has had 18,000 cumulative acres of past harvest representing 9 percent of the original POG; as a result, 91 percent of the original POG remains today. Following maximum future harvest after 100+ years, the percentage of original POG remaining would range from 68 percent (Alternative 7) to 87 percent (Alternative 1) (Table 3.9-20). High-volume POG is currently estimated to represent 88 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 64 to 83 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 88 percent of original acreage at present, to a minimum of 65 to 85 percent after 100+ years (Table 3.9-22).

Currently, 78 percent of the large watersheds (representing 75 percent of the acreage) of the portion of the province within the Tongass Forest boundary are considered to be in an intact condition. After 100+ years, this percentage is expected to be reduced to a minimum of 47 to 72 percent (representing 45 to 69 percent of the acreage) (Table 3.9-19).

Projected future cumulative maximum harvest would be 8,000 acres to 26,000 acres under Alternatives 1, 2, 3, 5, and 6, resulting in 77 to 87 percent long-term POG retention, 73 to 83 percent of the original high-volume POG retention, and 76 to 85 percent of the original large-tree POG retention. The conservation strategy employed in each of these alternatives would result in POG being distributed in reserves and within the matrix across the province so that, although local reductions in biodiversity would be expected, habitat representation across the province would be maintained. The goshawk and marten standards and guidelines would provide additional POG in the matrix in this province under Alternative 5. Under Alternatives 4 and 7, harvest could be as high as 37,000 to 43,000 additional acres, resulting in the retention of 68 to 71 percent of original POG, 64 to 67 percent of original high-volume POG, and 65 to 69 percent of large-tree POG. In all alternatives, large reserves exist in the southern and western portions of the province. However, Alternatives 4 and 7 do not include reserves over large areas in the north and east parts of the province, as well as portions of the west. As a result, these two alternatives would have a higher effect on province biodiversity.

North Misty Fiords

Only 2,000 acres of past harvest has occurred in the North Misty Fiords province, and up to 7,000 acres is projected for the future. As a result, a minimum of 95 percent of the POG originally found in the province is expected to be retained long term, relative to the 99 percent at present (Table 3.9-20). Similarly, neither high-volume nor large-tree POG are expected to drop below 90 percent of their original acreages. Also, future development is not expected to reduce the percentage of large watersheds in intact condition to less than 88 percent by number or 91 percent by acreage, under any of the alternatives (Table 3.9-19). Therefore, because of the very limited extent of future development, cumulative effects on biodiversity are expected to be very low under any of the alternatives.

South Misty Fiords

No past harvest has been mapped within the South Misty Fiords province and less than 200 acres (on non-NFS lands) are projected to be harvested in the future. Therefore, the percentage of original POG remaining in the province after 100+ years would be almost 100 percent (Table 3.9-20). Future development is not expected to change the percentage of large watersheds in an intact condition either; currently this percentage is 100 percent. As a result, because of the very limited extent of future development, cumulative effects on biodiversity are expected to be virtually non-existent under any of the alternatives.

Ice Fields

Approximately 3 percent of the original POG in this province has been harvested, resulting in 97 percent of the original POG remaining. Following maximum future harvest after 100+ years, the percentage of original POG remaining would range from 93 percent (Alternative 7) to 97 percent (Alternative 1) (Table 3.9-20). High-volume POG is currently estimated to represent 93 percent of its original acreage. Future representation of high-volume POG is expected to be a minimum of 90 to 93 percent (Table 3.9-21). Similarly, large-tree POG is expected to decline from about 83 percent of original acreage at present, to a minimum of 81 to 83 percent after 100+ years (Table 3.9-22).

Currently, 93 percent of the large watersheds (representing 94 percent of the acreage) of the province are considered to be in an intact condition. After 100+ years, this percentage is expected to be reduced to a minimum of 82 to 88 percent (representing 88 to 94 percent of the acreage), depending on the alternative (Table 3.9-19).

Cumulative effects on biodiversity associated with Alternative 1 would only be associated with past harvest because no NFS harvest and only a few acres of non-NFS harvest would occur. Alternatives 2, 3, 4, 5, 6 and 7 would result in a cumulative maximum of 1,000 to 4,000 acres of additional harvest, resulting in the long-term retention of at least 93 percent of original POG, 90 percent of high-volume

POG, and 81 percent of large-tree POG. The vast majority of this POG is in reserves (Table 3.9-14). Therefore, although local watershed effects are expected, cumulative effects on biodiversity at the province level are expected to be minor.

Chilkat River Complex

The Chilkat River Complex province has had about 21,000 acres of past harvest, representing 12 percent of the original POG; therefore, 88 percent of the original POG remains today. The province lies entirely outside the Forest boundary, so there would be no future harvest on NFS lands associated with any of the alternatives. Approximately 32 percent of the existing POG, 26 percent of existing high-volume POG, and 11 percent of existing large-tree POG stands are located in reserves.

Future cumulative harvest associated with state and private lands in the province, could result in up to 52,000 additional acres of POG harvest after 100+ years (Table 3.9-20). With this additional harvest, the POG retention would amount to a minimum of 56 percent, with a minimum of 60 percent retention for high-volume POG and 32 percent retention for large-tree POG. In addition, future development associated with Haines and Skagway could contribute to cumulative effects within the province.

Tongass management would not contribute to cumulative effects within the province and would only contribute to a regional effect, relative to multiple adjacent provinces. The three provinces that are adjacent to the Chilkat River Complex are the Glacier Bay/Fairweather Range, the Ice Fields, and the Lynn Canal provinces. Among these three, the Lynn Canal province would be managed with the highest intensity. However, even in the Lynn Canal province, the long-term retention of POG would be 79 to 92 percent, depending on the alternative. The Ice Fields and Glacier Bay/Fairweather Range provinces would retain 93 to 100 percent of their POG under any alternative (Table 3.9-20).

Glacier Bay/Fairweather Range

Past harvest within the Glacier Bay/Fairweather Range province has been limited to a few hundred acres. Similarly, negligible future cumulative harvest is projected under all alternatives. As a result, the percentage of original POG remaining in the province after 100+ years would be almost 100 percent (Table 3.9-20). Future development is not expected to change the percentage of large watersheds in an intact condition either; currently this percentage is also close to 100 percent because of Glacier National Park. Therefore, because of the very limited extent of future development, cumulative effects on biodiversity are expected to be negligible under any of the alternatives.

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Wildlife

Affected Environment

The Tongass National Forest supports a rich array of wildlife species, providing habitat for approximately 54 species of mammals, 231 species of birds, and 5 species of amphibians and reptiles. There are an additional 18 species of marine mammals found in Southeast Alaska that depend entirely on the ocean environment, as well as 45 bird and 3 amphibian or reptile species considered casual or accidental visitors to Southeast Alaska. Some species that are relatively abundant on the Forest (e.g., bald eagles and brown bears) are listed as threatened or endangered in other parts of their range, and others are endemic to the Tongass (essentially found nowhere else in the world) and may occupy ranges limited to single islands. Other species have wide geographic ranges and are found elsewhere in Alaska, Canada, and the lower 48 states. The diversity of wildlife on the Forest provides many opportunities for consumptive and non-consumptive uses including commercial, general, and subsistence hunting; and photographic and viewing activities.

This section provides an overview of wildlife habitats on the Tongass, describes current management regimes related to wildlife habitat and relevant policies, and provides information on key species and their habitats. The consumptive uses of wildlife are also briefly discussed. This section also addresses issues related to invasive species and endemism. Updated information presented at an interagency review of the Forest Plan Conservation Strategy, held in Ketchikan, Alaska, in April 2006, is incorporated and referenced where appropriate. This workshop took into account new literature published since 1997 as well as ongoing research and included the presentation of preliminary results.

Approximately 55 percent of the 16.8 million acres of the Tongass National Forest consists of temperate rainforest (see Figure 3.9-3 of the *Biodiversity* section). This includes both productive and non-productive old growth (POG), a classification that relates to the ability of a stand to grow trees of a certain size or volume per acre. Ninety-eight percent of the POG on the Tongass is dominated by Sitka spruce and western hemlock, both of which occur throughout Southeast Alaska. Approximately

4 percent of the Tongass is young-growth forest (both natural and harvested), primarily distributed among four biogeographic provinces (North Central Prince of Wales, Etolin Island, Kupreanof/Mitkof, andRevillagigedo Island/Cleveland Peninsula). The remaining 41 percent of the Tongass consists non-forested habitat that includes sparsely vegetated areas of shrub and herbaceous (e.g., muskegs, alpine, estuaries), non-vegetated areas (e.g., snow, rock, ice), and aquatic sites (e.g., streams, ponds, and lakes). Tables 3.9-2 and 3.9-3 in the *Biodiversity* section show the distribution of forested and non-forested cover types on the Tongass.

Old-Growth Habitat and the Conservation Strategy

Although many wildlife species on the Tongass are associated with more than one habitat type, most inhabit old-growth forests or prey on species that inhabit old-growth forests. Old growth is characterized by a patchy, multi-layered canopy; trees that represent many age classes; large trees that dominate the overstory, standing dead (snags) or decadent trees; and higher accumulations of down woody material. The structure and function of an old-growth ecosystem will be influenced by stand size, landscape position, and juxtaposition with other elements of the landscape. POG can be broken down further in terms of seven categories based on tree size and density. See the Old-Growth Forest subsection in the Affected Environment portion of the *Biodiversity* section of this document, including Figures 3.9-4 and 3.9-5, for a detailed discussion of old growth on the Tongass and the size-density model (SDM).

The 1997 Forest Plan established a comprehensive, science-based old-growth conservation strategy to address wildlife sustainability and viability. This strategy was based on careful analysis and integration of the best scientific information available at that time and is comprised of two key components.

The first is a Forest-wide reserve network that is designed to protect the integrity of the existing old-growth ecosystem. It incorporates a network of small, medium, and large old-growth reserves (OGRs) and other non-development Land Use Designations (LUDs), which protect 71 percent of the existing POG on the Tongass National Forest (Appendix D).

The second component of the conservation strategy is a set of standards and guidelines that apply in the development LUDs where commercial timber harvesting is permitted (referred to as the matrix). In these areas, the standards and guidelines sustain key components of the landscape that the available scientific information indicates is important for wildlife. These include a 1,000-foot buffer along the entire marine shoreline and riparian buffer corridors. Standards and guidelines established for other reasons, also contribute protected old growth. Finally, assuming the maximum level of timber harvest permitted by the Forest Plan, there are additional areas that are not scheduled for harvest due to economic considerations. Collectively, these standards and guidelines and unscheduled areas would maintain at least 66 percent of the POG within the matrix or over 19 percent of all POG on the Tongass (Appendix D).

Overall, the conservation strategy in the 1997 Forest Plan protects slightly more than 90 percent of all existing POG forests on the Tongass. It is important to note that this percentage assumes that old-growth forest is harvested at the maximum allowable rate in each future decade before sufficient second-growth forest has reached harvestable size and can replace old growth in the harvest. If this maximum rate does not occur, then the percentage of POG retained will be higher. A more detailed description of the Tongass conservation strategy, and the basis for its development, is provided below under effects, in the *Biodiversity* section, and in Appendix D.

Landscape Connectivity and Fragmentation

Landscape connectivity is defined as the degree to which the structure of a landscape helps or hinders the movement of wildlife species (Taylor et al. 1993). A "well-connected" landscape enables organisms to readily move among habitat patches over the long term. Fragmentation is the loss of connectivity across the landscape and is a substantial threat to many species, especially those that are smaller or less mobile. Fragmentation occurs when large blocks of habitat are broken into smaller parcels by natural (e.g., wind throw) or human induced (e.g., roads or timber operations) forces. As habitat is lost or fragmented, residual habitat patches become smaller and more isolated from each other. This limits the movement of species and, through their increased isolation, puts them at greater risk of extirpation. Open spaces left by fragmentation can act as travel barriers for some species, or increase the risk of predation for other species that venture across them (see the *Biodiversity* section for additional discussion on fragmentation).

There are two types of landscape connectivity that can be considered: structural and functional connectivity (Brooks et al. 2003). Structural connectivity describes the physical relationships among habitat patches, generally ignoring the behavioral response of organisms to landscape structure. Landscape corridors, or areas of continuous habitat that link similar habitat patches in a landscape and thus facilitate the movement of species among isolated habitat patches, are representative of structural connectivity. On the Tongass, intact riparian buffers and the beach fringe function as corridors that facilitate dispersal and allow movement between small, isolated subpopulations of species. Advances in the fields of landscape ecology, habitat fragmentation, and population genetics have led to a broader view of connectivity, with less of a structured focus on corridors, and more of a perspective on the functional connectivity provided by landscape linkages or "linkage zones" (Bennett 1999 as cited in Haufler 2007). Functional connectivity relates to the degree of movement or flow of organisms through the landscape. Linkage zones are not necessarily discrete features of the landscape, but may occur where the juxtaposition of particular habitats or land uses act to funnel dispersers between habitat patches. The concept of functional connectivity addresses movement capabilities of individual species, habitat patches, landscape configurations, matrix conditions, barriers, and their relationships in maintaining continuous populations (Haufler 2007). On the Tongass, matrix lands play a vital role as landscape linkages because they provide functional connectivity between OGRs and other non-development land use areas.

The National Forest Management Act (NFMA) regulations provide that habitat must be "well distributed" so that "individuals can interact with others in the planning area." The continued existence of a population within which interaction between individuals becomes difficult (significantly less frequent) or impossible may no longer be well distributed, as segments of the population become isolated. The fragmentation of habitats, which isolates and creates small insular populations, contributes to decreased population distribution and increased likelihood of local extirpation (Wilcove et al. 1986). Because the Tongass is an island archipelago, relatively isolated populations may already exist with naturally higher risks to local extirpation (see discussion of endemism below).

The idea of maintaining well-distributed habitats brings up the issue of scale, which is a fundamental difficulty underlying the assessment of functional landscape connectivity. For example, because species differ in their dispersal abilities and, therefore, the way they perceive patches as functionally connected, the scale of the interaction between the species and the landscape should be taken into account when assessing the connectedness of the landscape. That is, there are likely features within the matrix that are not conducive to crossing by some species that are most appropriately identified at the project level, rather than on a Forest-wide basis. As such, the following discussion takes a broader view of connectivity by focusing on areas where natural or human-caused features (e.g., roads and clearcuts) constrain potential movement by wildlife to narrow bands of habitat, often referred to as “pinch-points” or “bottlenecks.”

These points often function as movement corridors and need special planning and design to ensure that wildlife migration patterns and habitat diversity are protected over the long term and are thus an important aspect in considering functional landscape connectivity. Additionally, determining if management activities are likely to create barriers that could affect species distribution on a landscape scale (e.g., within biogeographic provinces) is a useful means of identifying potential adverse short-term effects on maintaining well distributed, viable populations.

“Pinch-points” can be geographic or ecologically based. For example, areas have been identified on the Tongass where geographic “pinch-points” connect major landscapes within islands. These are all relatively narrow areas between larger land units where future alterations in habitat could significantly reduce natural connectivity and limit the ability of land-based species to disperse or migrate. The following is a description of six key areas, identified by the Interdisciplinary Team (IDT) during the development of the 1997 Forest Plan, where a high amount of development has occurred; there are a number of additional pinch-points (e.g., the Cleveland peninsula between Santa Ana and Yes Bay and between Neets and Shrimp Bay) where concentrated harvest is less likely to occur during the life of the Forest Plan, which should be analyzed at the project level:

1. The portage between Tenakee Inlet and West Port Frederick on Chichagof Island, a narrow neck of land connecting northeast Chichagof Island to the main body of the rest of the island. This is in the East Chichagof biogeographic province.
2. The area connecting Lisianski Inlet with the North Arm of Peril Strait is a narrow region that connects two major portions of Chichagof Island.
3. The area between Port Camden, Bay of Pillars, and 3-Mile Arm on Kuiu Island (Kuiu Island biogeographic province), a narrow neck of land connecting the northern and eastern part of the island to the rest of Kuiu Island.
4. The narrow area between Lindenburg Peninsula and the remainder of Kupreanof Island.
5. The Neck Lake area between Whale Passage and El Capitan Passage on Prince of Wales Island (North Central Prince of Wales biogeographic province) has experienced high levels of past and ongoing forest management activities. It also is a relatively narrow piece of land connecting the extreme northern end of Prince of Wales Island to the remainder of the island.
6. Sulzer Portage, between the West Arm Cholmondeley Sound and Portage Bay at the head of Hetta Inlet, on Prince of Wales Island. This area has had considerable timber harvesting on both National Forest and adjacent private lands, and due to a recent transfer of land ownership the pinch-point itself is now all private land. This relatively narrow neck of land joins the southeast part of Prince of Wales Island to the remainder of the island, connecting North Central and South Prince of Wales biogeographic provinces.

Ecological “pinch-points” are areas where habitat conditions within a landscape facilitate movement between habitat patches. These areas may be peninsulas of forested habitat surrounded by nonforested habitat that receive concentrated wildlife use and can best be identified by conducting a landscape connectivity analysis. Some species are very mobile through a variety of habitat conditions and some need relatively intact mature forest to successfully travel. Some conditions, such as large water crossings, present a barrier to movement to some species and not to others. For most species, however, connectivity is not an either/or function. Pyare and Smith (2005, 2006) conducted a preliminary evaluation of functional connectivity on the Tongass by experimentally evaluating the movement potential of flying squirrels through various landscape elements in an intensively managed area on Prince of Wales Island to derive a spatial model to evaluate movement potential at a larger scale. Experiments revealed that flying squirrels moved with the least resistence across large expanses of old-growth and old-growth fragments, followed by second-growth up to 100 meters wide, with the most resistence in regenerating clearcuts and young second growth greater than 100 meters wide. Noteably, while males appeared to have a high movement potential in fragmented landscapes, females and juveniles did not. This detailed level of pinch-point analysis is necessarily done at a finer scale during project planning or landscape analyses (Smith and Pyare 2005, 2006).

Species Accounts

The following species accounts are divided into five sections: Threatened and Endangered Species, Candidate Species, Forest Service Sensitive Species, Management Indicator Species, and Other Species of Concern. Species on "sensitive lists" compiled by other entities (e.g., Boreal Partners in Flight, Alaska Natural Heritage Program, and Alaska Department of Fish and Game (ADF&G) Nongame) are addressed through the Regional Forester's sensitive species list. This list is in the process of being updated. Table 3.10-1 lists all species considered for this section.

Threatened and Endangered Species

Federally listed threatened and endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS) under authority of the Endangered Species Act (ESA) of 1973, as amended. An endangered species is defined as one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as one that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

The federally listed wildlife species within the boundary of the Tongass National Forest include humpback whale (*Megaptera novaeangliae*) and Steller sea lion (*Eumetopias jubata*). Recovery plans have been prepared for the humpback whale and Steller sea lion. The ESA for the State of Alaska authorizes the Commissioner of the ADF&G to list Alaska endangered species. Species listed as endangered by the State of Alaska include the short-tailed albatross (*Diomedea albatrus*), humpback whale, right whale (*Eubalaena glacialis*), and blue whale (*Balaenoptera musculus*). With the exception of the humpback whale, none of these species occur in Southeast Alaska and therefore are not considered further here.

Pursuant to Section 7 of the ESA, a Biological Assessment was prepared to assess the effects of the 1997 Forest Plan revision on endangered or threatened species and ensure that proposed actions would not jeopardize the continue existence of listed species (specifically, humpback whale and the eastern population of the Steller sea lion) and was submitted to NMFS for review and concurrence. The Biological Assessments and agency concurrences for the Forest Plan revision can be found in Appendix J of the 1997 Forest Plan Revision Final EIS. Humpback whales and Steller sea lions will not be addressed further in this document, but are evaluated in an updated Biological Assessment prepared for the current Forest Plan amendment (Appendix F).

The Queen Charlotte goshawk and the Alexander Archipelago wolf were both the subject of listing petitions under the ESA in the 1990s; the petitions were reviewed and formally accepted by USFWS in 1994. USFWS concluded in 1995 that listing was not warranted for either subspecies, but concerns remained for their long-term viability. The goshawk finding was challenged in U.S. District Court, which remanded the finding to USFWS with instructions to base the finding on the existing management plan for the Tongass (the 1997 Forest Plan), rather than the one in

Table 3.10-1
Wildlife Species in Southeast Alaska that are Federally Listed Species or Candidate for Listing under the ESA (NMFS or USFWS), Management Indicator Species (USDA Forest Service), or Sensitive Listed Species (USDA Forest Service)

Species Common Name (*Scientific Names*)[2/]	Federal T&E Listed Species	Federal Candidate Species	Management Indicator Species[1]	Forest Service Sensitive Listed Species [2]	Other Species of Concern
MAMMALS					
Alexander Archipelago Wolf (*Canis lupus ligoni*)			X		
American Marten (*Martes americana*			X		
Black Bear (*Ursus americanus)*			X		
Brown Bear (*Ursus arctos*)			X		
Northern Flying Squirrel (*Glaucomys sabrinus*)					X
Humpback Whale (*Megaptera novaeangliae*)	X				
Mountain Goat (*Oreamnus americana*)			X		
Red Squirrel (*Tamiasciurus hudsonicus*)			X		
River Otter (*Lutra canadensis*)			X		
Sitka Black-tailed Deer (*Odocoileus hemionus sitkensis*)			X		
Steller sea lion (*Eumetopias jubata*)	X				
BIRDS					
Bald Eagle (*Haliaeetus leucocephalus*)			X		
Brown Creeper (*Certhia americana*)			X		
Hairy Woodpecker (*Picoides villosus*)			X		
Kittlitz's Murrelet (*Brachyramphus brevirostris*)		X			
Marbled Murrelet (*Brachyramphus marmoratus*)					X
Queen Charlotte Goshawk (*Accipiter gentilis laingi*)				X	
Osprey (*Pandion haliaetus*)				X	
Peale's Peregrine Falcon (*Falco peregrinus anatum*)				X	
Red-breasted Sapsucker (*Sphyrapicus ruber)*			X		
Spruce Grouse (*Falcipennis Canadensis*)					
Trumpeter Swan (*Cygnus buccinator*)				X	
Vancouver Canada Goose (*Branta canadensis fulva*)			X		

[1] This document addresses all Management Indicator Species listed in the 1997 Forest Plan.
[2] Listed plant and fish species are addressed in their respective sections.

development at the time. USFWS released a new finding in August 1997, which also concluded that listing was not warranted. Several more legal challenges occurred in the intervening years and, most recently, the court instructed the USFWS to evaluate whether Vancouver Island is a "significant portion of the subspecies' range and, if so, to determine whether the bird should be listed. A new Finding, released in November 2007 concluded that that Vancouver Island is a significant portion of the Queen Charlotte goshawk's range and that listing the subspecies on Vancouver Island is warranted. The review also indicated that the subspecies' populations in British Columbia and Alaska are distinct population segments (DPS) and that the best available information on biological vulnerability and threats to the goshawk does not support listing the Alaska DPS as threatened or endangered at this time.

The Kittlitz's murrelet is a candidate species for listing. Species accounts for the Kittlitz's murrelet, Queen Charlotte goshawk, and Alexander Archipelago wolf are provided below under the Candidate Species subsection, Forest Service Sensitive Species subsection, and Management Indicator Species subsection, respectively.

Candidate Species

Kittlitz's Murrelet

On May 9, 2001, the Secretary of the Interior was petitioned to list the Kittlitz's murrelet (*Brachyramphus brevirostris*) as endangered with concurrent designation of critical habitat under the ESA. Petitioners cited dramatic reductions in population size over the past decade and declining habitat quality as reasons for the requested listing. The species was officially designated a candidate species (warranted, but precluded) on May 4, 2004.

The Kittlitz's murrelet is closely associated with glacial habitats along the Alaska mainland coast. Breeding sites are usually chosen in the vicinity of glaciers and cirques in high-elevation alpine areas with little or no vegetative cover (van Vliet 1993). When present, vegetation is primarily composed of lichens and mosses (Day et al. 1983). The species nests a short distance below the peak or ridge on coastal cliffs, barren ground, rock ledges, and talus above timberline in coastal mountains, generally near glaciers 0.2 to 47 miles inland (Day et al. 1983). The remote and solitary nesting habits lead to extreme difficulty in finding nests. Non-breeding or off-duty breeders spend the summer in inshore areas, especially along glaciated coasts.

The Kittlitz's murrelet is one of the rarest seabirds in North America. The only American population occurs in Alaskan waters from Point Lay south to northern Southeast Alaska (Endicott and Tracey Arm). The largest breeding populations are believed to be in Glacier Bay National Park and Preserve, Prince William Sound, Kenai Fjords, and Icy Bay (Kendall and Agler 1998 as cited in Day et al. 2000). According to the petition, the southern boundary of the breeding range is LeConte Bay on the Tongass National Forest. Latest worldwide population estimates range from 9,500 to 26,500 birds. The best information available from USFWS indicates that Prince William Sound populations have declined by 84 percent since 1984, Kenai Fjords area by 83 percent since 1976, Malaspina Forelands by 38 percent and perhaps as much as 75 percent between 1992 and 2002, and Glacier Bay by 60 percent between 1990 and 1999. Speculated causes for decline include oil pollution, glacial recession, gillnet mortality, and availability of preferred forage fish (Kuletz et al. 2003, Piatt and Anderson 1996, van Vliet and McAllister 1994). Effects of these factors include increased adult and juvenile mortality and low recruitment. Human-caused mortality includes gillnet fisheries and oil spills like that from the Exxon Valdez or smaller tourism and fishing boats. Increased disturbance from helicopter tours and cruise ships may also be a factor.

Forest Service Sensitive Listed Species

Sensitive species are those plant and animal species identified by the Regional Forester for which population viability is a concern on National Forest System (NFS) lands within the region. Either a significant current or predicted downward trend in population numbers or density, or a significant current or predicted downward trend in habitat capability that would reduce a species' existing distribution indicates a viability concern. The goal of the Forest Service Sensitive Species Program (Forest Service Manual 2670) is to ensure that species numbers and population distribution are adequate so that no federal listing will be required and no extirpation will occur on NFS land. The Alaska Region Sensitive Species List was last updated in June 2002 and an update is currently in progress.

Plants and fish species identified as Sensitive are discussed in their respective sections. The Queen Charlotte goshawk is described in greater detail because this species has additional management concerns. The Regional Sensitive Species List continues to be revised as new information dictates.

Queen Charlotte Goshawk

The northern goshawk inhabits forested lands throughout North America, favoring dense stands of conifer or deciduous mature and/or old growth for nesting habitat. The Queen Charlotte goshawk is recognized as a distinct subspecies, and is endemic to coastal rainforests from Vancouver Island to northern Southeast Alaska (Taverner 1940, Iverson et al. 1996, Squires and Reynolds 1997). Recent genetic analysis indicates that this population may be genetically distinct from goshawks found elsewhere (Talbot et al. 2005 as cited in USFWS 2007). During the last decade, conservation designations of the goshawk in Southeast Alaska have varied; however, its status in Southeast Alaska remains a concern (Cotter 2007b). In addition to being considered a species of special management concern on the Tongass, the Queen Charlotte goshawk is of special concern to the State of Alaska and has been included by Stenhouse and Senner (2005) on Audubon's Alaska WatchList because of its limited distribution and the potential threats posed by commercial timber harvesting in breeding and nonbreeding seasons. In 2000, the Canadian government listed the Queen Charlotte subspecies as threatened because of continued logging of low-elevation, old-growth coniferous forests within its range and likely population declines (Environment Canada 2006).

Within Southeast Alaska and on the Tongass, the goshawk is a year-round resident and may occupy different, or overlapping, winter and breeding territories. Prior to studies during the past decade, very little was known about goshawks on the Tongass. Goshawks occur in low densities across the Forest and are difficult to study in the dense temperate rainforests of Southeast Alaska (Schempf et al. 1996 as cited in USFWS 2007). A recent interagency study of goshawks in the Tongass found 61 nesting areas within approximately 30,000 mi^2 (77,000 km^2); though this number is not reflective of a density estimate *per se* (Flatten et al. 2001). Goshawk nests can be found in all LUDs, and the number of known nest sites has not significantly increased in recent years; however, this is probably related to reduced survey efforts and the fact that goshawks are frequenty missed during surveys due to their secretive nature, low density, and use of old-growth habitats where they are difficult to detect (Flatten et al. 2001, Boyce et al. 2005, *Northern Goshawks on the Tongass National Forest* presented at the Tongass Conservation Strategy Review Workshop 2006). The interagency research project has also ceased, and follow-up of leads apart from timber sale activities now seldom occurs.

A nesting area, which in Southeast Alaska can be 2,000 acres (800 hectares) in size (Iverson et al.1996, Flatten et al. 2001), is defined as the area containing all nests used by a pair of goshawks; it is the portion of a pair's home range that contains all active and inactive nests. Female goshawks tend to move greater distances between nests in sequential years than males; however, a majority of nests remained within a 0.8-mile (1.3-kilometer) radius of the previous year's nest and all movements were within 3.2 kilometers of the "year one" nest site (Lewis and Flatten 2004 as cited in USFWS 2007). Adult home ranges on the Tongass are some of the largest recorded for the species, averaging 9,640 acres for females and 10,625 acres for males during the nesting season, and 29,160 acres for females and 29,400 acres for males outside of the nesting season (Lewis and Flatten 2004 as cited in USFWS 2007). The large size of Tongass goshawk home ranges compared to other areas may be related to methological differences; aircraft were used in Southeast Alaska for radiotelemetry and birds were located even if they were "over the ridge" where ground-based radiotelemetry would not have located the bird (Squires and Reynolds 1997, Kenward 2006).

Based on a recent study of 37 nest trees, 54 percent were Sitka spruce, 41 percent were western hemlock, and 4 percent were yellow cedar (Flatten et al. 2002). Lewis et al. (2003) found nest trees in Southeast Alaska to be larger than those around them at the nest site. In a separate analysis of 63 nest sites (habitat immediately surrounding the nest) from 50 nesting areas (a 20- to 30-acre area surrounding a nest, including roosts and prey plucking sites), 89 percent were located in high-volume stands with relatively dense, multi-storied canopies (SD5N, SD5S, and SD67 categories) compared to the surrounding forest (Lewis et al. 2003, McClaren 2004, Doyle 2006); nest areas had significantly more forest, productive forest, hemlock, and canopy cover and less non-forested area than random 12-hectare plots, and less non-forested habitat and forest/non-forest edge than random 65-hectare plots (Lewis 2005). Goshawk nesting density appears to be closely associated with dense overstories and open understories and goshawk habitat may therefore be improved by silvicultural activities which reduce the densities of shrubs, saplings, and small poles, while maintaining or enhancing the canopy of large trees (Crocker-Bedford 1990). Some nests have been found in maturing second-growth (previously harvested) stands (Bosakowski et al. 1999, McClaren 2004). On Vancouver Island, most second-growth stands supporting nests were 60 to 80 years old, and suitable structure was apparently achieved in as little as 50 years (McClaren 2004).

The diet of goshawks in Southeast Alaska is dominated by a few key prey (grouse spp., medium-sized birds such as Steller's jay and varied thrush, and red squirrels, where present). In prey rich areas, blue grouse and red squirrel are the dominant prey items taken (Lewis 2001). On Prince of Wales Island and other islands where blue grouse and red squirrels are not present, spruce grouse, Steller's jays, and ptarmigan are the dominant prey items taken (Lewis 2001). Small mammals make up a small portion of the overall diet in this area. Thrushes, grouse, and squirrels (common forest inhabitants that may be affected by timber harvesting) contribute up to 60 percent of prey deliveries to goshawk nests during the breeding season (Lewis et al. 2004). Recent research from neighboring populations on Haida Gwaii/Queen Charlotte Islands suggests blue grouse populations have probably declined since intensive harvesting was initiated, despite the limited benefit gained from some recent harvesting (e.g., new openings [more than 15 years] are used by breeding birds), and that this decrease in grouse may have substantially impacted the viability of the threatened goshawk population (Doyle 2004a, 2006).

POG forest is an important component of goshawk habitat use patterns in Southeast Alaska and at all scales (nest tree, nest site, post-fledging areas) goshawks select POG forest types. Habitat use of the 1,000-foot beach and estuary buffer was higher for females than males during the nesting and non-nesting season, with peaks in use occuring at 3,000 and 4,000 feet from the beach fringe (*Northern Goshawks on the Tongass National Forest* presented at the Tongass Conservation Strategy Review Workshop 2006). Radio telemetry points within adult home ranges suggest very high use of POG forests. Non-productive forest types and second-growth stands are also used to a lesser extent, and in some areas these matrix lands may be important for long-term goshawk management (Reynolds 2004, Reynolds et al. 1992). Most other habitat types (such as alpine, subalpine, muskeg, and clearcuts) were used infrequently or avoided by goshawks. This is corroborated by recent research conducted in the Southwest and Pacific Northwest, which indicates that although goshawks prefer to place their nests in mature to old-growth forest types, they are much more adaptable than once thought, and when these habitats are not available they will nest in maturing second growth with sufficient structure or in smaller patches of trees, and forage in young forest as well as along edges and in openings (Bosakowski et al. 1999, McClaren 2004, Boyce et al. 2006, Reynolds et al. 2006). Although there is some documented use of second growth in Southeast Alaska, the majority of Southeast Alaska second growth is younger than 50 years and most goshawks are associated with older forests. Use of older second growth (e.g., approximately 90- to 100-year-old stands) by goshawks for nesting in a few instances in Southeast Alaska was used by the assessment panels to suggest that goshawks would benefit from a long timber rotation of 150 or 200 years, providing 50 or 100 years of use.

Timber harvesting on the Tongass and on private lands in Southeast Alaska, has resulted in the conversion of old-growth forest to young growth, and likely has contributed to a decline in goshawk habitat capability due to their association with this habitat and the association of their prey with this habitat (e.g., blue grouse and red squirrels). Although goshawks are considered generalist predators and possess some adaptability to fluctuations in their prey base, large-scale habitat disturbance may diminish breeding success of goshawks in Southeast Alaska through changes in prey availability (Lewis et al. 2004). In the contiguous U.S., such habitat change is believed to reduce the number of breeding goshawks by degrading the structural character of forests used for nesting and foraging, though it is still unclear how goshawk populations respond to habitat modifications because study of effects across a gradient of harvest intensity is lacking (Boyce et al. 2006). However, forest harvest may be compatible with goshawk management provided that habitat needs are provided at multiple spatial scales (Reynolds et al. 1992). For example, Doyle (2004b) concluded that grouse selection of stands with more open canopy with a variety of heights and a patchy shrub layer on the Haida Gwaii/Queen Charlotte Islands, provides for the possibility that there may be a pattern for single tree selection, or a patch retention harvest threshold, that will allow harvesting without impacting grouse populations and thus, goshawks.

In 1996, a conservation assessment was conducted to synthesize literature and original data from Southeast Alaska to describe the habitat relationships and conservation status of the Queen Charlotte goshawk (Iverson et al. 1996). Iverson et al. (1996) concluded that goshawk habitat theoretically could be maintained across the landscape under a 300-year ecological rotation. A risk assessment using a conceptual 300-year rotation revealed that several landscapes (including the North Prince of Wales Biogeographic Province) within the Tongass may be at increased risk of not sustaining goshawks. The assessment suggested that a combination of reserve-based and dynamic-landscape management approaches could sustain well distributed viable populations of goshawks across the Tongass. In 1997, a panel of goshawk experts concluded that, even though they had viability concerns, under the 1997 Tongass Forest Plan, there would be a high likelihood that after full implementation for 100 years, goshawks would still persist across the Forest in some distributional status considerably more dense than in refugia (Iverson 1997).

As noted above under the Threatened and Endangered Species section, a recent court decision has required USFWS to determine whether Vancouver Island is a “significant portion of the subspecies range” and, if so, to determine whether the bird should be listed. USFWS (2007) finalized an update to the 1997 Status Assessment in April 2007. A new Finding, released in November 2007 concluded that that

Vancouver Island is a significant portion of the Queen Charlotte goshawk's range and that listing the subspecies on Vancouver Island is warranted. The review also indicated that the subspecies' populations in British Columbia and Alaska are DPS and that the best available information on biological vulnerability and threats to the goshawk does not support listing the Alaska DPS as threatened or endangered at this time.

Osprey

The best available information indicates that the osprey is naturally rare in Southeast Alaska and this area may represent the northern periphery of the species' range. A total of 16 osprey nest sites have been documented in Southeast Alaska (USDA Forest Service 1997a). Of this total, no more than three have ever been known to be active in any year. Nests can be found along the coasts of Wrangell Island and Kupreanof Island, typically 0.25 to 1.4 miles from the nearest saltwater; ospreys do nest along inland freshwater lakes, but none has been documented in Southeast Alaska. They require large trees and snags or power poles for nesting and, in Southeast Alaska, osprey nests typically occur in broken-top spruce trees or western hemlock snags. Ospreys nest from late April through August and probably overwinter in Mexico and Central America. Historically, there is no evidence that there were additional ospreys in Southeast Alaska, and population numbers have remained stable but low. Limiting factors are unknown, but available nest sites and foraging areas (i.e., larger lakes, rivers, beaver ponds, coastal beaches or large estuaries with abundant fish) do not appear to be limiting. Interaction and competition with the abundant bald eagle population may be a limiting factor.

Peale's Peregrine Falcon

As of 1997, 36 nests of Peale's peregrine falcon have been located in Southeast Alaska; 32 of which are on the Tongass National Forest. Nest surveys are very difficult to conduct, and biologists believe more nests may be present. Peregrine nest distribution is closely associated with large seabird colonies located on the outer coasts or nearby islands. The nest sites are on cliffs ranging from 65 to 900 feet in height; all but one nest faces the open ocean. Seabirds are thought to be major prey of the falcon. Information on falcon breeding biology or reproductive success is limited, but based on USFWS surveys, their population appears to be stable.

Trumpeter Swan

The largest nesting population of trumpeter swans on the Tongass National Forest occurs on the Yakutat Forelands. A smaller breeding population occurs in the Chilkat Valley on non-NFS land. Young cygnets have been located as far south as Traitors Cove on Revillagigedo Island and pairs of swans have been consistently observed during the summer months on Smuggler's Lake on the Cleveland Peninsula. Surveys by USFWS and other cooperating agencies indicate that the Yakutat population continues to be stable. A complete aerial survey was completed in September 2005. Mean brood size was estimated at 3.1 with approximately 27 percent of the total swans counted (n=23,692) reported as juveniles. The mean brood size was 3 percent higher than in 2004, but lower than the 29-year mean. The proportion of juveniles was 30 percent higher than in 2004 and 7 percent above the 29-year average. Trumpeter swans winter in ice-free areas throughout Southeast Alaska. Winter surveys on the Yakutat Forelands documented 646 adults and 98 juveniles in March 2006. Information on wintering habitats and populations elsewhere on the Tongass is very limited, but a traditional winter concentration area has been documented on Mitkof Island near Petersburg. Numerous swans from other parts of Alaska migrate through Southeast Alaska, and many winter in suitable habitats in Southeast Alaska.

Management Indicator Species

Management Indicator Species (MIS) are vertebrate or invertebrate species whose response to land management activities can be used to predict the likely response of other species with similar habitat requirements. NFMA regulations of 1982 require both the selection of MIS during development of forest plans (36 CFR 219.19(a), 1982), and that reasons for species selection be clearly stated. Criteria are to include those species whose population changes are believed to indicate the effects of management activities (36 CFR 219.19(a)(1), 1982).

Though required under the NFMA, the MIS concept is not universally accepted and is difficult to use, especially on the Tongass. First, our fundamental knowledge of many Tongass MIS is limited, as is our understanding of the viability requirements of most Tongass wildlife species. Moreover, although Tongass MIS represent varying needs related to old-growth forest, there is no assurance that all or even most other old growth associated species are adequately represented. Additionally, many current MIS are difficult to monitor or no clear linkage has been established between observed population changes and habitat modification. Some species may be better monitored through surrogate measures such as important habitat features or prey populations. Consequently, an effort is underway to re-evaluate, and possibly reduce, the current list of MIS.

For the 1997 Forest Plan, 13 wildlife MIS were identified and are discussed in this section. Four MIS species with special management concerns (brown bear, marten, Sitka black-tailed deer, and Alexander Archipelago wolf) are discussed in more detail. POG habitat provides essentially all of the highly important habitats and the preponderance of the moderately important habitats for most of the MIS. However, some species (e.g., wolves) use a variety of different habitats but rely on prey species associated with old growth (e.g., black-tailed deer). Table 3.10-2 indicates the relative importance of conifer successional stages as habitat for the MIS. Table 3.9-4 in the *Biodiversity* section displays the elevational distribution of productive and unproductive old growth on the Tongass, based on different elevation constraints thought important for many of the species discussed in this section.

Sitka Black-Tailed Deer

Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) are indigenous to the coastal regions of Southeast Alaska and northwest British Columbia. This subspecies of mule deer occupies the northernmost extreme of black-tailed deer habitat. Deer are strong swimmers, and have occupied almost all islands of the Alexander Archipelago capable of supporting them. On the mainland, deep snow and harsh winters limit populations more than on the islands.

The Sitka black-tailed deer is the wildlife species receiving the highest hunting and subsistence use of all terrestrial species in Southeast Alaska. Table 3.10-7 in the effects section below presents the average deer harvest per year over the last 10 years by Wildlife Analysis Area (WAA). This species represents those that use lower elevation (below 800 feet elevation) POG forest habitats during the winter period. The quantity, quality, distribution and arrangement of winter habitat are considered the most important limiting factors for Sitka black-tailed deer in Southeast Alaska. There are about 4.8 million acres of old-growth forest (3.0 million acres of POG and 1.8 million acres of unproductive old growth below 800 feet elevation within occupied deer habitat on the Tongass National Forest (Table 3.9-4 in the *Biodiversity* section). Currently, approximately 92 percent of the original old growth remains Forest-wide (see Table 3.10-7 for relative deer habitat capability by WAA).

Table 3.10-2
Relative Importance of Conifer Successional Stages as Habitats for Management Indicator Species

		Successional Stages[1]					
					Late (>200 years)		
		Early (years)	Mid (years)			Productive Old Growth	
Species	Season[2]	0-25	26-150	150-200	Unproductive Old Growth	Low-Med (SD4S, SD4N, SD5H)	High (SD5S, SD5N, SD67)
Mountain Goat	1	L	L	L	L	M-H	H
Sitka B-tail Deer	1	L-M	L	L-M	L-M	M	H
River Otter	2,3	L	L	M	L	H	H
American Marten	1	L	L	L	L	M	H
Brown Bear	3	L	L	L	M-H	M-H	M-H
Black Bear	2,3,4	M	L	L	M	M-H	M-H
Wolf[3]	5	-	-	-	-	-	-
Red Squirrel	5	L	L-H	H	L	M-H	M-H
Bald Eagle	2,3	L	L	L	L	H	H
Red-br. Sapsucker	2,3	L	L	L	L	H	M
Hairy Woodpecker	1	L	L	L	L	L	M-H
Brown Creeper	1	L	L	L	L	L	L-H
Van. Can. Goose	2,3	L	L	L	H	H	H

[1] H = Highest importance, high population densities, M = Moderate importance, moderate population densities, L = Least importance, low population densities
[2] Season codes: 1 = winter, 2 = spring, 3 = summer, 4 = fall, 5 = all year
[3] Wolves use habitats according to the abundance and availability of prey species (primarily Sitka black-tailed deer).

A deer winter habitat suitability index (HSI) model, which takes into account snow depth (indicative of typical, moderate winter severity), elevation, aspect, and conifer forest successional stage, is currently used in Tongass Forest planning to provide an index of habitat capability (referred to as the TLMP deer model, DeGayner 1997). It is a stand-alone model, based on expert opinion, which does not require the collection of new data. Old-growth forests are assigned the highest value because they intercept snow and provide understory forage plants. Generated HSI values are an index of how features are correlated with deer winter habitat. High model scores represent features that are correlated with deer abundance. These features include closed canopy (based on volume class rather than canopy cover), maritime influence, south facing slopes, and low average snow depth.

One shortcoming of the model is the high rating it gives to some large-tree old-growth stands (some of the stands mapped as SD67). These stands consist of widely spaced, very large Sitka spruce trees, most commonly located in riparian floodplains. Riparian floodplains tend to be some of the coldest locations on the landscape due to cold air drainage, shade, and flat terrain, and tend to have greater snow accumulations than neighboring stands, making them less hospitable to deer (T. Hanley, personal communication, 2007). Additionally, despite their high volume, these stands have open overstories that intercept less snow than other stands and, while they typically have a high understory biomass, dominant species include devils club, salmonberry, elderberry, and ferns, all of which provide suitable forage during summer but not during winter (Hanley and Hoel 1996). Thus, these stands constitue poor winter range, but by default, their high volume results in high assigned model values. The effect of this error is to overestimate the value of some large tree stands and to overestimate the impact of their harvest; however, the overall effect is relatively small because these stands comprise a very small fraction of the landscape (T. Hanley, personal communication, 2007).

Recent research indicates the greater importance of summer range for reproduction and population recovery following severe winters, and for building up pre-winter body reserves. This suggests that changes to the 1997 HSI model may be warranted such that higher suitability values are assigned to habitats that provide important summer forage, such as recent clearcuts, unproductive forest, and low volume old growth (Parker et al. 1999). Due to changes in vegetation mapping on the Tongass, model coefficients are currently being refined; however, these modifications will occur outside of the timeframe for the Forest Plan amendment. Therefore, the existing, approved deer HSI model used in the 1997 Forest Plan Revision Final EIS will be used here for alternative comparisons, with the caveat that it likely overestimates the effect of timber harvest on deer habitat quality.

The deer model provides a tool to evaluate the relative differences among alternatives. The winter HSI model is most appropriate for analysis over large planning areas such as the entire Tongass National Forest or at the scale of a WAA or number of WAAs, where the greatest differences in habitat value occur between main habitat types (e.g., old growth versus young clearcuts versus closed-canopy young-growth) and their topographic settings, rather than differences within such classes. Thus, the model has limitations when applied at the watershed or project planning level. A new tool for evaluating deer habitat appropriate for analysis at finer scales, called the Forest Resource Evaluation System for Habitat (FRESH-Deer) model, is currently being developed by the Forest Service in cooperation with the University of Alaska (*Deer Habitat Management*, presented at the Tongass Conservation Strategy Review Workshop 2006). FRESH-Deer is a food-based system that provides a “snap shot” analysis of habitat conditions at one point in time by taking into account the biomass of available forages (by species and by plant part), the nutritional quality of each forage (e.g., digestible energy and digestible protein), and user-specified metabolic requirements (e.g., metabolic energy, digestible protein) that are dependent on the age, sex, season, and reproductive status of the animal. The model identifies limiting factors within the habitat and the most important forages. In contrast to the winter HSI model, FRESH-Deer is a data-driven model that requires the collection of new data. In the future, this model may be available for use in project planning.

In addition to winter habitat conditions, predation can act as a major controlling factor of deer populations. Primary predators include humans, wolves, and black-bears; however, the predominance of each in terms of impacting the deer population varies geographically. For example, studies of deer mortality indicate that on Mitkof and Heceta Islands human harvest and wolf predation were the main causes of deer mortality, but on Prince of Wales Island deer mortality (primarily fawns) was predominantly due to bear predation (*Wolves and Predator-Prey Interactions*, presented at the Tongass Conservation Strategy Review Workshop 2006). Deer are the primary prey of wolves in Southeast Alaska, and the significance of predator/prey interactions on wolf populations led to the conclusion that wolf persistence was directly linked to deer habitat capability. However, even in high-quality habitats increased deer mortality can occur during severe winters. In fragmented landscapes, where small, remnant patches of old growth exist, deep snow may isolate deer by precluding movement between patches (McNay 1995). Concentrated use of these areas can result in overbrowsing of forage and ultimately malnutrition and death (Farmer et al. 2006)

Mountain Goat

Mountain goats (*Oreamnos americanus*) represent species using cliffs, alpine and subalpine, and old-growth forest habitats. The quantity and quality of winter habitat is the most limiting factor for mountain goats in Southeast Alaska. Lack of snow interception in early successional stages and lack of forage in middle successional stages reduces the value of winter habitat. Historically, mountain goats in Southeast

Alaska were present only on the mainland, but they have more recently been transplanted to many of the islands.

Mountain goat populations in Southeast Alaska are currently monitored via ADF&G aerial surveys and harvest records, which are used to estimate population trends. This species is considered one of the easier species in Southeast Alaska to monitor by virtue of their predictable use of open terrain during summer and fall. However, they spend much of their time outside of areas where habitat manipulations (e.g., logging) have occurred or are likely to take place in the future. Additionally, a clear link between timber harvest and mountain goat population trends has not been established. Existing Forest Plan standards and guidelines were developed to reduce the impacts of other activities (e.g., helicopter over-flights) and impacts associated with facilities (e.g., crew camps).

Black Bear

Black bears (*Ursus americanus*) are present throughout the mainland and on the islands south of Frederick Sound. They use habitats from sea level to the alpine. There are about 9.4 million acres (excluding rock, permanent ice fields, and acres of lakes) within occupied black bear range on the Tongass National Forest. Estuarine, riparian, and forested coastal habitats receive the highest use by black bears and appear to have the highest habitat values. Within forested areas, both early and late (old growth) successional stages provide the best forage and/or cover for black bears. A recent interagency study estimated black bear population size on the northern portion of Kuiu Island (Peacock 2005) and conservation genetics more broadly across the Alexander Archipelago (e.g., Peacock et al. 2007).

Black bears were chosen as an MIS because of their importance for hunting and for recreation and tourism. However, this species is difficult to monitor and existing monitoring data, derived from ADF&G sealing records, are not sensitive enough to detect population changes over large expanses, or determine the cause of population change in a given area.

River Otter

The river otter (*Lutra canadensis*) was selected as an MIS because of its association with coastal and freshwater aquatic environments and the immediately adjacent (within 100 to 500 feet) upland habitats. River otters are distributed throughout Southeast Alaska along coastal and inland waters (MacDonald and Cook 1999). Their distribution is Forest-wide in suitable habitats. Beach characteristics affect the availability of food and cover, and adjacent upland vegetation is also important in providing cover for otters. Old-growth forests have the highest habitat value, providing canopy cover, large-diameter trees and snags, and burrow and den sites. They tend to use POG (SDM SD5N, SD5S, SD67 categories) with fairly open understory and greater than 50 percent canopy closure where they commonly rest in cavities or beneath the roots of large conifers or snags (Larsen 1984, Ben-David et al. 1996, Bowyer et al. 2003). Younger successional stages provide lower quality habitat.

The best data currently available on river otter populations typically consist of infrequent, localized density estimates and thus may not be sufficient to monitor population changes at a level of resolution appropriate for the Tongass National Forest (i.e., commensurate with very small changes in habitat). Further, there is no monitoring protocol in place to detect changes in the population due to human-caused habitat change. Beach, Estuary, and Riparian standards and guidelines under the current Forest Plan protect most, if not all, of the key otter habitat components, thus greatly reducing risk to this species and others that rely on such habitats. It is important to note, however, that most streams receive a standard 100-foot buffer which does not protect habitat used by otters beyond this distance.

American Marten

Marten naturally inhabit the mainland of Southeast Alaska and many of the islands in the Alexander Archipelago. Known endemic populations exist on Admiralty, Etolin, Gravina, Kupreanof, Mitkof, Revillagigedo, Woewodski, Wrangell, and Kuiu Islands (MacDonald and Cook 2000). However, many islands remain unsampled but could also support populations. Marten were transplanted to Prince of Wales, Chichagof, and Baranof Islands between 1930 and 1950; whether these transplants were new introductions or just supplemented existing populations is unknown.

Although only one species of marten is formally recognized in Southeast Alaska two distinct lineages exist, including the coastal form *caurina,* which in the Alexander Archipelago occurs only on Kuiu and Admiralty Islands, and the continental form *americana* (Cook et al. 2006). Originally, these lineages were described as separate species but were reclassified as separate subspecies in the 1950s. It is unknown whether these lineages have different life history traits or habitat preferences, and thus, may require different management strategies. However, recent molecular analyses clearly distinguish the two forms and suggest that they have very different evolutionary histories (Stone and Cook 2002, Small et al. 2003, Cook et al. 2006). Hybridization of *caurina* and *americana* individuals has been documented in the two contact zones where both forms coincide, one in Southeast Alaska (Kuiu Island) and one in Montana (Cook et al. 2006).

Marten numbers fluctuate greatly over time in response to food availability habitat conditions and trapping pressure. Results of a multi-scaled study on Chichagof Island conducted between 1990 and 1999 evaluated marten habitat selection, demographics, diet, and prey availability, and indicate that marten abundance is best predicted by the abundance of long-tailed voles (Flynn and Schumacher 2001, Flynn et al. 2004). Habitat requirements reflect a strong interaction between food, cover, climate, and predation, with forest cover being particularly important for travel, dens and resting sites, hunting, and avoiding predation and inclement weather (Flynn and Schumacher 1999, 2001). Consequently, the quantity and quality of winter habitat is a limiting factor for marten in Southeast Alaska. There are about 7.2 million acres of forested land (all age classes and types of conifer forests) below 1,500 feet elevation within occupied marten habitat on the Tongass. Due to lower snow accumulation, habitats at lower elevations have higher value for wintering marten. Coastal habitats (beach fringe) and riparian areas have the highest value, followed by upland habitats below 1,500 feet in elevation. Of the successional stages, larger-sized old-growth forests have the highest value because they intercept snow, provide cover and denning sites, and provide habitat for prey species used by marten. Early successional stages do not provide these habitat components and have lower habitat value. However, studies of eight marten populations in Southeast Alaska conducted between 2001 and 2003 show that marten selected POG but used some second growth 26 to 40 years of age; on Mitkof Island these second growth stands were characterized by abundant understory forage and small mammals (Flynn et al. 2004). In addition, home ranges of marten were well distributed across the landscape and included areas with timber harvest and roads. These findings indicate that although OGRs are still an appropriate model for marten conservation in terms of providing optimal habitat requirements, the management of matrix lands to provide productive habitat and linkages between reserves is also important. Noteably, marten densities are higher in intact forests with less fragmentation (Hargis et al. 1999, Flynn et al. 2004), indicating that large, continguous block of old growth are important for this species.

Dispersal between islands is limited, but marten are fairly mobile on land. Marten are easily trapped and can be overharvested. Forest management activities resulting in increasing access may result in the potential for overtrapping. Currently the ADF&G permits unlimited trapping of marten in the Game Management Units (GMUs) that cover the Tongass (GMUs 1, 2, 3, 4, and 5) from December 1 to February 15. In GMU 3, which includes the endemic population on Kuiu Island, a 9-year average of 188 marten were trapped per year (Lowell 2004). For perspective, across Southeast Alaska the annual average harvest ranged from 224 martens per year on north central Prince of Wales Island to three martens per year on northern Kuiu Island between 1991 and 2002 (Flynn et al. 2004).

Marten were initially selected as an MIS because forest management activities were expected to affect population abundance, and marten pelts represented significant economic value to local residents. In Southeast Alaska, the best available information that can be related to marten populations comes from the ADF&G sealing records; however, this monitoring method was not designed to determine causes of observed population trends. Further, although marten populations appear to be sensitive to habitat alteration, no clear correlation between population trends and habitat change has been defined due to the lack of research on this dynamic and the absence of long-term population datasets. An assumption of the conservation strategy was that large OGRs would support a minimum of 25 female martens; however, in a study of marten densities conducted between 2001 and 2003, Flynn et al. (2004) determined that this minumim number was not met in five of eight study areas, the exception being the Chichagof Island site and possibly the sites near Point Couverden and Thomas Bay. These results illustrate the importance of the matrix lands between reserves for marten survival and the importance of the POG retention requirement under the conservation strategy.

Brown Bear

Southeast Alaska is home to one of the highest concentrations of brown bears (*Ursus arctos*) in the world (ADF&G 2000). Brown bears are important both for hunting (including both outfitter guided and non-guided hunting) and to the recreation and tourism industry of Southeast Alaska. As tourism grows in Southeast Alaska, there is increasing demand for more bear viewing opportunities such as those provided by Pack Creek and Anan Creek. Brown bears are present on the mainland and on most the islands north of Frederick Sound. They are occasionally reported on Mitkof, Etolin, and Wrangell Islands south of Frederick Sound, but are not found on any of the other islands in Southeast Alaska. Brown bears use areas from sea level to the alpine and are habitat generalists. There are about 7.9 million acres (excluding rock, permanent ice fields, and acres of lakes) within occupied brown bear habitat on the Tongass; 7.5 million acres of which are considered to be roadless. Home ranges of brown bears in Southeast Alaska are much smaller than those found in interior portions of North America. Average annual home range sizes for radio-collared bears on Admiralty Island was 39 square mile (100 square kilometers) and 14 square miles (37 square kilometers) for males and females, respectively (Schoen and Beier 1990); these are comparable to home range sizes of radio-collared bears on Chichagof Island (Titus et al. 1999).

The late-summer season has been identified as the most critical or limiting period for brown bears when they must build up energy reserves that are adequate to survive the winter and successfully reproduce (Hildebrand et al. 1999). During this season, many brown bears concentrate along low elevation valley bottoms and salmon streams, with most use occurring within 500 feet of streams (Schoen and Beier 1990, Titus and Beier 1999), where their efforts focus on consuming large quantities of fish in order rebuild their body condition and lay on essential fat reserves. Brown bears have been known to maximize their energy intake by preferentially attacking salmon with the highest energy content (i.e., those that have just entered the stream with protein and fat stores that have not yet been depleted) and by consuming the most energy dense body parts (Gende et al. 2004a, b, Gende and Quinn 2004). These are often the same areas of highest human use and most intense resource development activities. To better understand these relationships, a study on Chichagof Island conducted between 2001 and the present is evaluating brown bear spatial relationships, resource selection, and levels of use during the salmon spawning season in relation to riparian management along two drainages that differ in timber harvest intensity and road building (Flynn et al. 2007). Results showed that in both drainages male brown bears tended to concentrate their use along the stream, whereas females made greater daily movements and used both riparian and adjacent upland areas. In the drainage with more timber harvest and roading, with a smaller riparian buffer, daily movements of female bears tended to be greater and more variable (75 percent of radiotelemetry locations occurring within 2,482 feet of the stream), including more use of adjacent upland areas, than in the less disturbed drainage (75 percent of radiotelemetry locations occurring within 937 feet of the stream). DNA-based population estimates indicated that the number of male bears along both streams was approximately equal and remained constant over time, with an increase in use in September; the number of female bears present declined over the same period. Additionally, diet analyses were conducted with an interest in evaluating the proportion of the diet consisting of salmon, based on the premise that a greater amount of salmon in the diet should support a larger and more productive population. Salmon obtained from mid-summer to early fall represent an important food source for accumulation of energy reserves to sustain bears over-wintering in dens. Results showed that females along heavily managed streams ate less salmon than females along steams with larger riparian buffers, though both drainages still supported high densities of brown bears (22 bears per square kilometer in the less altered watershed and 13 bears per square kilometer in the highly altered watershed, as measured within a 500 meter riparian buffer). A similar study on the Kenai Peninsula reported that female brown bears with cubs tended to avoid areas used by other bears and by humans, apparently in an effort to increase offspring survival, and used less productive salmon spawning areas despite having high nutritional requirements (Suring et al. 2006). These results indicate that small streams are important for female and young bears and forested buffers are important to maintaining high density brown bear populations by providing adequate vegetative cover for secure foraging areas and to support anadromous fish production (Flynn et al. 2007).

Cover for visual obscurity, provided by riparian buffers, is important for minimizing interactions among bears and between humans and bears. Increases in human activity due to an expanding road system in an area may result in increased direct human-induced deaths of bears. This may include legal hunting, illegal kills, wounding losses, and deaths due to the defense of life or property (DLP mortality). Open roads are of greatest concern because they receive the highest, most consistent use; however, closed roads are also important to consider because they provide off-highway vehicle and pedestrian access. ADF&G permits harvest of brown bears in GMU 4, which encompasses Admiralty, Baranof, and Chichagof islands. An annual average of 165 brown bears per year was taken from this area over the last 5 years (ADF&G 2005b). Hunting is also permitted elsewhere in Southeast Alaska.

Alexander Archipelago Wolf

Two Alaskan subspecies of the gray wolf are currently recognized (Weckworth et al. 2005). The wolf found in Southeast Alaska is known as the Alexander Archipelago wolf (*Canis lupus ligoni*). It inhabits the mainland and the larger islands south of Frederick Sound (MacDonald and Cook 2000). However only the largest islands, including Prince of Wales, Kuiu, Kupreanof, Mitkof, Etolin, Revillagigedo, Kosciusko, Zarembo, and Dall islands, are thought to support persistent wolf populations (Person et al. 1996). Recent genetic analyses have shown that wolves on Prince of Wales Island (GMU 2) are a population segment isolated from all other wolves in Southeast Alaska and coastal British Columbia (Weckworth et al. 2005). Wolves require an adequate prey base of ungulates, beaver, and salmon; in most areas of Southeast Alaska the Alexander Archipelago wolf depends heavily on deer. Suitable habitats for wolves equate to areas capable of supporting this prey base. Wolves use a wide variety of habitats when prey are present, and can affect prey populations in those areas.

Wolf densities are closely tied to the population levels of their prey though populations may not exceed certain levels even when prey abundance is high due to other regulatory mechanisms including environmental conditions and social interatcions (Messier 1994, 1995). However, deciphering the influence of each of these factors can be obscured by varying rates of harvest, time lags in carnivore response to changes in prey, or changes in prey vulnerability (Peterson 1977, Fuller and Sievert 2001). Throughout their range, a density of one adult wolf per 10 square miles appears to be high, based on densities reported for wolf populations elsewhere in North America, and this density is often considered as a saturation point beyond which wolf populations would not expand (Person et al. 1996). Wolves have large home ranges (about 100 square miles per pack), use a wide variety of habitats, and are very mobile (Person et al. 1996).

A petition to list the Alexander Archipelago wolf as threatened under the ESA in 1993 illustrated a concern for the viability of this subspecies. USFWS accepted the petition, confirming the concern, but concluded in 1995 that listing was not warranted at this time. However, an interagency wolf conservation assessment was conducted to synthesize available information on wolf ecology and identify management considerations for sustaining viable wolf populations on the Tongass (Person et al. 1996). The assessment concluded that wolf densities are generally lower on the mainland and higher on islands in the southern half of the Tongass.

The large islands south of Frederick Sound (GMUs 2 and 3) support approximately 60 to 70 percent of the total wolf population in Southeast Alaska (Person et al. 1996, Person 2001). Principal concerns exist on Prince of Wales and Kosciusko Islands, where past timber harvest has reduced deer habitat capability and increased road density. Although the wolf population is capable of sustaining harvest, Person (2001) expressed concern that expanding road access, particularly on Prince of Wales Island, may increase mortality of wolves there beyond sustainable levels. Therefore, assessing potential impacts to the wolf population is critical given the complex relationship they have with deer populations and human livelihoods.

Recent analyses presented at the Tongass Conservation Strategy Review Workshop (2006) have modeled the probability of an overkill (average harvest of greater than 30 percent of the population) or destructive harvest (harvest greater than 90 percent of the population occurring once between 1985 and 1999) of the wolf population on Prince of Wales Island taking into account road density and whether the road system was connected to a main road system with access to a ferry. Results indicated that 32 percent of WAAs on Prince of Wales Island have road densities indicatative of a high probability of overkill and 52 percent have road densities indicating a high proability of having had at least one destructive harvest between 1985 and 1999. These results indicated that roads exert a strong influence on wolf mortality, particularly when connected to main road systems. However, it is important to note that roads themselves do not decrease habitat capability for wolves, but increased density of roads may lead to higher hunting and trapping mortality through improved human access. There are other methods available to address unsustainable hunting and trapping mortality including changes to both state and federal hunting and trapping regulations and increased enforcement.

GMUs 2 and 3 support some of the highest wolf densities in the state and populations are thought to be stable in GMU 2 and increasing in GMU 3 (ADF&G 2003). The State permits wolf harvest with a bag limit of five wolves taken by hunting and no limit for trapping; their objective is to maintain an average annual harvest of 39 wolves in GMU 2 based on the average harvest from 1984 to 1990 (ADF&G 2003). However, there is a harvest cap in GMU 2 that does not allow the harvest of more than 30 percent of the estimated fall population to ensure that a sustainable wolf population is maintained. Wolf hunting and trapping regulations for federally qualified users under the auspices of the Federal Subsistence Board are generally the same as that under State of Alaska regulation.

Important components of a wolf conservation strategy include providing core habitats with low road density, maintaining wolf harvest within sustainable limits through regulations, and providing adequate deer habitat to support an abundant and stable deer population. Under the current Forest Plan, this is accomplished through standards and guidelines for road density, deer density, and den site buffers with associated timing restrictions. Current wolf standards and guidelines direct that effective road closures should be implemented when road access has been determined through analysis to be a significant factor in wolf mortality contributing to unusustainable wolf mortality. Preliminary results presented at the Tongass Conservation Strategy Review Workshop (2006) indicate that closed roads also may contribute to wolf mortality and that open and closed roads should be considered in road density calculations. In addition, consideration should be given to excluding high elevations when calculating road densities. Current standards and guidelines related to den site buffers and timing restrictions include buffers of 1,200 feet surrounding active dens from April 15 to July 1, no road construction within 600 feet during this time period, and protection for active dens from disturbance.

The wolf was selected as an MIS because of population viability concerns in some areas of the Tongass. However, the datasets available for monitoring wolves are insufficient for detecting all but very large changes in the wolf population and are not designed to track trends in the population resulting from changes in their habitat. Additionally, although recent efforts have been made to improve information on wolves in the form of multi-year research projects undertaken by ADF&G and the Forest Service, it is difficult to determine the link, if any, between habitat change on the Tongass and changes in the wolf population, especially given confounding factors such as weather-dependent fluctuations in prey abundance or spatially differential hunting pressure (USDA Forest Service 2004i). Further existing observation and monitoring measures do not address the distinct population in GMU 2.

Bald Eagle

North America's bald eagle (*Haliaeetus leucocephalus*) population reaches its highest density in Southeast Alaska. In 1992 the population was estimated at over 13,000 adult birds; more than 8,000 nest sites were identified through 1996. Their nesting habitat is primarily old-growth trees along the coast and within riparian areas. The USFWS and Forest Service maintain an interagency agreement for bald eagle habitat management in the Alaska Region, which includes standards and guidelines for regulating human disturbance within identified bald eagle use areas.

Gende et al. (1998) reported a decrease in active bald eagle nest density with increasing proximity to clearcuts, with reduced nesting activity for locations within 948 feet (300 meters) of clearcuts. Gende et al. (1998) suggested that a buffer of 328 feet would be inadequate to mitigate effects of harvest, and recommended a

984-foot buffer around active nests (Gende et al. 1998). Furthermore, most bald eagles nest within 328 feet (100 meters) of saltwater shorelines in Southeast Alaska and it has been suggested that to prevent loss of this segment of the eagle population, a 1,300-foot buffer be maintained to protect all nesting bald eagles. Currently, a 330-foot radius protective habitat management zone surrounds all identified bald eagle nest trees and a 1,000 foot beach buffer is maintained along the shoreline.

The bald eagle was selected as an MIS because of its use of coastal areas for foraging and nesting. Unlike many current MIS, a reasonably precise estimate of bald eagle population trends in Southeast Alaska can be derived from surveys conducted by USFWS, which could serve as a logical measure of the efficacy of the 1,000-foot beach buffer prescription under the current Forest Plan. USFWS has completed an evaluation of the effectiveness of the 1,000-foot beach buffer prescription for conserving forest-dwelling birds through two separate research projects, which indicated that a minimum of 1,000-foot buffer was beneficial for several species (red breasted sapsucker and some others) and then buffers less than this may not be effective at maintaining nesting habitat for some species (see Kissling 2003 and Sperry 2006 for additional information).

Red Squirrel

The red squirrel is one of only two arboreal rodents in Southeast Alaska. Red squirrels are abundant on many of the islands in the Alexander Archipelago and the mainland. Red squirrels require forests with cone-producing trees and cavities in trees and snags for nesting and denning. The root systems of large spruce trees are also important for den sites. They represent a species that can do fairly well in seed-producing young-growth timber stands. There are about 8.4 million acres of forested land (including all age classes and types of conifer forests) within occupied red squirrel habitat on the Tongass National Forest. Optimum habitat use is believed to occur when patches of preferred habitat are greater than 30 acres.

The red squirrel was selected as an MIS because it is an important prey species for marten and requires forests with cone-producing trees and cavities in trees and snags. However, few data are available describing red squirrel populations over time and changes in local populations do not necessarily imply negative impacts to the overall population. Thus, this presents an impasse in the ability to correlate human-induced habitat change with population trends. Additionally, although habitat capability for red squirrels is reduced through the conversion of POG to second growth, recovery of habitat capability after timber harvest is much faster for red squirrels than other species. That is, although post-harvest formation of structures favored for nesting and food storage (cavities) takes longer, the majority of habitat capability (food availability) is restored quickly as cone production typically begins 40 years after harvest.

Red-breasted Sapsucker

The red-breasted sapsucker (*Sphyrapicus ruber*) is well distributed throughout Southeast Alaska during the spring, summer, and early fall seasons, and occurs in lower elevations during the late fall and winter seasons. They use a wide variety of forested habitats but require the presence of snags during the breeding season and are indicative of low volume POG (SD4H category). They are weak excavators and therefore require rotted or soft substrates in order to create cavities for nesting and roosting. There are about 9.9 million acres of forested land (includes all age classes and types of conifer forests) within occupied red-breasted sapsucker habitat on the Tongass National Forest of which approximately 980,000 acres are in the SD4H category (see Table 3.9-5 in the *Biodiversity* section). Old-growth forests provide the best snag habitat over the long-term; stands with higher densities of snags receive more use. Red-breasted sapsuckers on northern Vancouver Island, British Columbia, preferentially selected large diameter trees (mean diameter at breast height [dbh] 93.3 cm), which Joy (2000) surmised provided an optimal balance of nest space (could accommodate larger clutch sizes), insulation, and protection from predation. In managed landscapes, forest buffers are important for this species. Kissling (2003) found that in Southeast Alaska red-breasted sapsucker densities were positively correlated with forest buffer width, and appeared to be maximized when bufferes were at least 300 meters wide.

The red-breasted sapsucker was selected as an MIS as a representative primary cavity excavator. In Southeast Alaska, currently the best available information that can be related to red-breasted sapsucker populations comes from the US Geological Survey (USGS) Breeding Bird Survey (BBS) and the Audubon Society Christmas Bird Counts (CBC). Additional information has been derived from the Monitoring Avian Productivity and Survivorship (MAPS) program, under which three to seven stations are surveyed by the Tongass National Forest to capture forest birds during the breeding season, and the Alaska Landbird Monitoring Survey (ALMS). However, these are large-scale monitoring programs and may not detect changes in avian populations at a scale and resolution appropriate for the Tongass National Forest. Further, existing monitoring does not relate changes in red-breasted sapsucker habitat directly to changes in their populations under the present limitations of data provided and assumptions used.

Hairy Woodpecker

The hairy woodpecker (*Picoides villosus*) is considered an uncommon, permanent resident throughout Southeast Alaska. Hairy woodpeckers use old-growth forest habitats with snags and dying trees for foraging and nesting. Like the red-breasted sapsucker, hairy woodpeckers are primary cavity excavators for other cavity-using wildlife species. Their winter habitat may be their most limiting. There are about 9.9 million acres of forested land (including all age classes and types of conifer forests) within occupied hairy woodpecker habitat on the Forest. High-volume old-growth forests provide the best long-term snag habitat, with large diameter old-growth trees (particularly SD5S, SD5N, and SD67 categories) receiving more use than stands with smaller diameter trees. There are approximately 2 million acres of old growth in the SD5S, SD5N, and SD67 categories; optimum habitat use is believed to occur when patches of preferred habitat are greater than 500 acres.

The hairy woodpecker was also selected as an MIS as a representative primary cavity excavator. As with the red-breasted sapsucker, the best available information that can be related to hairy woodpecker populations in Southeast Alaska comes from the BBS, CBC, the MAPS program, and the ALMS. However, these are large scale monitoring programs and may not detect changes in avian populations at a scale and resolution appropriate for the Tongass National Forest. Further, existing monitoring does not relate changes in hairy woodpecker habitat directly to changes in their populations under the present limitations of data provided and assumptions used.

Brown Creeper

The brown creeper (*Certhia americana*) is considered an uncommon, permanent resident throughout Southeast Alaska. Brown creepers are likely more common than usually acknowledged, but detectability of this species is relatively low, resulting in abundance estimates that are biased low. This species was selected as an MIS because of its close association with large diameter old-growth trees (particularly SD5S, SD5N, and SD67 categories). As noted above, there are approximately 2 million acres of the SD5S, SD5N, and SD67 category old growth on the Forest. The factor most cited as limiting brown creeper populations is the availability of old-growth and mature woodlands as nesting and foraging sites and research has shown that creepers abandon sites that have been subjected to even light (e.g., partial-cut) logging activity because such activity is typically focused on large, mature trees (Wiggins 2005). In a study of the effects of buffer width on breeding bird communities in the Tongass, a majority (83 percent) of all brown creeper observations occurred in undisturbed control plots (Kissling 2003). Optimum habitat use is believed to occur when patches of preferred habitat are greater than 15 acres (USDA Forest Service 2003).

In Southeast Alaska, the best available information that can be related to brown creeper populations comes from the BBS and the CBC. Additional information has been derived from the MAPS program and the ALMS. However, these are large scale monitoring programs and may not detect changes in avian populations at a scale and resolution appropriate for the Tongass National Forest. Further, existing monitoring does not relate changes in brown creeper habitat directly to changes in their populations under the present limitations of data provided and assumptions used.

Vancouver Canada Goose

Vancouver Canada geese (*Branta canadensis*) are distributed throughout the Alexander Archipelago of Southeast Alaska, with an estimated resident population of 10,000 birds. This population is relatively non-migratory, with the majority of birds moving only locally between nesting, brood rearing, molting, and winter concentration areas. Vancouver Canada geese were selected as an MIS because of their association with wetlands (both forested and non-forested) in the estuary, riparian, and upland areas of the Forest. Vancouver Canada geese are highly mobile and are found throughout the islands of Southeast Alaska.

Nesting and brood-rearing habitats are potentially affected by various forest management activities, though timber harvest in these areas has generally been minimal because these sites are fairly unproductive. Additionally, Riparian and Wetland standards and guidelines in place under the current Forest Plan, which include the use of various Best Management Practices (BMPs), are designed to minimize impacts to and maintain the function of these habitats. Effects of timber harvest and recreation on winter habitats have not been assessed but may result in increased human disturbance to wintering flocks or their habitats. Waterfowl census surveys conducted by the USFWS are the best source of demographic information for Vancouver Canada geese; however, population data are too insufficient to indicate a Forest-wide trend in the population, and thus no clear relationship has been established between population numbers and trends in habitat change.

Other Species of Concern

Marbled Murrelet

The marbled murrelet (*Brachyramphus marmoratus*) is a robin-sized seabird. It feeds below the water's surface on small fish and invertebrates, and in Southeast Alaska, is usually found within 5 miles of shore. The marbled murrelet typically nests on mossy-limbed branches of large, mature coniferous trees within stands of structurally complex, coastal old-growth forest (SD5N, SD5S, SD67 categories). There are roughly two million acres of this habitat on the Tongass. However, on some treeless islands in Southeast Alaska marbled murrelets will lay eggs on bare talus slopes in mountainous areas (Piatt et al. 2007).

The majority of the world population of marbled murrelet breeds in Alaska, with most found in Southcentral and Southeast Alaska. In March 2006, a status review for the marbled murret was initiated by the USFWS for the northern part of the species range to support ESA deliberations over the listing of the species as threatened in the sourthern part of its range (California, Oregon, and Washington). This review compiled published information on the conservation status, population biology, foraging ecology, population genetics, population status and trends, demography, marine and nesting habitat characteristics, threats, and ongoing conservation efforts for marbled murrelets in Alaska and British Columbia (Piatt et al. 2007). Genetic analysis conducted as part of the review identified three distinct population segments: one in the central and western Aleutian Islands, one ranging from the eastern Aleutians to Northern California, and one in central California. Based on historical abundance information, the Alaska population numbered approximately 1 million birds in the recent past and is now estimated to be approximatey 270,000 birds (Piatt et al. 2007). Three areas of greatest abundance include Lower Cook Inlet (35,670 birds), Prince William Sound (33,745 birds), and Southeast Alaska (144,190 birds).

Using trend information from at-sea surveys conducted at eight sites in Alaska, numbers have declined annually at five sites at rates of -5.4 to -12.7 percent per year since the 1990s, representing an overall decline in the Alaska population of 70 percent during the past 25 years (Piatt et al. 2007). Populations at three sites in Southeast Alaska have exhibited overall declines of 46 to 70 percent between the early 1990s and 2001. Likewise, the Prince William Sound population declined by 69 percent between 1989 and 2005 and the population on the outer coast has declined by 43 percent between 1992 and 2002. Possible causes of estimated overall Alaska declines are oil spills, mortality from gill netting, cyclic changes in marine food productivity, and the harvesting of POG forests, though it is likely that it is a combination of these forces, as has been implicated in similar declines observed in other seabird populations in Alaska (Piatt et al. 2007). The 2007 status review concluded that, over the last half century, marbled murrelets have lost about 15 percent of their suitable forested nesting habitat in Southeast Alaska due to large-scale logging, though nesting habitat losses cannot explain the declines observed in areas such as Prince William Sound or Glacier Bay where industrial logging has not occurred on a large scale or at all (Piatt et al. 2007).

Recent research indicates that key microhabitat characteristics of marbled murrelets nest sites include: (1) sufficient height to allow stall landings and jump-off departures, (2) openings in the canopy for unobstructed flight access, (3) sufficient platform diameter to provide a nest sight and landing pad, (4) soft substrate to provide a nest cup, and (5) overhead cover to provide shelter and reduce detection by predators (Hamer and Nelson 1995, Nelson 1997, and Burger 2002). Conceptually, uneven-aged silvicultural practices or extended harvest rotations may maintain sufficient forest structure to support nesting murrelets, depending on gap size and the interspersion of trees and patches in the cutting unit. However, due to their association with old-growth forests it is apparent that nesting habitat for this species is not easily created and is likely that in young stands, suitable nesting habitat will not develop for 150 or more years (Albert and Schoen 2006).

An interagency conservation assessment of marbled murrelets in Southeast Alaska conducted in 1996 concluded that a murrelet conservation strategy should consider a reserve-based approach, especially in those biogeographic provinces where substantial timber harvest has been concentrated and is projected to continue (DeGange 1996). The current Forest Plan satisfies many of the measures identified in the assessment, including a Forest-wide system of OGRs and uneven-aged management in many areas that allow timber harvest. Standards and guidelines pertaining to marbled murrelets include maintaining a 600-foot (200-meter) radius no cut buffer zone around identified murrelet nests. However, marbled murrelet nests are extremely difficult to find, so in the Pacific Northwest where old growth is relatively rare, some resarchers have suggested that a more effective conservation strategy would be to maintain a 5-mile (0.8-km) radius buffer around any stand that is occupied by marbled murrelets (Raphael 2006).

Spruce Grouse

Spruce grouse (*Falcipennis canadensis*) are resident across much of northern North America, occurring from Alaska to Labrador southward into New England and into the northern states of the western U.S. The Prince of Wales spruce grouse is a subspecies that is endemic to Prince of Wales and nearby islands in southern Southeast Alaska.

Spruce grouse are closely associated with taiga and northern montane coniferous forests, with a lush understory of mountain cranberry, blueberry, crowberry, and spiraea growing on a thick carpet of mosses, where they rely heavily on pine and spruce needles as their main food source. Spruce grouse select relatively young successional stands that are dense with a well developed middle story. Microhabitat selection varies between seasons, with habitat selection being driven by snow during winter (they move from open stands to dense stands possibly in relation to the availability of snow of sufficient depth for snow roosting) and by food availability during summer (density of breeding females increases with the abundance of the shrub and herb layer). During dispersal and migration, birds traverse stands of deciduous growth, though they generally avoid non-forested habitat.

Spruce grouse in Southeast Alaska appear to be living in isolated and scattered low-density populations, which fluctuate overtime apparently in response to the degree of maturation of post-disturbance re-growth and predation pressure (Boag and Schroeder 1992). These small and isolated populations are particularly vulnerable to overexploitation associated with advancing roads and settlements. In addition, travel barriers created by development may reduce the exchange between neighboring populations, making it difficult for isolated populations to recruit new breeders. Though they are closely associated with conifer forests, the highest densities of spruce grouse are supported by areas with a mosaic of older coniferous habitats interspersed with regenerating patches of dense trees. Changes in forest structure, (e.g., timber harvest or windthrow) associated with fragmentation may lead to population declines if open areas are too large or forested patches are spread too far apart to enable spruce grouse to move between them. In the GMUs that encompass the Tongass (GMUs 1, 2, 3, 4, and 5), the ADF&G permits taking of spruce grouse between August 1 and May 15, with a bag limit of five per day.

Flying Squirrel

The northern flying squirrel (*Glaucomys sabrinus*) inhabits the boreal forests of Alaska, Canada, and the far northern U.S. and occurs on the mainland and southern islands in Southeast Alaska. The Prince of Wales flying squirrel subspecies (*G. s. griseifrons*) is endemic to Southeast Alaska and has been documented on Dall, El Capitan, Heceta, Kosciusko, Orr, Suemez, Tuxecan, Prince of Wales, and Barrier islands (Demboski et al. 1998, Smith 2005). The subspecies *G. s. zaphaeus* is more widespread in Southeast Alaska and occurs on the mainland.

The flying squirrel is a keystone species in the Pacific Northwest associated with late-seral habitat and is a diet specialist (mycophagous). Their density often increases with forest complexity. However, recent research has suggested that flying squirrels in Southeast Alaska differ ecologically from those in the Pacific Northwest, in that they are more closely associated with important, individual habitat attributes (large standing live and dead trees) that may be present in both old and complex young forests, and have been shown to use peatland-scrub-mixed conifer forests, rather than just old-growth forest (Smith and Nichols 2003, Smith et al. 2004b, Smith et al. 2005a). Surveys on Prince of Wales and Mitkof Islands indicated that the primary habitat of this species is high-volume POG, with some of the highest flying squirrel densities recorded in North America; however, breeding females were found in peatland and mixed-conifer stands, although demographic analyses showed that these were sink habitats (Smith and Nichols 2003). Additionally, a study on Prince of Wales Island found the density of large-diameter trees (greater than 74 cm dbh), abundance of *Vaccinium* shrubs, and density of large-diameter (50 to 74 cm dbh) snags was positively correlated with habitat use (Smith et al. 2004b). Although this study only looked at unmanaged landscapes, the authors suspected that had younger, less complex forest been included in their comparison, more attributes typical of old forest would have emerged as correlates of population density. Flying squirrels use large tree and snags for denning and nesting and require an adequate spacing of trees to travel through the forest. Thus, although flying squirrels may not be good indicators of "old" forest condition, they may be good indicators of landscape permeability in managed landscapes because successful dispersal of the species depends on the functional connectivity of the landscape (Smith et al. 2005a). The Prince of Wales subspecies was identified by the 1997 Forest Plan risk assessment panel as being at risk of extirpation in managed landscapes; however, the recent research described above indicates that this risk is likely less than presumed because abundant noncommercial forests appear to contribute to breeding populations (Smith 2005).

Flying squirrels are an important prey for various predators including great horned owls, Queen Charlotte goshawks, and marten, although few, if any, predators in Southeast Alaska specialize on flying squirrels (AKNHP 2006, Smith and Nichols 2003). Consequently, direct impacts to flying squirrels associated with habitat change may result in indirect impacts to predator populations. Timber harvest can adversely affect flying squirrel populations by creating restricted, isolated populations if clearcut size is too large or if some scattered tall conifers in large cuts are not retained as cover and for travel across the open spaces.

Migratory Birds

Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) provides for the conservation of migratory birds and their habitats and requires the evaluation of the effects of federal actions on migratory birds, with an emphasis on species of concern. Federal agencies are required to support the intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory birds when conducting agency actions.

Neotropical migratory birds are far ranging species that require a diversity of habitat for foraging, breeding, and wintering. Therefore, patterns of population declines are generally detected at larger observational scales than those traditionally used to manage lands and by assessing habitat at a larger geographic scale, effects to overall biodiversity can be better incorporated into the planning process (Finch and Stangel 1992).

Over 100 species of birds migrate from the lower 48 states, Central and South America, to nesting, breeding, and rearing grounds in Alaska. Most of the birds fly to the interior or northern Alaska and only pass through southeast Alaska on their way to the breeding grounds. There are 114 "Important Bird Areas" identified by the Audubon Society, and a Partner for BirdLife International is working to identify a network of sites that provide critical habitat for birds. Of those areas identified, 49 sites have been recognized to date as important habitat for migratory birds in Alaska. Though there are no recognized Important Bird Areas within Southeast Alaska, a statewide Important Bird Area program is well underway (Stenhouse 2007). There are 40 protected bird species that may occur on the Tongass National

Forest; however, 20 bird species are identified as species of concern in Southeast Alaska (Boreal Partners in Flight 1999) and listed in Table 3.10-3.

Of the protected bird species, 35 are associated with old-growth and mature forest habitats, and thus are sensitive to timber management activities. Based on nesting behavior, these species fall into four categories including ground-nesting birds (blue and spruce grouse), cavity- and bark-nesting birds (12 species including woodpeckers, the brown creeper, swallows, forest owls, and wrens), tree- and shrub-nesting birds (20 species including flycatchers, warblers, forest raptors, crossbills, thrushes, kinglets, and corvids), and specialized nesters (dippers). Spruce grouse are discussed above in detail. Of the cavity- and bark-nesting birds, only the red-breasted sapsucker and northern saw-whet owl are migratory, the rest being year-round residents in Southeast Alaska. Cavity nesters require suitable nest cavities and adequate foraging habitats such as snags and dead wood material on live trees (e.g., broken tree tops) that are not recruited into harvested stands for more than 100 years (Sallabanks et al. 2001). For example, in a study of the effect of buffer width on breeding bird communities in the Tongass (Kissling 2003), 83 percent of brown creeper observations occurred in undisturbed control plots. Thus, the conversion of old-growth stands to clearcuts and younger successional stages reduces the amount of habitat available to these species. In addition, fragmentation increases forest edge area which can improve predator access and affect ecological dynamics of the forest through microclimatic effects (DellaSala et al. 1996).

Of the forest- and shrub-nesting species in Southeast Alaska, most are migratory. Large proportions of the global population of several species breed in Southeast Alaska (e.g., 21 precent of varied thrushes and 20 percent of Pacific-slope flycatchers). Though there is a general lack of information regarding habitat requirements for most of these species, many occur more commonly in high-volume, lower elevation old-growth forests compared with second-growth stands (DellaSala et al. 1996, Russel 1999, Kissling 2003, Zwickel and Bendell 2005). The Pacific-slope flycatcher, varied thrush, golden-crowned kinglet, and Townsend's warbler have the strongest association with old-growth and mature forest and require interior forest conditions (Stotts et al. 1999 as cited in Cotter 2007c). For Townsend's warblers, large trees have been found to be important as nest sites in Southcentral Alaska, with predation rates higher among nests in small trees than in large trees (Matsuoka et al. 1997a, 1997b). Kissling (2003) measured breeding densities of Townsend's warblers to be more than two times higher in forested beach buffers than in adjacent clearcuts. Like cavity- and bark-nesting species, open cup-nesting birds are also sensitive to fragmentation and tend to avoid nesting near forest edges where they are particularly vulnerable to predation (DellaSala et al. 1996). It is important to note that while studies of bird community response to timber harvest alternatives to clearcutting in Southeast Alaska do indicated that creation of forest edge may increase nest predation rates, the actual response depends on a broad array of factors and is highly variable.

A specialized-breeder, the American dipper is a dependent stream-dweller and a year-round resident of Southeastern Alaska (Gabrielson and Lincoln 1959 as cited in Cotter 2007a). Within Southeast Alaska, American dippers appear to migrate seasonally along an altitudinal gradient as they do elsewhere in their range (Johnson 2003 as cited in Cotter 2007a, Morrissey 2004). American dippers benefit from adequate riparian buffers and thus may serve as an indicator of watershed health throughout the forest (Cotter 2007a). Estuaries and the intertidal zone are also important seasonal habitats for this species (M. Willson, ecologist, Juneau, AK, personal communication 2004 as cited in Cotter 2007a). As with the other nesting guilds, American dippers are known to be sensitive to human activities that negatively affect the riparian zone (Kingery 1996).

Bird community composition and abundance has been shown to be correlated with forest buffer width, with widths in excess of 984 feet (300 meters) appearing optimal for many species (*Forest Birds* presented at the Tongass Conservation Strategy Review 2006). For example, Kissling (2003) found that densities of Pacific-slope flycatchers and Townsend's warblers were similar in buffers greater than 300 meters wide and in control sites, but lower in buffers less than 300 meters wide. Likewise, red-breasted sapsucker densities were positively associated with buffer width at the stand and landscape scales with densities greatest in buffers in excess of 300 meters. The largest effects were detected at the landscape scale, suggesting that a fragmentation threshold may exist for some species (Kissling 2003). Thus, as landsapes become more fragmented, forest buffers become increasingly important for migratory birds. Recent and ongoing studies that have evalatuated the effects of silviculture on bird communities include Deal et al. (2002), DellaSala et al. (1996), De Santo et al. (2003), De Santo and Willson (2001), Hennon et al. (2002), Holimon et al. (1998), Kissling (2003), Kissling and Lewis (ongoing), Matsuoka et al. (ongoing), Sieving and Willson (1998), and Sperry (2006).

Table 3.10-3
Migratory and Resident Birds Identified as Species of Concern in Southeast Alaska[1]

Common Name	Scientific Name	General Habitat	Preferred Habitat[2]	Abundance
Blue Grouse	*Dendragopus obscurus*	Habitat affinities vary by season and region. Coastal birds tend to remain in old-growth or recently logged forests all year. Inland birds prefer forest edges in summer, coniferous forests in winter (Kaufman 1996). Found in coniferous and mixed forests in Southeastern Alaska; also in dwarf conifer forests at treeline.	2, 3	Rare
Western Screech-Owl	*Otis kennicottii*	open coniferous and deciduous forests and along rivers, creeks, ponds and bogs. Also forest edges and in suburban areas in parks, orchards and gardens. Often nest near water (Campbell et al. 1990). In southern part of range in mesquite groves and saguaros (Kaufman 1996). Probably non-migratory in Alaska due to sufficient habitat to meet year-round requirements (P. Schempf, pers. commun.). In Yakutat, appears to favor riparian spruce (B. Andres, pers. commun.).	2	Uncommon
Black Swift	*Cypseloides niger (borealis)*	appear to be restricted to river valleys with steep unvegetated cliffs. Although nesting has not been confirmed in Southeastern Alaska, summer sightings in adequate habitat suggest Black Swifts are a probable breeder.	5	Rare
Vaux's Swift	*Chaetura vaux*i	Nests in coniferous and mixed forests, especially old growth. Often observed foraging over lakes, rivers, open country and clearcuts. Many records from Southeastern Alaska are along rivers and estuaries.	2	Uncommon
Rufous Hummingbird	*Selasphorus rufus*	Found in a variety of habitats throughout breeding range including old growth, second growth, thickets, and shrubby hillsides	2	Common
Red-Breasted Sapsucker	*Sphyrapicus ruber*	Often associated with mature stands, especially hemlock and/or spruce in Pacific Northwest and Southeastern Alaska, but may not be an obligate old-growth species.	2	Abundant
Olive-sided Flycatcher	*Contopus cooperi*	In Central Alaska, most often found in open conifer forest. Usually associated with openings (muskegs, meadows, burns, and logged areas) and water (streams, beaver ponds, bogs, and lakes). Apparently requires an uneven canopy or openings for aerial hawking, and wet areas productive of insect prey.	3	Uncommon
Western Wood-Pewee	*Contopus sordidulus*	In Southeastern Alaska, occurs along large mainland rivers, much less common on islands.	3	Uncommon
Hammond's Flycatcher	*Empidonax hammondii*	In southeastern Alaska, found in riparian deciduous forests.	2, 3	Uncommon
Pacific-slope Flycatcher	*Empidonax difficilis*	Prefers old-growth coniferous forests, especially near streams.	2, 3	Common
Steller's Jay	*Cyanocitta stelleri*	In Alaska, found predominately in coniferous forests	2	Abundant
Northwestern Crow	*Corvus caurinus*	Coastal beaches, rocky shores, estuaries, coastal ponds and inshore islands.	2, 6, 7, 8	Abundant

Table 3.10-3 (continued)
Migratory and Resident Birds Identified as Species of Concern in Southeast Alaska[1]

Common Name	Scientific Name	General Habitat	Preferred Habitat[2]	Abundance
Chestnut-backed Chickadee	*Poecile rufescens*	In Southeastern Alaska, common in mature hemlock/spruce forests and also in pole and sawtimber stages of successional forests	2	Abundant
American Dipper	*Cinclus mexicanus*	Dippers are a riparian-obligate species and are totally dependent on the productivity of streams and rivers.	4, 5	Fairly Common
Varied Thrush	*Ixoreus naevius*	Found mostly in thick, wet, coniferous forests of the coast.	1, 2, 3	Abundant
Townsend's Warbler	*Dendroica townsendi*	Largely restricted to mature forests with tall coniferous trees throughout its breeding range. Most abundant in large undisturbed tracts of contiguous forest, but will also use forests in late successional stages.	2, 3	Common
Blackpoll Warbler	*Dendroica striata*	Habitat preference variable, but usually found in tall shrubs (riparian woodland) or in coniferous or deciduous forest or woodland	2	Rare
MacGillivray's Warbler	*Oporornis tolmiei*	In southeastern Alaska, it is found in shrubs along hemlock/spruce edges, deciduous woodlands with shrubs, clearcuts, and riparian shrubs.	1	Uncommon
Golden-crowned Sparrow	*Regulus satrapa*	Prefers low to tall alder and willow scrub on hillsides and near tundra. Commonly found in proximity to lakes, streams, and bogs. In winter prefers uninterrupted brushland, streamside thickets, and chaparral.	1	Fairly Common
Golden-crowned kinglet	*Zonotrichia atricapilla*	Found in coniferous forests (spruce, fir, and hemlock) all times of year; also in mixed forests in southcoastal and central Alaska. In winter and migration, can be found in other trees and shrubs.	1, 3	Common

1/ Source: Boreal Partners in Flight Landbird Conservation Plan for Alaska Biogeographic Regions (1999)
2/ 1=shrub thicket; 2=hemlock/Sitka spruce/cedar forest; 3=mixed deciduous/spruce woodland; 4=fluvial waters; 5=cliffs, bluffs, and screes; 6=moraines, alluvia, and barrier islands; 7=beaches and tidal flats; 8=rocky shores and reefs.

Endemism

The Federal ESA defines endemic as "a species native and confined to a certain region; having comparatively restricted distribution." Forest Plan standards and guidelines for endemic mammals direct the Forest to "maintain habitat to support viable populations and improve knowledge of habitat relationships of rare or endemic terrestrial mammals that may represent unique populations with restricted ranges." Likewise, the NFMA directs that management prescriptions "shall preserve and enhance the diversity of plant and animal communities, including endemic(s)."

Due to its historic isolation, ecological complexity, and narrow distribution between the Pacific Ocean and coastal mountain ranges the North Pacific Coast is considered a hot spot for endemism (Demboski et al. 1999, Cook and MacDonald 2001, Cook et al. 2006). Southeast Alaska has been found to be a region with an especially high degree of endemism in its small mammal fauna, principally because of the combination of its archipelago geography and its highly dynamic glacial history (Demboski et al. 1998). Roughly 23 percent of the 107 mammalian taxa in Southeast Alaska (species and subspecies) are endemic to the region (MacDonald and Cook 1996 as cited in Cook et al. 2006, Cook et al. 2001). Recent molecular genetic analysis has enabled a more accurate look at the level of genetic divergence among island and mainland populations than previously possible; this analysis has refuted the classification of some taxa previously believed to be endemic and identified other taxa as endemic (see Dawson et al. [2007] for a current list of species and associated ranges). Two of these, the Prince of Wales flying squirrel and the Alexander Archipelago wolf, are incipient species, or subspecies that are beginning to diverge due to lack of interaction with other varieties of the same species (Bidlack and Cook 2001, *Other Mammals Including Endemic* presented at the Tongass Conservation Strategy Review Workshop 2006).

Current understanding of endemism in Southeast Alaska is based on the sampling of only a minority of the islands (just over 100 of the more than 2,000 named islands). The documentation of new distributions, new species, and distinct populations from this effort, much of which occurred between 1991 and 1999, suggests a high level of endemism on the Tongass (Cook et al. 2006). Thus, there continue to be gaps in knowledge about the natural history and ecology of wildlife subspecies indigenous to Southeast Alaska and conclusive geographic ranges of many endemics cannot yet be produced (Hanley et al. 2005, Dawson et al. 2007). Although mammals have been the primary focus of current research on endemics there are potentially other endemic animals (e.g., nonvolant taxa) that exist on the Tongass.(e.g, endemic spruce grouse on Prince of Wales Island and Zarembo Island). These include organisms such as plants, birds, amphibians, or invertebrates that may foreseeably have levels of endemism (Dawson et al. 2007).

Within the Alexander Archipelago, the Prince of Wales Island complex appears to be an endemic hotspot based on evidence that it was an area of refugia during the last glacial event (Cook et al. 2001). This has implications for management because there is notable overlap between this area, past timber harvest, and the potential for future timber harvest (Cook et al. 2006).

The island archipelago setting of the Tongass and naturally fragmented landscapes of Southeast Alaska, create challenges for management as natural interaction between subpopulations and individuals is often problematic, especially for species that cannot move between islands. The insular distribution patterns of many terrestrial mammal species among individual islands illustrates these dispersal limitations. For example, in study of population structure and genetic diversity in eight northern flying squirrel populations in the Alexander Archipelago (six island and two mainland populations), Bidlack and Cook (2001, 2002) found that island populations were less genetically diverse and that, on a genetic level, populations appeared to be isolated by distance, indicating that there is little long-distance geneflow across the archipelago. The authors found that six populations from the Prince of Wales complex are genetically very similar, suggesting current or recent geneflow among these islands, yet no apparent gene flow between the Prince of Wales complex and other populations in Southeast Alaska. Similar recent research on the demography, systematics, phylogeography, and post-glacial expansion of Southeast Alaska endemics has focused on the red-backed vole (Runck 2001, Cook et al. 2004, Smith and Nichols 2004, Runck and Cook 2005, Smith et al. 2005b), long-tailed vole (Conroy and Cook 2000), Keen's mouse (Lucid and Cook 2004, Smith et al. 2005b), dusky shrew (Demboski and Cook 2001), long-tailed shrew (Demboski and Cook 2003), ermine (Fleming and Cook 2002), marten (Stone and Cook 2002, Stone et al. 2002), wolverine (not endemic, but isolated populations with limited dispersal capability occur in Southeast Alaska; Tomasik and Cook 2005), and black bear (Stone and Cook 2000, Peacock et al. 2007). Major factors identified by these studies include reduced genetic diversity, limited dispersal capabilities, and the existence of highly divergent or relatively restricted western, or Pacific coastal, lineages of some species. This last factor was due to the existence of eastern and western forest refugia in North America during past glacial advances, all resulting in populations that are especially vulnerable to environmental stochastisity and anthropogenic disturbances.

Island archipelagos themselves are more sensitive to the effects of introduced exotics, emerging pathogens and disease (e.g., canine distemper), and natural events, such as climate change, than other managed landscapes, due to their insularity. Therefore, there is a higher probability of extinction on islands due to the restricted ranges of species, patterns of extinction are dynamic (i.e., in higher latitude archipelagos geographic ranges of mammals and recolonization abilitites fluctuate with glacial advances and retreats), and the effects of management activities are magnified. In fact, more than 81 percent of mammalian extincions in the last 500 years have been insular, endemic mammals (Ceballos and Brown 1995 as cited in Dawson et al. 2007). Noteably, while the distribution of mammalian species in Southeast Alaska is a function of the size of the island on which they occur and distance to the mainland, the distirubtion of endemic mammals is not (Conroy et al. 1999, Dawson et al. 2007). Thus, designing conservation measures based on island size or location will not effectively maintain the endemic diversity found in this region. Because of the uniqueness of this type of geographic setting and the vulnerability of species within it, some researchers have proposed structuring conservation efforts and land management planning along the North Pacific Coast around the issue of endemism (Cook and MacDonald 2001, Cook et al. 2001).

Invasive Species

Species are considered invasive if they are not native to an ecosystem, and are likely to cause harm to human health, the economy, or the environment (Executive Order 13112). Due to its remote landscape and climate, Alaska has relatively few invasive species compared to the rest of the United States. However, factors such as altered disturbance patterns, climate change, and the expansion of the transportation network in Alaska are expected to increase the prevalence of invasives. Global climate change also creates conditions suitable for new invasives by altering geographic range limits and by making habitats no longer suitable for native species.

Invasive species can affect native species by preying on them, competing with them, hybridizing with them, disrupting or destroying their habitat, or introducing pathogens or parasites that sicken or kill them. At least eight terrestrial species have been introduced into coastal Alaska habitats: Norway rat (*Rattus norvegicus*), European black slug (*Arion atter*), garden slug (*Arion* spp.), leopard slug (*Limax maximus*), elk (*Cervus elaphus*), house mouse (*Mus musculus*), starling (*Sturnus vulgaris*), and rock dove (*Columba livia*). Raccoons and snowshoe hares have also been introduced; however, due to their small population size and limited distribution, these species are not currently considered a threat to coastal Alaska ecosystems (Schrader and Hennon 2005). At this time, only rats are considered to be causing substantial ecological harm in coastal ecosystems and thus invasive, though there is concern about the expanding elk population (Schrader and Hennon 2005). With the exception of elk, which were introduced intentionally as part of a collaborative effort between ADF&G and the USDA Forest Service and are a desired non-native in some areas, all other species were unintentionally introduced.

Norway rats likely became established along the Alaska coast following shipwrecks of early European explorers and now occur in areas of human habitation and along coastal islands where food supplies are abundant (Schrader and Hennon 2005). The primary concern with this species is the adverse effects it may have on ground-nesting birds, as evidenced by rat populations on the Aleutian and Queen Charlotte Islands that prey on bird nests and have substantially impacted breeding bird colonies.

Elk were introduced to Alaska to develop additional hunting opportunities. As recently as 1987, ADF&G introduced elk on Etolin Island. Elk have spread to other islands and areas in the Southeast. A population occurs on Zarembo Island, and there have been reports of elk on other nearby islands including Onslow, Wrangel, Mitkof, Kupreanoff, Kashevaroff, Prince of Wales, Brush, Shrubby, and Farm islands. They have also been spotted on the mainland as far north as Cape Fanshaw, and one of the original transplanted and radio-collared elk was located at the mouth of the Stikine River (J. Brainard, USDA Forest Service biologist, Petersburg District, personal communication). Elk are a desired non-native species on Etolin and Zarembo islands, but there are still many unknowns about their presence and potential ecological effects elsewhere. The ADF&G Division of Wildlife Conservation has prepared a draft elk management plan for Southeast Alaska to manage and better understand the elk population and its potential effect on native plants and animals (ADFG 1999). The main concern is competition with native Sitka black-tailed deer due to the high degree of dietary overlap of the two species (ADFG 1999). This is primarily an issue on deer winter range, where deer are most limited by resource availability. Elk may reduce the available winter forage for deer through browsing, physically displace deer, alter predator-prey dynamics, and directly compete for food. The degree of dietary overlap between the species is the highest reported in the literature, indicating a high potential for direct competition (Kirchhoff and Larsen 1998). Pellet-count surveys on Etolin Island between 1991 and 1998 documented a doubling of the elk population while deer population declined by 56 percent (ADFG 1999). An associated issue is that a decline in deer numbers could lead to fewer deer hunting opportunities. One recommendation for managing the elk population outside Etolin and Zarembo islands is to increase harvest pressure.

There are also two invasive aquatic amphibian species that are present in coastal Alaska. The red-legged frog (*Rana aurora*), which is native to the Pacific Northwest, has established populations in several drainages on Chichagof Island and the Juneau area and recent surveys suggest that its range is expanding (MacDonald 2003). Effects of this species are currently unknown but potentially include the displacement of the endemic boreal toad (*Bufo borealis*) and wood frogs (*Rana sylvatica*) (MacDonald 2003). The Pacific chorus frog (*Pseudacris regilla*) has an established breeding population on Revillagigedo Island in a single pond complex (MacDonald 2003). Currently, this population is thought to be having little effect on native amphibian species, because in recent years boreal toads and rough-skinned newts (*Taricha granulose*) have successfully reproduced in the same pond complex (Schrader and Hennon 2005).

Consumptive Uses of Wildlife on the Tongass

A number of the wildlife species on the Tongass are important for subsistence, general hunting, or trapping. Sitka black-tailed deer, mountain goat, brown bear, black bear, moose, wolf, marten, river otter, and waterfowl (collectively) are all species with hunting and/or trapping seasons managed by the ADF&G. These species are also important for a variety of native and traditional uses that vary across the geographic area and cultural framework of Alaska. This factor must be considered in management actions because of the need to be in compliance with Title VIII of ANILCA requiring that the needs of rural residents be given priority when managing wildlife and fisheries resources in Alaska. This priority adds considerable importance to the job of monitoring management effects. The Federal Subsistence Board has management responsibility for subsistence taking of fish and wildlife on federal lands in Alaska and the State of Alaska has management responbility for subsistence and general taking of fish and wildlife on all lands in Alaska. The primary source of information on annual hunting and trapping is the ADF&G. Except for a summary for Sitka black-tailed deer, consumptive use information is not repeated here (see the *Subsistence* section for more information on subsistence uses of wildlife). The Sitka black-tailed deer is by far the most important, and most "harvested," terrestrial wildlife species for subsistence purposes, and for general hunting.

Based on ADF&G annual harvest summary reports, an average of 10,670 deer per year were harvested in Southeast Alaska from 1996 to 2004. This is approximately 2,400 deer per year lower than the average annual harvest over the previous 15 years (ADF&G 1996). Annual harvest fluctuated from year to year between 1996 and 2004 ranging from 8,574 deer harvested in 2002 to 12,289 in 1998 (ADF&G, various years). Deer harvest has not been evenly distributed throughout Southeast Alaska. Of total deer harvested during this period, approximately 70 percent were harvested from Admiralty, Baranof, and Chichagof islands, and adjacent small islands (GMU 4), where the deer hunting season is longer and bag limits are larger than other parts of Southeast Alaska. Another 23 percent came from Prince of Wales and adjacent Islands (GMU 2). Eight percent of the harvest came from both the group of islands that comprise GMU 3 (Kuiu, Kupreanof, Mitkof, Zarembo, Etolin, and Wrangell islands) and the mainland (GMU 1). Less than 1 percent came from Yakutat (GMU 5). This trend is similar to that reported over the previous 16 years (see 1997 Forest Plan Revision Final EIS for trends in deer harvest between 1981 and 1996), though the proportion of harvest in GMU 3 has increased since that period, likely because much of that area was closed to deer hunting in the 1980s. Total annual harvest has remained stable over the same period in GMUs 1, 2, and 4; ADF&G began conducting surveys in GMU 5 in 1997 and harvest in this area remains low, but appears to be gradually increasing.

The number of deer hunters decreased between 1996 and 2003 from 8,270 to 7,028, for an average of 7,632 deer hunters per year (ADF&G various years). This is approximately 8 percent lower than the long-term average reported for the 15 years prior to 1996 (ADF&G 1996). The average success rate for deer hunting from 1996 to 2003 was 1.4 deer per hunter, which is slightly lower than the long-term average (1.6 deer per hunter). Likewise, the average annual success rate during this period (60 percent success) was lower than the long-term average (63 percent success).

In 1987-1988, ADF&G conducted a survey within Southeast Alaska, asking deer hunters how many deer they desired to harvest (annually). The average from this survey was 4.2 deer, but respondents indicated they would be satisfied with an average of 2.7 deer. It has been estimated that a deer population at carrying capacity could support an annual harvest by hunters of up to about 10 percent of winter carrying capacity, with the population remaining stable and hunter satisfaction (success/effort) remaining fairly high (Flynn and Suring 1993). When harvest approaches 20 percent of carrying capacity, hunter satisfaction may diminish, and the harvest may be unsustainable over time, particularly in areas with high predator populations. If deer populations are above long-term carrying capacity, such as after several mild winters, hunter success may remain temporarily high.

Environmental Consequences

Introduction

This section builds on the effects analysis conducted for the 1997 Tongass Forest Plan Revision Final EIS (USDA Forest Service 1997a). It is based on the known (or estimated) requirements of selected wildlife species with varying needs related to old-growth forest; there is no assurance that all, or even most, other old-growth associated species have similar needs or are adequately represented. Our knowledge of the specific viability requirements of most Tongass wildlife species is limited. We do know that the old-growth forest ecosystem is the dominant forest system in Southeast Alaska and provides habitat for most of these species, and is the primary habitat type potentially affected by the programmatic changes discussed here. Therefore, an analysis that focuses primarily on the old-growth ecosystem will best address or capture the requirements of all the old-growth associated species.

NFMA requires that the Forest Service provide for the diversity of plants and animals, based upon the suitability and capability of each National Forest, as a part of meeting overall multiple-use objectives (16 USC 1604(g)(3)(B)). The NFMA implementing regulations define diversity as "the distribution and abundance of different plant and animal communities and species within the area covered by a [forest plan]" (36 CFR 219.3). In addition to providing diversity direction (at 219.26), the NFMA regulations include the following provisions for managing habitat to maintain viable populations of wildlife species:

> Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area. (36 CFR 219.3)

The Multiple Use-Sustained Yield Act of 1960 states that "the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes" (16 U.S.C. 528). The Act further directs the Forest to maintain renewable surface resources for multiple use and sustained yield. Likewise, under NFMA, forest plans are required to incorporate multiple use and sustained yield principles. Accordingly, another important purpose of the Tongass Forest Plan is to manage wildlife resources in such a way that, in addition to ensuring that viable wildlife populations are sustained, consumptive (hunting) and non-consumptive (wildlife viewing) opportunities are maintained.

In order to accomplish these requirements, an Old-Growth Conservation Strategy (Conservation Strategy) was developed within the framework of the 1997 Forest Plan to maintain viable and well distributed populations of old-growth associated species on the Tongass. The Conservation Strategy is the product of the integration of several science-based efforts that were informed by the latest concepts in conservation biology and landscape ecology. These efforts include the Interagency Viable Population Committee's (VPOP) proposed strategy for conserving old-growth associated vertebrates on the Tongass, which ranked species according to the concern for their viability and well distributed status and developed conservation strategies for the highest concern species (Suring et al. 1993). This proposal, its peer review (Keister and Eckhardt 1994), and ensuing response (Suring et al. 1994) formed the basis for two components of the Conservation Strategy: a coarse filter and a fine filter approach to conserving biodiversity on the Tongass.

The coarse filter component to the Conservation Strategy is the old-growth strategy which divides the Forest into reserves consisting of protected lands which include non-development LUDs, and a system of small, medium, and large OGRs located strategically across the landscape. The reserves, based on the system of large and medium Habitat Conservation Areas (HCAs) originally mapped by VPOP, were designed to protect the "biological heart" of the forest and maintain a functionally interconnected old-growth ecosystem. In general, the size, spacing, and number of reserves were based on the home range and dispersal capabilities of old-growth associated species of concern. In addition, many other non-development LUDs (e.g., wilderness) were identified as functioning as large and medium OGRs. To address the need for larger habitat reserves and minimize fragmentation, the Forest Plan also contains at least one "very large" reserve within each of the 21 biogeographic provinces across the Tongass. However, there was insufficient information to finalize the location of all small OGRs prior to the 1997 Forest Plan.

VPOP recommended placing a small HCA in each 10,000-acre watershed with the objective of "providing temporary functional habitat for animals dispersing between large and medium HCAs and to ensure that species of concern have a relatively high likelihood of occurring in each $10,000^{+}$-acre watershed." The task of refining the location of small reserves has been conducted since then on a project-by-project basis per VPOP recommendations. During the current Forest Plan amendment process, an interagency team developed biological recommendations for the majority of the small OGRs on the Tongass. These recommendations were reviewed and refined at the District and Forest Supervisor levels to account for multiple uses and the resulting refined small OGR proposal is incorporated into Alternatives 1, 2, 3, and 6 in this assessment (see Appendix D)..

Between 1997 and 2008, lands within the non-development LUDs have increased by 2,000 acres through reallocation, even though the total lands within the Tongass have decreased (primarily due to land adjustments). The Old-Growth Habitat LUD area has increased based on 24 project analyses conducted during this period, and the percentage of Tongass POG in reserves has increased from 70 to 71 percent (see Appendix D). Matrix lands, which include timber management lands, constitute areas where timber harvest can occur. Primarily since the 1950s, approximately 450,000 acres of POG has been converted to young-growth stands under the Tongass timber management program (Table 3.9-2 in the *Biodiversity* section provides a breakdown of cover types on the Tongass by biogeographic province and Table 3.9-8 provides a breakdown of POG harvest by decade).

The second component of the Conservation Strategy is a fine-filter approach, which includes species and habitat specific standards and guidelines that provide for connectivity between reserves and address old-growth structural needs within the matrix lands. Some of the primary management prescriptions, designed to ensure protection of a significant proportion of high-quality habitat within the matrix, are the 1,000-foot beach and estuary fringe and the riparian buffers. Other standards and guidelines preclude or significantly limit timber harvest in areas of high hazard soils, steep slopes (greater than 72 percent), high vulnerability karst terrain, visually sensitive travel routes and use areas, and timber stands technically not feasible to harvest. In addition to providing additional old-growth protection, many of these prescriptions provide important connectivity functions within and between matrix lands and the larger OGR system lands outlined in the Conservation Strategy. There are also specific standards and guidelines designed to protect key wildlife habitat structure (e.g., reserve trees and cavity nesting habitat).

Matrix lands are receiving growing attention for the importance they potentially play in maintaining well distributed and viable wildlife populations. Some species, particularly those that are wide ranging, require large blocks of continuous habitat to meet their life requirements. They also require surrounding habitat within the matrix for movement. Wolves and nesting pairs of goshawks, for example, require land bases that are larger than most OGRs on the Tongass and use resources within matrix lands to meet their life requisites and facilitate movement. Matrix lands are also important for supporting prey populations of many old-growth associated species.

Previously, little emphasis was given to the young second-growth component of the matrix in terms of its ability to contribute structure, function, or value to wildlife. However, there appears to be a growing perception that, with active management, young stands can contribute at least some of the values commonly associated with old growth (Barbour et al. 2005). Key features of old-growth forest include large, old decadent trees, multiple canopy layers, standing snags, down woody debris, and a diverse and abundant herb layer. These features can be maintained or created by retaining structures and organisms at the time of regeneration harvest of old-growth forest and through active management of young, even-aged stands. Some potential approaches to even-aged management involve thinning of older, “commercial”-aged young-growth stands (Deal 2001, Deal and Tappeiner 2002, Deal et al. 2002), including red alder (*Alnus rubra*) in the reforestation of harvested areas to expedite the production of large-diameter conifers (Deal 1997, Deal et al. 2004, Hanley et al. 2006), and the initial use of alternatives to clearcutting (McClellan et al. 2000). It should be emphasized that additional research on the implementation of these techniques is needed.

For example, both pre-commercial and commercial thinning of young-growth stands have beneficial impacts to black-tailed deer by opening up the forest and promoting the growth of understory vegetation. Likewise, active young-growth management has the potential to benefit both marten and goshawk through an increase in small mammal populations (red squirrels and red-backed voles, major prey items of these species, benefit from more open forests with abundant understory vegetation) and by speeding the succession of older young-growth stands toward old-growth condition (Hanley 1996, 2005). Although the time frame in which young-growth stands become suitable habitat for many species is beyond the lifespan of the Forest Plan, it is something to be considered as part of a long-term vision for management of the Tongass. It must be noted, however, that there research on the effectiveness of young-growth management is on going and peer-reviewed results are not yet available. The evidence in support of the potential benefits of young-growth management for multiple values is derived from a series of demonstration projects that have tested various second-growth management methods (e.g., Zaborske et al. 2002; Deal et al. 2004; McClellan 2004, 2005; Wipfli et al. 2003), retrospective assessments (Hanley and Barnard 1998), and other observations. Thus, there remains much uncertainty about the true benefits of second-growth management to wildlife. Although active management will likely improve habitat conditions in young conifer stands, significant questions remain regarding the types of treatments, treatment timing, and cost/benefit tradeoffs.

Effects Analysis

Framework for Analysis

Alternatives 1, 2, 3, 5, and 6 do not propose to change the framework of the existing Forest Plan Old-Growth Conservation Strategy. That is, these alternatives maintain a strategy divided into coarse filter (system of protected lands) and fine filter (species- and habitat-specific standards and guidelines) management regimes, which appears to be an appropriate framework for maintaining well distributed and viable wildlife populations on the Tongass. Alternative 4 modifies the coarse filter component by requiring OGRs in only four of the most heavily modified biogeographic provinces (North Central Prince of Wales, Kupreanof/Mitkof Islands, Dall Island and Vicinity, and East Chichagof Island) in addition to maintaining two individual reserves including the Wright Lake (mainland southeast of Wrangell), and Myers Chuck (Cleveland Peninsula northwest of Ketchikan) reserves and creating one near Eva Lake (northeast Baranoff Island) in an area currently designated as semi-remote recreation. In addition, all VCUs outside of these biogeographic provinces would be required to retain 33 percent of their old growth with no requirement to consider spacing, location, size, shape, or composition in the design of the retained acres, as are provided by Appendix K of the current Forest Plan (Old-Growth Habitat Reserve Criteria). Alternative 7 maintains substantial area in non-development LUDs, but eliminates the system of OGRs and would not have a specific retention requirement..

Alternative 5 would maintain the current standards and guidelines described in the 1997 Forest Plan. Consistent under Alternatives 1, 2, 3, and 6 are proposed changes that modify the existing standards and guidelines or create new standards and guidelines that are similar to those under Alternative 5. These alternatives would replace the Goshawk Foraging and Marten Habitat standards and guidelines with a Forest-wide Legacy Structure standard and guideline, revise the Goshawk Nest standard and guideline, and modify a number of other standards and guidelines (see Appendix D and the accompanying Forest Plan volume). Alternatives 1, 2, 3, and 6 also propose boundary modifications to the existing system of small OGRs (see the interagency effort described above in the Introduction). Rationale and background for these changes are provided in Appendix D.

Alternatives 4 and 7 eliminate the Goshawk Foraging and Marten Habitat standards and guidelines, but do not apply the Legacy Structure standard and guideline. Alternative 4 maintains the existing Goshawk Nest standard and guideline, whereas Alternative 7 eliminates it and relies on the general Raptor Nest standard and guideline to provide protection.

The following wildlife analysis is subdivided into three major sections. The first section focuses on the Conservation Strategy where changes to LUD designations, impacts to the OGR system and landscape connectivity, and matrix land management are discussed. The old-growth ecosystem is discussed in the *Biodiversity* section, but is briefly addressed here relative to the Conservation Strategy's ability to maintain viable populations of old-growth associated species. The second section focuses on species-specific direct and indirect impacts related to habitat capability for ESA Candidate species, MIS, Forest Service Sensitive species, and other selected terrestrial wildlife species; impacts to ESA-listed species (which only include marine mammals and fish) are discussed in an updated Biological Assessment (Appendix F). Where appropriate, changes to standards and guidelines are discussed. Consideration of endemic and invasive species under the Forest Plan is also briefly addressed. The third section of this analysis evaluates cumulative effects of the proposed Forest Plan amendment on wildlife. Potential effects of the proposed action are discussed inlight of, the risks associated with uncertainties related to existing knowleged of species distributions and habitat relationshiops, the efficacy of the of protective measures under the conservation strategy, the future direction of forest management on the Tongass, and overall unpredictable enrivonmental factors such as climate change.

Old-Growth Forest Conservation Strategy

When considering the viability of old-growth associated species, the possible effects of alternatives, and the likelihood of maintaining viable well distributed populations, the assumption is made that if a functional interconnected old-growth ecosystem is maintained, then its component parts (composition and structure) and processes (function) are maintained. The likelihood of these outcomes is discussed in detail in the *Biodiversity* section. The framework of the old-growth conservation strategy relative to wildlife viability is now further described as two basic components: 1) the reserve system in terms of its ability to effectively maintain the integrity of the old-growth forest ecosystem through non-development LUDs such as Wilderness Areas, Research Natural Areas, Remote and Semi-Remote Recreation, and Old-Growth Habitat, among others, and 2) matrix lands where development, such as timber harvest and road building, is permitted that will alter the old-growth forest ecosystem on a portion of the lands. These development LUDs are restricted by a suitability determination process (see *Timber* section), which precludes the harvest of forest stands that would result in impacts to long-term site productivity or cause irreparable damage (e.g., mass wasting), and other Forest-wide standards and guidelines.

The amount of matrix lands (development LUDs) versus reserve system lands (non-development LUDs) is one measure of the ability of the alternatives to protect the integrity of the old-growth forest ecosystem. There are approximately 3.6 million acres of matrix lands under Alternative 5 (No Action), which would slightly decrease under the Alternative 6. Alternatives 3, 2, and 1 would provide increasingly greater protection by reallocating existing matrix lands to various non-development LUD designations, resulting in approximately 3.0 million, 2.0 million, and 938,000 acres of matrix, respectively. In contrast, Alternatives 4 and 7 would create an additional 1.1 million and 1.5 million acres of matrix lands relative to Alternative 5, respectively (see Table 3.10-4).

Table 3.10-4
Summary of Acres in Matrix and Reserve Lands by Alternative

Alternative	Matrix[1]		Reserve[2]	
	Acres	% of Landbase	Acres	% of Landbase
Alternative 1	840,359	5.0%	15,933,443	95.0%
Alternative 2	1,929,485	11.5%	14,844,321	88.5%
Alternative 3	2,803,945	16.7%	13,969,858	83.3%
Alternative 4	4,727,686	28.2%	12,046,116	71.8%
Alternative 5	3,605,974	21.5%	13,167,834	78.5%
Alternative 6	3,457,420	20.6%	13,316,385	79.4%
Alternative 7	5,049,695	30.1%	11,724,107	69.9%

[1] Includes Modified Landscape, Timber Production, Scenic Viewshed, and Experimental Forest LUDs
[2] Includes all other LUDs where timber harvest is prohibited or restricted

Table 3.9-12 in the *Biodiversity* section shows the acreage and percentage of POG, high-volume POG, and large-tree POG that would be contained within reserves and matrix lands, and the acres that would be protected from harvest in the matrix, under each alternative. Table 3.10-5 (below) provides a summary of the percentage of POG in each category, under each alternative. There are approximately 4.95 million acres of POG remaining on the Tongass. Alternative 5 (No Action) provides a combination of land allocations that protects at least 91 percent of this acreage over the long-term, and is believed to reduce the overall risk and increase the likelihood of maintaining viable and well distributed populations of old-growth associated species. Alternatives 1, 2, 3, and 6 would also protect at least 91 percent of the existing POG. However, Alternatives 4 and 7 would protect 87 and 84 percent, respectively. Within reserves (non-development LUDs), which represent long-term habitat patches or blocks of POG, the greatest percentage of existing POG would be maintained by Alternative 1 (93 percent), followed by Alternatives 2 and 3 (84 and 78 percent, respectively), Alternatives 5 and 6 (71 and 72 percent, respectively), and Alternative 7 (57 percent). Tables 3.9-14 and 3.9-18 in the *Biodiversity* section present additional detail on the percentages of POG protected in reserves and throughout the landscape by biogeographic province and ecological subsection, respectively. Harvest under all of the alternatives would be concentrated in four biogeographic provinces (North Central Prince of Wales Island, Etolin Island and Vicinity, Kupreanof/Mitkof Islands, and Revillagigedo Island/Cleveland Peninsula), where substantial amounts of timber harvest have already occurred. That is, a majority of harvest under all alternatives occurs in or near the roaded base (areas where roads are already constructed) which is concentrated in the four aformetioned biogeographic provinces. As the alternatives increase in harvest intensity, the area harvested progressivly extends beyond that roaded base.

Table 3.10-5.
Percentage of Existing Productive Old-Growth Acreage in Reserves, Protected/Unscheduled in the Matrix, and Suitable for Timber Harvest in 2008

Alternative	POG Area in Reserves	POG Area in Matrix – Protected or Unscheduled: Protected in Beach Fringe, Riparian, & Other	POG Area in Matrix – Protected or Unscheduled: Suitable, But Not Scheduled for Harvest	Total Protected POG	Total POG Suitable for Harvest[1]
1	93%	4%	1%	98%	2%
2	84%	10%	2%	96%	4%
3	78%	14%	2%	94%	6%
4	60%	25%	1%	87%	13%
5	71%	18%	1%	91%	9%
6	72%	17%	2%	91%	9%
7	57%	26%	1%	84%	16%

[1] Represents the maximum POG that could be harvested assuming POG harvest takes place at the maximum rate.

The 1997 Forest Plan Revision Final EIS expert panel assessment concluded that due to the Forest-wide system of OGRs and standards and guidelines that provide additional protection to old-growth habitat, Alternative 11 (the basis for Alternative 5 in this EIS) would provide an amount and distribution of habitat adequate to maintain viable populations of vertebrate species across the Tongass and to maintain the diversity of plant and animal communities. Wildlife dependent on old-growth and/or unroaded habitats would have a moderately high likelihood of being maintained as viable and well distributed across the Tongass. Alternative 5 in this EIS was based on the 1997 Alternative 11, but incorporates the amendments that have occurred since 1997. These amendments have slightly increased the proporation of non-development LUDs so Alternative 5 would be slightly more protective than the 1997 Alternative 11.

The same conservation measures are generally maintained under Alternatives 1, 2, 3, and 6. The largest change is the replacement of the goshawk and marten standards and guidelines with the legacy standards and guidelines. As a result of this change, legacy would still be provided in the highest risk areas, but there would be slightly less POG protected within the matrix overall. However, the fact that these alternatives would allocate larger acreages to non-development LUDs produces more POG in reserves and a greater overall percentage of protected POG. In addition, these alternatives would protect a higher overall percentage of the larger tree POG types (both high-volume POG and big-tree POG), and would generally protect more POG and more larger tree POG in the most heavily harvested biogeographic provinces compared with Alternative 5 (see the *Biodiversity* section). Therefore, their likelihood of maintaining viable, well distributed populations of old-growth associated species across the Tongass would be higher. Because of the reduction or elimination of the OGR system under Alternatives 4 and 7, respectively, and the increase in area of development LUDs, these alternatives would have a reduced ikelihood of maintaining viable, well distributed populations relative to Alternative 5.

As discussed above, matrix lands, including both old growth and some older young growth (e.g., stands of 25 to 150 years of age), are important in facilitating movement of wildlife across the landscape and providing life requisites to many species. However, young-growth stands vary in their value to wildlife but can potentially contribute more, in terms of structure and function, through active stand management. There are approximately 687,000 acres of young-growth stands (including both harvested and natural young growth) on the Tongass. Under all the action alternatives, several Forest-wide standards and guidelines have been modified to specifically address young-growth management. The Timber Management standards and guidelines direct the Forest to "implement commercial thinning treatments in young conifer stands to obtain chargeable timber, improve wildlife habitat…" Likewise, wording has been added to the Transportation Road Management standards and guidelines to "consider future needs for commercial thinning." The term "young-growth management" has been incorporated into existing standards and guidelines for Wildlife Habitat Improvement. Finally, the Forest is also planning for thinning in non-development LUDs to improve wildlife habitat. Management of young growth will increase over time and will produce positive benefits to wildlife by shortening the stem-exclusion phase of stand development when tree crowns are crowded and forage availability is at its lowest.

Landscape Connectivity

Fragmentation associated with habitat loss results in smaller sizes of habitat patches available to a species, increased distances among habitat patches, increasing amounts of matrix conditions in which habitat patches are embedded, and altered spatial distribution of habitat types (Haufler 2007). These factors are strongly tied to the structural and functional connectivity of the landscape, and thus the ability of the landscape to support well distributed and viable wildlife populations. When a landscape becomes fragmented (i.e., when habitat patches become small and farther apart), a continuously distributed population may become a series of small, isolated subpopulations that rely on the ability of dispersing individuals to facilitate genetic interchange between populations and to recolonize area following local extirpation. Consequently, smaller, less mobile species that have limited dispersal capabilities and species that occupy limited ranges (e.g., endemics) are likely to experience the largest population level effects of fragmentation. Consequently, matrix lands play a vital role in providing functional connectivity across fragmented landscapes (Szacki 1999).

Timber harvest under all alternatives would increase fragmentation and reduce landscape connectivity. Alternative 7 proposes the greatest amount of timber harvest and therefore would result in the greatest increase in habitat fragmentation, followed by Alternatives 4, 5, 6, 3, 2, and 1, in decreasing order (Table 3.10-5 and Table 3.9-11 in the *Biodiversity* section). Most of this harvest would occur in the North Central Prince of Wales Island, Etolin Island, Kupreanof/Mitkof Island, and Revillagigedo Island/Cleveland Peninsula biogeographic provinces, which have already been heavily impacted by timber harvest.

The OGR system, as noted above, is an important component of the Conservation Strategy aimed at maintaining the amount and distribution of old growth on the Tongass. A reserve system would be maintained under Alternatives 1, 2, 3, 5, and 6. By limiting the OGR system to four highly developed biogeographic provinces and instating a retention requirement elsewhere, Alternative 4 would not be as effective in maintaining landscape connectivity over the long-term if retained acres are widely distributed, in small parcels, are linear in shape, and are not located to specifically protect important habitat features (e.g., suspected goshawk nesting habitat or deer winter range). This is particularly relevant in the Etolin and Revillagigedo Island/Cleveland Peninsula biogeographic provinces where a substantial amount of timber harvest is proposed but where no reserve system would be in place. Alternative 7 would have effects similar to Alternative 4, but to a greater extent because it eliminates old-growth habitat reserves all together.

The following discussion addresses the areas identified as being critical links connecting portions of the landscape in areas where a high amount of timber harvest has occurred, or is likely occur in the future:

Pinch-point No.1: This pinch-point is located in the middle of the East Chichagof biogeographic province, one of the more heavily developed provinces. This area is completely protected by a large OGR under Alternative 5, which provides connectivity between northeast Chichagof Island and the rest of the island. Alternatives 1, 2, 3, and 6 maintain this protection and add to it to varying degrees through the reallocation of the adjacent Timber Production lands to Remote and Semi-remote Recreation where minimal timber harvest is allowed. These alternatives ensure that habitat protection is in place to facilitate wildlife movement through the pinch-point as well as provide connectivity to a large area of LUD II and the West Chichagof-Yakobi wilderness area to the west.

This pinch-point would receive little protection beyond what is provided by the beach fringe in Alternatives 4 and 7, which designate the area as development LUDs. Alternative 4 proposes to shift the large OGR to the southeast, and Alternative 7 removes it completely, eliminating any actual old-growth connectivity across the pinch-point, except that which is provided by the beach buffer, which is only 500 feet wide in Alternative 7. Not only would Alternatives 4 and 7 isolate old-growth habitat in the vicinity of the pinch-point, but they could potentially isolate a portion of Chichagof Island if timber harvest limits wildlife movements through this corridor.

Pinch-point No. 2: The area connecting Lisianski Inlet with the North Arm of Peril Strait on Chichagof Island is pinch-point No. 2. This area is fully protected as a Legislated LUD II area in all alternatives.

Pinch-point No. 3: This area includes the Port Camden-Bay of Pillars connection and the portage between Port Camden and 3-Mile Arm and serves as a major linkage connecting north Kuiu with east Kuiu Island and Rocky Pass on its eastern edge; and North and South Kuiu Island. This area is protected by Old-Growth Habitat, Semi-Remote Recreation, and Remote Recreation LUDs under Alternatives 1, 2, 3, 5, and 6. In contrast, under Alternatives 4 and 7, all of the Old-Growth Habitat LUDs in northern and eastern Kuiu would be reallocated to development LUDs; some non-development LUD would remain around the Bay of Pillars. Thus, Alternatives 4 and 7 could negatively affect wildlife movements between major portions of the island.

Pinch-point No. 4: Pinch-point No. 4 is the narrow area between Lindenburg Peninsula and the remainder of Kupreanof Island and it is largely protected by the Petersburg Creek-Duncan Salt Chuck Wilderness. The remaining small area not included in the Wilderness between Portage Bay and Duncan Salt Chuck is primarily forested peatland. Under all alternatives the beach fringe buffer provides some additional connectivity but to a lesser extent under Alternative 7 because it reduces the buffer from 1,000 to 500 feet.

Pinch-point No. 5: This area connects the extreme north end of Prince of Wales Island to the remainder of the island, where there has been substantial past and on-going forest management activities. Under Alternatives 1, 2, 3, 4, 5, and 6 a cross-island connection is nearly protected by a small OGR around Neck Lake, and fully protected farther south by a very large reserve (including Remote Recreation LUD) around Sarkar Lakes. Because much of the pinch-point is highly developed, additional habitat alterations could create barriers to movement. Furthermore, the critical connecting habitat of this area is primarily inland (both shorelines are private land), and thus existing standards and guidelines for beach fringe and estuary buffers under all alternatives are not likely to maintain much additional connectivity. All action alternatives add a small Special Interest Area south of Neck Lake, which would be withdrawn from timber management. No OGRs exist under Alternative 7, thus reducing the likelihood of functional cross-island connectivity.

Pinch-point No. 6: This area is now all private land, dividing the north-central and south portions of Prince of Wales Island with a non-NFS strip of land one to two miles wide. Continued timber harvesting is anticipated on these private lands, with the potential to create migration and dispersal barriers. All action alternatives provide some additional protection to this pinch-point, relative to Alternative 5 (No Action), by designating a Special Interest Area adjacent to the non-NFS land. However, Alternative 7 eliminates all the Old-Growth Habitat LUDs in the vicinity of the pinch-point, thus reducing the functional connectivity of the old-growth ecosystem in the surrounding area.

Species Assessments

As noted above, the NFMA directs the Forest to manage wildlife habitat to maintain viable and well distributed populations to ensure continued existence in the planning area. Quantitative criteria for viability are not specified by the NFMA or associated regulations. For this analysis, the evaluation of viability includes considerations of its unique island archipelago environment as well as current scientific thinking on population viability and conservation biology, as found in the general literature and that compiled during the recent Tongass Conservation Strategy meeting (2006).

This section briefly discusses potential effects to all Candidate, Forest Service Sensitive listed species, MIS, and selected other species of concern. There are several species that have been identified as species of special management concern, and for which a more in-depth fine filter analysis is necessary. As discussed under the Affected Environment portion of this section, these include two species evaluated for possible listing under the Endangered Species Act (Alexander Archipelago wolf and goshawk), the most important wildlife species for consumptive use (Sitka black-tailed deer, also important as the principal prey for the wolf), and two other species important as old-growth habitat indicator species and long-term viability concerns (brown bear and marten).

The 1997 Forest Plan Revision Final EIS wildlife analysis relied in part upon expert panel evaluations of alternatives in terms of the estimated relative risks to a species or habitat of concern. Seven "panel assessments" were conducted: one for wolf, marten, goshawk, brown bear, marbled murrelet, "other terrestrial mammals" including endemics, and one for the old-growth ecosystem. Each of these old-growth associated species was selected ostensible because collectively their ecologies incorporated the breadth of forest habitat features and other attributes of environmental variation represented across the Forest, and because they were thought to be representative of a subset of species that are sensitive to disturbance and potentially at risk of either becoming locally extirpated or jeaopardizing cultural or subsistence uses. This approach has been effectively used in the Pacific Northwest and was chosen for the Tongass because a substantial amount of uncertainty existed in the understanding of various wildlife habitat and community relations and there was generally inadequate information on which to base predictive models (i.e., population viability anaysis).

The panel assessments resulted in the generation of a set of estimates of the likelihood of various outcomes related to the persistence of each species under each plan alternative, which were then examined to determine the influence of the alternatives on viability across the Tongass (Shaw 1999).The panel assessments evaluated alternatives in terms of their ability to maintain the continued existence of well distributed, viable wildlife populations across the Tongass. A 100-year time period, or planning horizon, was used for the viability analysis, which was assumed to be the minimum period over which viability could be evaluated based on current scientific literature. This time period is the average rotation age under even-aged management and thus the time period over which old-growth characteristics would be affected (see the *Wildlife* section of the 1997 Forest Plan Revision Final EIS for further justification for this planning horizon and additional description of the panel assessments). It should be noted that within its first decade, the current Forest Plan has harvested much less timber than originally estimated in the 1997 Final EIS.

Candidate Species

Kittlitz's Murrelet

Due to the Kittlitz's murrelet's association with glacial habitat, this species occupies areas outside of where timber harvest and associated activities have occurred or are likely to occur. Major threats to this species are global climate change, which is correlated with a loss of suitable habitat (glacial melt) and reduction in prey availability due to warming sea temperatures. Human activity in the marine environment, particularly vessel traffic and fishing operations, are additional threats to this species. There is no indication that any Forest Service management activity is affecting the Kittlitz's murrelet (USDA Forest Service 2004h). Consequently, implementing any of the alternatives will not directly or indirectly affect the Kittlitz's murrelet.

Forest Service Sensitive Species

Queen Charlotte (Northern) Goshawk

Iverson et al. (1996) concluded that landscapes that maintained a forest age structure consistent with a 300-year ecological rotation would provide a high likelihood of sustaining goshawks. This composition would generally consist of one-third each of 0- to 100-year old stands, 100- to 200-year old stands, and 200-year old or older stands, categories with increasing value to goshawks. Additionally, harvest under a 300-year ecological rotation permits a maximum of 3.3 percent of the 1954 old growth to be harvested per decade in order to maintain a forest age structure favorable to goshawks. The 1997 Forest Plan Revision Final EIS compared alternatives in terms of their ability to support viable populations of goshawks over the long-term, by evaluating the number of VCUs where harvest levels met these criteria. This was based on the notion that the average size of a VCU approximates the size of a goshawk territory and that they are old-growth obligates, though recent research has shown that goshawks range wider and use a greater variety of habitats than once thought (Boyce et al. 2006, Reynolds et al. 2006). As a measure of the ability of each alternative to support well distributed viable goshawk populations, this discussion takes a more conservative approach by focusing on impacts to high value goshawk nesting and foraging habitat (SD5N, SD5S, and SD67 stands located below 800 feet in elevation) but on a forest-wide basis, and discusses trends in areas with the greatest risk of not supporting goshawks due to the high levels of past disturbance.

Protection of high value goshawk habitat would be greatest under Alternative 1 (24,000 acres proposed for harvest), followed by Alternatives 2 (48,000 acres), 3 (68,000 acres), 6 (97,000 acres), 5 (102,000 acres), 4 (145,000 acres), and 7 (191,000 acres). Table 3.10-6 summarizes the percentage of high-volume POG and large-tree POG that is suitable for harvest under each alternative. These percentages represent the maximum potentially harvested over 100+ years of Plan implementation. The extent to which harvest impacts the ability of an area to support goshawks is dependent on the amount of suitable habitat remaining in the resulting landscape. That is, areas that originally had a substantial amount high-volume POG before timber harvest began and where much of that amount remains (e.g., Admiralty Island and Central Coastal Range biogeographic provinces) have a higher likelihood of supporting healthy goshawk populations even with additional harvest. Table 3.9-15 in the *Biodiversity* section displays the original acres of high-volume POG and the minimum percentage remaining after 100+ years of Plan implementation by biogeographic province.

Table 3.10-6
Maximum Percentage of Existing High-Volume (SD5N, SD5S, and SD67) and Large-Tree (SD67) Productive Old-Growth Proposed for Harvest by Elevation Category and Alternative after 100+ years

Elevation Category	Alternative						
	1	2	3	4	5	6	7
High-Volume POG							
< 800 feet	2.0%	4.0%	5.6%	11.9%	8.3%	7.9%	15.6%
> 800 feet	2.0%	6.1%	8.5%	16.8%	12.0%	11.6%	19.3%
Total	**2.0%**	**4.8%**	**6.7%**	**13.8%**	**9.8%**	**9.3%**	**17.1%**
Large-Tree POG							
< 800 feet	2.9%	5.1%	7.0%	12.8%	9.5%	9.0%	17.0%
> 800 feet	3.0%	8.5%	10.8%	19.8%	14.6%	13.9%	22.6%
Total	**2.9%**	**6.1%**	**8.1%**	**14.8%**	**11.0%**	**10.4%**	**18.6%**

Biogeographic provinces with greatest potential reduction in high value goshawk habitat include North Central Prince of Wales, Kupreanof/Mitkof, Etolin and Vicinity, and Revilla Island/Cleveland Peninsula. Highest harvest in these provinces would occur under Alternative 7. However, it is important to note that under Alternatives 1, 2, 3, 4, 5, and 6 this loss is limited to old growth within the matrix and that the large and “very large” OGRs established under the Forest Plan were intended to compensate for timber management activities in the most developed areas. In the Prince of Wales Island area, for example, these include the Sarkar/Honker Divide/Karta Wilderness reserve that totals over 200,000 acres, the 200,000-acre reserve on South Prince of Wales, and a 56,000-acre reserve at Mt. Calder/Mt. Holbrook on Kosciusko Island.

Alternative 5 (No Action) also incorporates a set of standards and guidelines that were intended to address aspects of goshawk habitat such as connectivity and stand structure in highly developed areas. These include the goshawk foraging habitat standards and guidelines, which require that timber harvest units must meet certain minimum criteria designed to maintain forest stand structure characteristics thought to be beneficial to goshawks in VCUs on Prince of Wales Island where more than 33 percent of the POG has been converted to young-growth, and the goshawk nest standard and guideline. Additional protection of habitat elements important to goshawks is provided by marten habitat standards and guidelines (see description under marten). Both sets of guidelines only apply to provinces where harvest has been relatively extensive. The retention of additional forest structure in harvest units was thought to result in improved foraging habitat for goshawks and facilitate dispersal among OGRs. However, recent science supports retaining clumps of legacy trees rather than a uniform distribution of legacy trees (see Appendix D and *Northern Goshawks on the Tongass National Forest*, presented at the Tongass Conservation Strategy Review Workshop 2006). That is, even spacing of reserve trees may, in effect, create a thinned stand that over time grows into a forest with understory shrubs and trees filling in spaces under the forest canopy, inhibiting goshawk maneuverability for foraging within the stand.

Based on the 1997 panel assessment ratings (Iverson 1997), Alternative 5 (rated as its precursor, Alternative 11 in the 1997 Forest Plan EIS) was rated as having a high likelihood of sustaining viable, well-distributed goshawk populations during the 100-year planning horizon and unlikely to result in a loss of viability or a declining trend that would require additional protection (see Appendix D). In addition, the panel concluded that there was no possibility of extirpation from the Tongass and virtually no possibility the goshawk would exist only within isolated refugia populations under Alternative 5. It is important to recognize that the panel assessments were conducted prior to the development of the Goshawk and Marten standards and guidelines (discussed above). In addition, recent research suggests that goshawks may be more adaptable to managed forest conditions than once thought, though they rely on prey that are closely associated with old growth. Thus, the 1997 panel ratings, which considered the goshawk an old-growth obligate, may provide a conservative assessment of impacts to goshawks.

Alternatives 1, 2, 3, and 6 maintain the reserve system (slightly to substantially expanded over Alternative 5) and the various buffer standards and guidelines, but propose a new Forest-wide Legacy Forest Structure standard and guideline, in place of the existing Goshawk Foraging Habitat and Marten Habitat standards and guidelines. The Legacy Forest Structure standard and guideline is designed to protect forest legacy components in areas that are already highly developed, as well as areas that will experience increased harvest levels over the life of the Forest Plan. Thus, the Legacy Forest Structure standard and guideline is not limited to certain biogeographic provinces and, therefore, covers more provinces than the Goshawk standard and guideline (see Appendix D for a detailed analysis and comparison of the Legacy and Goshawk standards and guidelines). Because Alternative 6 would protect slightly more POG and a higher percentage of larger tree POG types within reserves, than Alternative 5 (Tables 3.10-5 and 3.10-6) and incorporates the Legacy standard and guideline, it is expected that long-term effects on goshawks would be similar to or slightly less than under Alternative 5. Because Alternatives 1, 2, and 3 would all result in lower harvests than Alternatives 5 and 6, it is expected that they would result in a very high likelihood of sustaining viable, well-distributed populations over the long term (based on their old-growth harvest levels, including larger POG types – see Table 3.10-6).

The reduction of the OGR system, in combination with the absence of species-specific or Forest-wide forest legacy retention, under Alternatives 4 and 7, respectively, would increase risk to goshawk populations. However, Alternative 4 maintains a relatively extensive reserve system in four of the most heavily developed biogeographic provinces, including the above mentioned “very large” reserves in the Prince of Wales Island complex. The distribution of these reserves is such that nearly all matrix habitats outside of these reserves and other protected areas are within the dispersal distance of goshawks, thus increasing the likelihood of re-colonization of landscapes that may be at risk of not supporting goshawks (USDA Forest Service 1997a). However, by significantly reducing reserves elsewhere and not providing legacy tree requirements, Alternative 4 could reduce the dispersal and re-colonization capability of goshawks in areas where timber would be harvested in the future. Even so, Alternative 4 would still only result in a harvest level of less than 12 percent of the existing low elevation, high-volume POG (considered to be the highest value goshawk habitat) after 100 years (Table 3.10-6). Based on the 1997 expert panel assessments (Iverson 1996a), Alternative 4 (equivalent to Alternative 6 in the 1997 FEIS) would be rated as having a moderately high likelihood of maintaining viable, well-distributed goshawk populations; the assessments also noted no possibility of extirpation from the Tongass, but a low likelihood that the alternative would result in the goshawk existing only in isolated refugia (Appendix D).

The likelihood of effects on goshawk distribution would be greater under Alternative 7, which eliminates much of the coarse-filter component of the Conservation Strategy (the Old-Growth Habitat LUD), as well as the species-specific Goshawk Foraging and Marten Habitat standards and guidelines. Full implementation of Alternative 7, would result in harvesting approximately 16 percent of the existing low elevation, high-volume POG after 100 years (Table 3.10-6). Based on the 1997 expert panel assessments (Iverson 1997a) Alternative 7 (equivalent to Alternative 2 in the 1997 FEIS) would be rated as having a moderate likelihood of maintaining viable, well-distributed goshawk populations; the assessments also noted there would be a very low possibility of extirpation from the Tongass and a low likelihood that the alternative would result in the goshawk existing only in isolated refugia.

Osprey

Limiting factors for osprey populations are unknown, but availability of nest sites and foraging areas do not appear to be limiting on the Tongass and Forest-wide standards and guidelines were developed to provide for protection of nest sites as they are identified. In addition to protection around known nest sites, standards and guidelines also include a 1,000-foot beach and estuary buffer that provides suitable dominant or co-dominant trees along shorelines, essentially protecting all suitable or potentially suitable nesting, perching, and foraging habitat for ospreys. Although in other parts of their range ospreys do nest on freshwater lakes, where no such buffer applies, none have been documented in Southeast Alaska. Consequently, no impacts to osprey or osprey habitats are anticipated from Alternatives 1, 2, 3, 4, 5, and 6, which uphold the current Forest Plan standards and guidelines. Ospreys would be at increased risk of effects associated with timber management activities under Alternative 7, which proposes to reduce the beach fringe buffer to 500 feet; however, this distance is likely to protect most nesting habitat.

Peale's Peregrine Falcon

Forest-wide standards and guidelines were developed to provide for protection of Peale's peregrine falcon habitat. Any project level planning requires the evaluation of potential impacts to known falcon nests within 2 miles of a proposed project in an effort to plan project activities to avoid adverse impacts to the falcons and their habitats. These standards and guidelines would be maintained under all the action alternatives, therefore no effects are anticipated for peregrine falcons.

Trumpeter Swan

The largest concentration of nesting trumpeter swans on the Forest is at Yakutat, in the Yakutat Forelands Biogeographic Province (primarily Roadless Area 339). Approximately 96 percent of this province is already within legislated LUD II areas or other natural setting LUDs; none of the alternatives propose changes to these designations. The entire nesting habitat is classified as wetlands and/or riparian habitat. Forest-wide standards and guidelines for wetlands and riparian management apply to these areas, which were specifically developed for trumpeter swan habitats on the Forest.

None of the alternatives would increase the likelihood of any adverse effects on trumpeter swan populations, nesting habitat, or wintering habitat, or would result in a loss of species viability. Therefore, no effects are anticipated for trumpeter swans.

Management Indicator Species

Sitka Black-tailed Deer

This analysis of effects to black-tailed deer uses the deer winter HSI model described in the Affected Environment section to evaluate impacts to winter range habitat capability potentially resulting from each of the alternatives. The Forest Plan model uses four discrete variables (four levels of snow depth, three elevation zones, four aspects, and seven vegetation/successional stages) to predict a habitat suitability index. For this application, a cross-walk was developed to reclassify the new Forest-wide vegetation model (the SDM) into the model vegetation categories (See Appendix B for additional details about the deer model analysis). This results in an overall reduction in average HSI values because fewer stands would be classified as high and medium volume strata and more stands would be classified as low volume strata compared to the old volume strata mapping used in the 1997 Forest Plan Revision Final EIS. However, this makes no difference to the analysis because relative values were used to compare alternatives. For reference, high volume stands include SDM vegetation categories SD5N, SD5S, and SD67; medium volume stands include SD4N, SD4S, and SD5H; and low volume stands include SD4H (see the *Biodiversity* section for further discussion of the SDM categories).

The deer model is used here to compare the alternatives in a relative sense. However, it should be noted that, for several reasons, the model is believed to overestimate the effects of harvest. Please refer to the discussion of these factors under the Sitka Black-tailed Deer subsection of the Affected Environment.

For the purpose of this analysis, the following assumptions were made:

- HSI values were standardized to range from 0 to 1.0, by dividing all values by 1.3, because outputs from such models represent a range from 0 to 100 percent habitat suitability, with higher values indicating higher habitat capability.
- After full implementation of the Forest Plan (100+ years), all suitable acres are harvested; calculations take the model implementation reduction factor (MIRF) into account which is the reduction between planned and actual timber volume/acres due to the presence of karst, unstable soils, and other issues that preclude harvest during timber sale layout. These numbers are based on known differences between the acres of forest land mapped as suitable for timber management and the number actually harvested on the Tongass (see the *Timber* section and the project record for additional discussion).
- To estimate 1954 habitat capability, previously harvested stands were assumed to be medium (SD4N, SD4S, SD5H categories) and high (SD5N, SD5S, and SD67 categories) volume forest; stand with a date of origin prior to 1954 were not changed.
- To project future habitat capability, 25 percent of the current young-growth stands would be in the stand initiation phase (25 years old or younger) and 75 percent would be in the stem exclusion phase (26 to 150 years old) by 2105; previously harvested stands that are unsuitable for harvest would be in the stem exclusion phase.
- This analysis evaluated relative changes in habitat capability; actual habitat capability may be more or less than model predictions.
- Lands under non-federal ownership have an assumed habitat capability of zero (see discussion below).

After the initial years following logging, there is a rapid increase in deer forage production due to the large amount of light penetration created by open stand conditions. However, this nutrition is of lower quality than the same forage types found in old growth. After the initial 20 to 30 years, there is a 100- to150-year period in which the vigorously growing hemlock and spruce shade out the understory forage. Person et al. (2001) described this situation as “succession debt” because the full impacts to deer may not immediately be expressed but will be sustained for many decades after timber harvesting. Under even-aged and two-aged harvest systems, the amount of habitat capability reduction over the 100-year analysis period is substantial and is directly related to the amount of timber harvest. While the short-term (20- to 30-year) effect is also related to the amount of timber harvest, the effect of timber harvest will vary with the average seasonal snow accumulation (since higher accumulations reduce forage availability). Under uneven-aged systems (such as group selection), available forage within any given area would be maintained for a longer time, as would adjacent thermal cover. Assumptions related to future forest condition are intended to model future deer habitat capabilties after harvest. For this analysis, the effects of harvest are modeled over the long term and all harvest is assumed to consist of regeneration methods (e.g., clearcut harvest). Regeneration methods and rotation length depend on site-specific analysis done at the project level.

Effects on winter range habitat capability by WAA, as indicated by changes in HSI scores, are displayed in Table 3.10-7. This does not include any State, City, or private land. Many of these lands have been, or will be, developed for intensive forestry and are expected to have lower habitat capability over time. WAAs are land divisions used by the ADF&G for deer inventories and planning. Table 3.10-7 illustrates the cumulative effect of timber harvest on estimated deer habitat capability, from the beginning of large-scale timber harvest on NFS lands in 1954 to the present and to year 2105 and includes the 10-year (1996 to 2005) average harvest intensity, measured in hunter-days, by WAA.

In addition, the percentage of high value habitats available for timber harvest was also calculated by WAA to quantify impacts to high quality deer winter range (Table 3.10-8). To take into account impacts to deer across the Tongass inhabiting areas that vary naturally in their habitat quality, high quality habitat was defined as the quartile of the land base with the highest HSI scores within in each WAA. Lands not available for timber harvest include areas within LUDs that do not permit timber harvest and areas that are protected by Forest-wide standards and guidelines, such as Riparian or Beach and Estuary Fringe.

Forest-wide, the alternatives are estimated to retain from 77 to 86 percent of the original winter range habitat capability in 100+ years (Table 3.10-7). At the WAA level, Alternatives 4 and 7 show the greatest reductions in deer habitat capability because they propose the greatest amounts of harvest. Most of the largest reductions in habitat quality occur in WAAs that have already experienced a high amount of past timber harvest (e.g., Prince of Wales and Kuiu Islands); however, there are several WAAs (e.g., 2008, 2305, 2927, 3524) where currently over 95 percent of the 1954 deer habitat capability remains, that would receive substantial reductions under some of the alternatives.

On average, the highest percentage of high quality winter range habitat subject to timber harvest is proposed under Alternative 7 (16 percent per WAA), followed by Alternatives 4 (13 percent), 5 (9 percent), and 6 (8 percent), 3 (6 percent), 2 (4 percent), and 1 (1 percent; Table 3.10-8). Forest-wide, however, the alternatives would harvest 1 to 5 percent of the existing high quality winter range (Table 3.10-8). Table 3.10-8 also displays the range of HSI scores in each WAA. At the WAA level, there are some areas where 40 to 55 percent of the high value deer winter range could be harvested under Alternatives 4, 5, 6, and 7. This magnitude of effect would be primarily concentrated on Prince of Wales Island, the Cleveland Peninsula and nearly islands, Baranof Island, and Mitkof Island.

Over the long-term, reductions in habitat capability and harvest of high value deer winter range could reduce carrying capacity, or the numbers of deer in areas capable of supporting them given the available resources, such that deer populations would decrease in areas that could no longer support the current population. This would primarily be a concern during severe winters, when resources are already limited. Ultimately reductions in the deer population resulting from decreased habitat capability could reduce the number of deer available to wolves and hunters. At some low level, wolf predation could actually limit deer population recovery (the “predotor pit” hypothesis (Boutin 1992), though there is no threshold population level or threshold loss of winter range that has been defined for Southeast Alaska with which to predict these potential population responses.

However, it is also important to note that forest management on the Tongass has produced more forage than assumed by the model, through the management of second-growth stands. The purpose of young-growth management is to accelerate the stem exclusion phase of forest development, which occurs roughly 15 to 25 years following a major disturbance when the growing space is fully occupied and tree crowns are crowded. Deer forage availability is at its lowest during this time due to the lack of light penetrating the understory, which causes lower tree limbs and understory plants to die and less vigorous trees to be shaded out. Activities such as thinning, girdling, or pruning, which open the forest canopy, result in increased understory biomass thus increasing the amount of forage available to deer. Since 1970, the Tongass has treated approximately 168,000 acres of second-growth, mostly by precommercial thinning; roughly 16.000 acres were treated specifically for wildlife and riparian objectives (*Young-growth Management*, presented at the Tongass Conservation Strategy Review Workshop 2006). However, it is important to note that there are still many uncertainties related to appropriate young-growth treatment designs, specific beneficial effects of such treatments, and implications for deer. In addition, some studies have shown the opposite results. Farmer (2006) found that the risk of death to fawns was positively correlated with pre-commercial thinning. The Tongass, in collaboration with the Pacific Northwest Research Station, is conducting the Tongass-Wide Young Growth Study (TWYGS) to address many of these uncertainties. TWYGS is the most extensive and intensive study of young-growth ever conducted in Southeast Alaska and is designed to evaluate the potential benefits of treating pre-commercial stands to increase wildlife habitat and wood production. Initial results indicate that the potential for restoring diverse and abundant understory plant communities through the active management of young stands is promising (*Young-growth Management*, presented at the Tongass Conservation Strategy Review Workshop 2006).

Mountain Goat and Black Bear

These species occupy different niches but both are associated with old-growth forest and are susceptible to over-hunting if road access is increased or improved, though most roads are located a long distance (both vertically and horizontally) from goat habitat. The amount of road access, quantified in terms of the amount of road construction and reconstruction proposed under each alternative, is assumed to be inversely related to the amount of POG conserved after full implementation of the Forest Plan (100+ years) and to be representative of the potential for over-hunting. This provides a rough index for assessing risk to these species, since roads can be designed (or closed) at the project level to avoid key habitats. Risk of over-harvest due to human access along roads is mitigated to some extent by Transportation Forest-wide standards and guidelines that require travel access road objectives to be developed for all roads, and Mountain Goat and Black Bear Forest-wide standards and guidelines directed toward assessing and minimizing disturbance and access to meet management objectives. A maximum of 3,874 miles of road construction and 2,100 miles of road reconstruction would be implemented after 100+ years of Forest Plan implementation under Alternative 5 (No Action). Alternative 6 (3,744 miles), Alternative 3 (2,799 miles), Alternative 2 (2,079 miles), and Alternative 1(774 miles) provide decreasing risk to these species associated with new road construction; all of these alternatives maintain or decrease the currently estimated level of road reconstruction (ranging from 2,046 miles under Alternative 6 to 925 miles under Alternative 1). Only Alternatives 4 and 7 would increase the proposed amount of road construction (4,890 miles and 5,825 miles, respectively) and reconstruction (2,182 miles and 2,371 miles, respectively). Thus

Table 3.10-7
Relative Changes in Deer Habitat Capability by Wildlife Analysis Area (WAA) by Alternative

WAA[1/]	Average Deer Harvest (Hunting)[1/]	Percent of 1954 Habitat Capability in 2006	Percent Deer Habitat Capability in 100+ Years[3/] Alternative 1	2	3	4	5	6	7	Average Hunting Pressure (Hunter Days)[2/]	Vicinity
101	112	94	94	89	87	86	86	86	85	715	Gravina Is.
202	11	0	0	0	0	0	0	0	0	60	Annette Is.
303	3	98	98	98	98	98	98	98	98	22	Duke Is.
404	12	100	100	100	100	100	100	100	100	70	Eastern Revilla Is.
405	27	83	80	74	73	73	74	73	71	131	Thorne Arm (Revilla Is.)
406	88	77	71	66	65	60	65	64	57	600	Carrol Inlet (Revilla Is.)
407	27	89	83	75	74	69	73	73	67	296	George Inlet (Revilla Is.)
408	21	96	96	95	95	94	94	94	94	317	Ketchikan
509	23	93	92	88	87	81	86	87	80	214	Naha Area (Revilla Is.)
510	48	68	63	59	58	53	57	58	50	277	Neets Bay Area (Revilla Is.)
511	0	100	100	100	100	100	100	100	100	0	Northern Revilla Is.
612	8	99	99	99	96	73	83	83	70	88	Eastern Cleveland Pen.
613	22	95	95	95	95	72	95	95	66	189	Helm Bay (Cleveland Pen.)
614	6	98	98	98	98	72	98	98	70	38	Meyers Chuck (Cleveland Pen.)
715	3	99	99	99	99	99	99	99	99	40	Redoubt Lake, Neckar Is.
716	0	100	99	100	100	100	100	100	100	6	Unuk Drainage (Cleveland Pen.)
717	0	100	100	100	100	100	100	100	100	0	Lower Chickamin (Misty Fiords)
718	0	100	99	100	100	100	100	100	100	0	Upper Chickamin (Misty Fiords)
719	0	100	100	100	100	100	100	100	100	33	Rudyerd Bay (Misty Fiords)
820	5	100	100	100	100	100	100	100	100	16	Wilson/Blossom Drainages (Misty Fiords)
821	0	100	100	100	100	100	100	100	100	0	Smeaton Bay (Misty Fiords)
822	1	100	100	100	100	100	100	100	100	19	Boca De Quadra Drainages (Misty Fiords)
823	6	100	100	100	100	100	100	100	100	15	Pearse Canal (Misty Fiords)
824	0	100	100	100	100	100	100	100	100	8	Peabody Mtns (Misty Fiords)
825	4	100	100	100	100	100	100	100	100	4	Upper Portland Canal (Misty Fiords)
826	0	100	100	88	87	73	86	86	70	0	Hyder (Misty Fiords)
901	37	97	89	82	79	75	80	78	71	85	Suemez Is.
902	27	100	100	100	99	100	99	99	99	62	Outside Is.
1003	60	66	54	53	53	49	51	52	47	175	Heceta Is.
1105	11	99	99	99	99	96	97	97	94	71	Dall Is.
1106	28	99	99	99	99	99	99	99	99	52	Long Is.
1107	47	98	97	97	97	88	90	90	86	192	Hydaburg, Hetta Inlet, Sukkwan Is.
1108	5	99	99	99	99	99	99	99	99	34	Southwestern Prince Of Wales Is.
1209	4	100	100	100	98	94	98	98	93	9	Southeastern Prince Of Wales Is.
1210	9	100	100	99	89	82	88	88	79	42	Moira Sound (POW)
1211	16	91	85	76	76	67	74	75	62	77	Kitkun, South Arm Cholmondeley (POW)
1212	19	100	100	100	92	91	92	92	90	40	Clover Mtn. (POW)
1213	7	98	98	89	89	80	87	88	74	40	West Arm Cholmondeley (POW)
1214	95	79	70	66	65	62	64	64	53	488	Skowl Arm, Polk Inlet (POW)

Table 3.10-7 (continued)
Relative Changes in Deer Habitat Capability by Wildlife Analysis Area (WAA) by Alternative

WAA[1/]	Average Deer Harvest (Hunting)[-/]	Percent of 1954 Habitat Capability in 2006	Percent Deer Habitat Capability in 100+ Years[3/] Alternative 1	2	3	4	5	6	7	Average Hunting Pressure (Hunter Days)[2/]	Vicinity
1315	241	55	50	49	47	44	47	47	41	1289	Kasaan Peninsula, Thorne Bay (POW)
1316	22	100	100	100	100	100	100	100	100	100	Karta Bay (POW)
1317	88	54	51	49	47	45	47	47	38	411	Twelve Mile Arm, Harris River (POW)
1318	223	92	85	78	76	66	72	75	64	917	Craig, Klawock Areas (POW)
1319	227	74	69	67	66	59	64	64	54	973	Thorne River Drainage (POW)
1323	42	97	94	91	91	88	90	90	84	124	Western Prince Of Wales Is.
1332	43	85	83	82	78	75	77	78	70	119	Trocadero Bay, Waterfall Area (POW)
1420	186	52	43	42	40	39	40	40	36	857	Coffman Cove, Luck Lake, Ratz Harbor (POW)
1421	92	74	66	64	64	64	63	63	55	377	Sweetwater Lake, Logjam Creek (POW)
1422	289	60	50	48	47	46	47	47	43	1494	Staney Creek, Naukati, Sarkar (POW)
1524	0	100	100	100	100	100	100	100	100	1	Warren Is.
1525	14	51	48	47	46	46	46	46	43	64	Southern Kosciusko Is.
1526	13	91	91	91	91	88	89	89	87	58	Holbrook Mt., Northern Kosciusko Is.
1527	46	73	65	61	60	60	59	59	55	128	Prince Of Wales El Capitan Area
1528	52	77	75	74	73	72	72	71	63	171	Salmon Bay (POW)
1529	215	73	63	61	60	56	59	59	50	797	Mt. Calder, Red Bay, Port Protection (POW)
1530	140	62	58	57	55	54	55	55	50	798	Exchange Cove, Whale Passage (POW)
1531	22	61	54	52	52	49	50	52	46	98	Tuxekan, Marble, Sea Otter Sound (POW)
1601	0	100	100	100	100	75	80	82	71	0	Fanshaw-Farragut Area
1602	3	99	99	99	99	98	99	99	98	25	Farragut River Drainage
1603	0	91	91	91	84	80	82	83	78	4	Thomas Bay
1604	0	100	100	100	100	100	100	100	100	0	Baird Glacier
1605	39	76	76	71	64	57	63	63	56	291	Muddy River, Patterson Glacier
1706	6	100	100	100	100	100	100	100	100	32	Horn Cliffs, Le Conte Bay
1707	6	100	100	100	100	100	100	100	100	15	North Arm Of The Stikine
1708	0	100	100	100	100	100	100	100	100	28	Stikine River Drainage
1809	0	100	100	100	100	100	100	100	100	0	Cone Mtn.
1810	2	100	100	100	77	62	75	75	62	8	Virginia Lake, Garnet Mtn.
1811	0	99	99	99	93	87	92	92	84	9	Aaron Creek Drainage
1812	0	97	96	96	93	93	93	93	91	0	Marten Lake, Harding River Drainage
1813	0	68	68	65	63	60	62	63	59	0	Bradfield River Drainages
1814	0	98	98	98	92	88	92	92	85	3	Eagle River, S. Shore Bradfield Canal
1815	5	92	92	92	89	87	88	89	85	12	Anan Creek
1816	2	89	88	85	78	75	77	77	72	15	Seward Passage
1817	9	100	100	100	99	89	89	88	68	59	Vixen Inlet, Union Bay
1901	36	91	87	80	78	70	77	77	64	131	Northern Etolin Is.
1902	7	79	72	72	68	64	68	68	58	16	Deer Is.
1903	62	86	80	73	72	63	71	71	60	821	Wrangell Is.
1904	18	59	58	57	52	48	50	51	43	37	Woronkofski And Stikine Mouth Is.
1905	350	77	72	67	67	59	66	65	57	1249	Zarembo Is.

Table 3.10-7 (continued)
Relative Changes in Deer Habitat Capability by Wildlife Analysis Area (WAA) by Alternative

WAA[1/]	Average Deer Harvest (Hunting)[1/]	Percent of 1954 Habitat Capability in 2006	Percent Deer Habitat Capability in 100+ Years[3/] Alternative 1	2	3	4	5	6	7	Average Hunting Pressure (Hunter Days)[2/]	Vicinity
1906	15	59	55	55	55	55	55	55	53	30	Kashevarof Islands
1910	18	96	96	96	94	93	94	94	92	125	Southern Etolin Is.
2007	117	79	74	68	67	62	66	65	58	1155	Mitkof Is.
2008	5	99	99	99	80	77	78	78	72	14	Woewodski Is.
2202	1	90	90	90	90	82	86	86	80	53	Sullivan River And Island
2203	0	92	92	92	92	90	91	91	90	0	Endicott River Drainage
2304	2	94	94	94	94	75	77	79	73	22	St. James Bay
2305	0	97	97	93	92	80	92	91	78	17	Southern Chilkat Range
2306	0	84	84	74	74	66	73	73	63	25	Excursion Inlet
2408	0	100	100	99	91	86	90	90	85	0	Eldred Rock-Pt. St. Mary
2409	0	99	98	97	91	85	91	91	83	5	Berners Bay
2410	0	100	100	100	100	100	100	100	100	18	Berners River Drainage
2411	0	100	100	100	100	100	100	100	100	0	Lace River Drainage
2412	0	100	100	100	100	100	100	100	100	0	Antler River Drainage
2413	0	100	100	100	100	100	100	100	100	0	Gilkey River Drainage
2514	4	100	100	99	94	86	83	94	84	29	Cowee, Davies Creeks
2515	8	100	100	100	100	100	100	100	100	87	Eagle River-Mendenhall River Area
2516	0	100	100	100	100	100	100	100	100	0	Juneau Ice Field
2517	6	100	100	100	100	92	94	95	88	47	Juneau And Lower Taku
2518	0	100	100	100	100	100	100	100	100	0	Taku River
2519	0	100	100	100	100	93	96	95	92	0	Turner Lake, Southern Shore Taku Inlet
2620	17	100	100	100	100	100	100	100	100	93	Lincoln Is.
2621	42	100	100	100	100	100	100	100	100	272	Shelter Is.
2722	275	100	100	100	100	88	100	100	100	2378	Douglas Is.
2823	4	100	100	100	100	92	95	95	89	7	Snettisham Inlet, Speel, Whiting Rivers
2824	0	100	100	100	100	100	100	100	100	5	Holkham Bay-Tracy Arm
2825	0	100	100	100	100	100	100	100	100	9	Endicott Arm
2926	2	100	100	100	98	87	88	89	85	22	Windham Bay, Chuck River, Hobart Bay
2927	2	100	100	100	99	79	87	88	76	14	Port Houghton-Cape Fanshaw
3001	410	81	81	79	79	72	78	79	71	937	Nakwasina, Neva Strait Area (NW Baranof)
3002	328	69	69	68	68	67	68	68	67	1111	Sitka Road System
3003	143	85	84	83	80	73	79	80	72	459	Silver Bay, Deep Inlet
3104	182	73	73	69	68	65	68	68	64	388	Northern Kruzof Is.
3105	130	99	99	99	98	97	97	97	97	207	Southern Kruzof Is.
3206	80	99	99	99	99	99	99	99	99	177	Redoubt Lake, Neckar Islands
3207	147	100	100	100	100	100	100	100	100	239	Crawfish Inlets, Neckar Bay (Baranof Is.)
3308	163	66	64	59	57	53	56	57	51	391	Kook Lake, Sitkoh Bay, False Is.
3309	72	99	99	99	99	93	94	94	92	114	Northern Shore Hoonah Sound
3310	158	93	93	93	93	93	93	93	93	327	South Arm Hoonah Sound
3311	124	97	97	97	97	88	89	91	86	202	Ushk Bay-Kakul Narrows
3312	90	91	91	87	87	80	86	86	79	137	Duffield Penin., Bear Bay
3313	134	65	64	57	56	50	52	53	48	226	Rodman And Saook Bay Drainages
3314	135	88	88	87	87	73	87	87	73	283	Fish Bay Drainages
3315	112	83	82	75	75	71	74	74	69	173	Catherine Island, Lake Eva, Hanus Bay
3416	75	100	100	100	100	100	100	100	100	109	Khaz Penin., Slocum Arm (Chichagof Is.)
3417	157	100	100	100	100	100	100	100	100	361	West Coast Chichagof
3418	65	100	100	100	100	100	100	100	100	116	Yakobi Is.

Table 3.10-7 (continued)
Relative Changes in Deer Habitat Capability by Wildlife Analysis Area (WAA) by Alternative

WAA[1/]	Average Deer Harvest (Hunting)[-/]	Percent of 1954 Habitat Capability in 2006	Percent Deer Habitat Capability in 100+ Years[3/] Alternative 1	2	3	4	5	6	7	Average Hunting Pressure (Hunter Days)[2/]	Vicinity
3419	54	100	100	100	100	100	100	100	100	130	Upper Lisianski Inlet, Lisianski River (Chichagof Is.)
3420	43	100	100	100	100	100	100	100	100	139	Idaho Inlet Drainages
3421	51	100	100	100	100	100	100	100	100	132	Port Althorp, Lower Lisianski, Inian Is.
3523	153	81	76	74	74	72	73	73	63	440	East Side Port Frederick, Game Creek (NE Chichagof)
3524	94	100	100	86	85	79	83	84	78	354	Hoonah Area
3525	171	78	71	67	67	62	65	66	58	443	Freshwater Bay Drainages (NE Chichagof)
3526	120	81	77	73	72	69	72	72	60	418	North Shore Tenakee Inlet (NE Chichagof)
3551	200	83	77	73	72	68	71	72	62	519	Whitestone Harbor, False Bay Drainages (NE Chichagof)
3627	71	76	70	67	65	62	64	65	61	187	Corner Bay, Trap Bay (Chichagof Is.)
3628	12	98	98	98	98	98	98	98	98	34	Kadashan (Chichagof Is.)
3629	62	91	91	89	85	75	79	80	73	143	Southern Shore Tenakee Inlet (Chichagof Is.)
3630	17	99	99	99	99	87	91	94	86	47	Upper Tenakee Inlet (Chichagof Is.)
3731	84	92	92	91	91	86	90	91	83	178	Kelp Bay-Takatz Bay (Baranof Is.)
3732	20	100	100	100	100	100	100	100	100	39	Warm Springs Coast (Baranof Is.)
3733	143	100	100	100	100	100	100	100	100	188	Whale Bay Drainages, Wilderness Coast (Baranof Is.)
3734	75	100	100	100	100	100	100	100	100	117	Southern Baranof Is.
3835	210	100	100	100	100	100	100	100	100	810	Northern Mansfield Penin.
3836	206	100	100	100	100	100	100	100	100	754	Hawk Inlet, Young Bay Drainages (Admiralty Is.)
3837	27	100	100	100	100	100	100	100	100	86	Wheeler, Greens Creeks Drainages (Admiralty Is.)
3938	112	100	100	100	100	100	100	100	100	287	Gambier Bay Drainages (Admiralty Is.)
3939	125	100	100	100	100	100	100	100	100	261	Pybus Bay Drainages (Admiralty Is.)
3940	79	92	92	92	92	92	92	92	92	160	Pt. Gardner, Eliza Harbor (Admiralty Is.)
4041	34	90	90	90	90	90	90	90	90	47	Whitewater Bay, Wilson Cove (Admiralty Is.)
4042	43	100	100	100	100	100	100	100	100	105	Angoon Area (Admiralty Is.)
4043	64	100	100	100	100	100	100	100	100	317	Central Admiralty Lakes
4044	215	100	99	99	99	99	99	99	99	433	Shee-Atika Drainages (Admiralty Is.)
4054	40	100	100	100	100	100	100	100	100	75	Fishery, Thayer Creeks
4055	67	96	96	96	96	96	96	96	96	162	Hood Bay, Chaik Bay Drainages (Admiralty Is.)
4145	82	100	100	100	100	100	100	100	100	243	Tiedeman Is.-Mole Harbor Area (Admiralty Is.)
4146	37	100	100	100	100	100	100	100	100	144	Windfall Harbor, Swan Cove Drainages (Admiralty Is.)
4147	61	100	100	100	100	100	100	100	100	273	Upper Seymour Canal (Admiralty Is.)

Table 3.10-7 (continued)
Relative Changes in Deer Habitat Capability by Wildlife Analysis Area (WAA) by Alternative

WAA[1/]	Average Deer Harvest (Hunting)[-/]	Percent of 1954 Habitat Capability in 2006	Percent Deer Habitat Capability in 100+ Years[3/] Alternative 1	2	3	4	5	6	7	Average Hunting Pressure (Hunter Days)[2/]	Vicinity
4148	53	89	89	89	89	89	89	89	89	156	West Side Glass Penin. (Admiralty Is.)
4149	59	100	100	100	100	100	100	100	100	155	East Side Glass Penin. (Admiralty Is.)
4150	112	100	100	100	100	100	100	100	100	453	Grand Is., Oliver Inlet, Stink Creek (Admiralty Is.)
4222	62	97	96	95	94	86	94	94	86	142	Pt. Adolphus, Mud Bay Area (Baranof Is.)
4252	101	92	92	78	78	70	77	76	69	221	Humpback, Gallagher Creeks (Baranof Is.)
4253	74	85	82	78	77	71	76	76	69	139	Neka Bay Drainages (Baranof Is.)
4256	54	100	100	100	100	100	100	100	100	184	Lemesurier, Pleasant Islands
4302	0	80	80	80	80	66	66	73	63	0	Lower Chilkat, Kelsall River Valleys
4304	0	100	100	100	100	100	100	100	100	0	Chilkat Penin.
4407	0	100	100	100	100	100	100	100	100	0	West Side Taiya Inlet
4408	0	100	100	100	100	100	100	100	100	0	Katzehin River-Eldred Rock
4503	0	100	95	96	96	97	97	97	97	0	Yakutat Forelands E. Of Dangerous River
4504	9	100	100	100	100	100	100	100	100	86	Yakutat Bay Islands
4505	0	100	93	94	94	95	95	95	95	0	Russell Fjord Drainages
4506	0	100	100	100	100	100	100	100	100	14	Eastern Shore Disenchantment Bay
4508	2	92	91	87	82	80	81	81	79	63	Yakutat Forelands W. Of Dangerous River
4607	0	100	98	98	98	98	98	98	99	0	Nunatak Bench
5012	10	76	73	61	60	55	58	59	52	62	Northern Kuiu Is.
5013	2	94	93	92	90	82	84	84	80	17	Port Camden, Bay Of Pillars
5014	5	96	96	96	96	70	75	75	64	20	Eastern Kuiu Is., Conclusion Is.
5015	1	100	100	100	100	100	100	100	100	1	Coronation Is.
5016	2	98	98	98	98	98	98	98	98	2	Tebenkof Bay
5017	2	98	98	98	98	89	98	98	86	10	Southern Kuiu Is.
5018	3	93	92	90	84	79	81	81	78	26	Rocky Pass/Kuiu
5130	6	98	96	96	90	83	86	87	81	51	Rocky Pass/Kupreanof
5131	15	90	86	83	83	80	81	82	79	164	Hamilton Creek, Big John Bay
5132	18	73	71	68	67	64	65	67	62	265	Kake Area
5133	27	98	97	97	96	82	84	85	80	153	West Duncan Canal
5134	40	92	92	92	89	83	87	87	83	157	South Shore Kupreanof
5135	5	98	94	90	90	89	89	89	85	31	North Shore Kupreanof
5136	16	86	76	71	67	60	64	66	58	79	Portage Bay, Nw Kupreanof
5137	4	98	98	97	97	97	97	97	97	20	Petersburg Creek (Kupreanof Is.)
5138	74	88	79	70	69	64	68	68	59	327	Southern Lindenberg Penin. (Kupreanof Is.)
Total		88	86	84	83	79	81	82	77		

[1] Includes only National Forest System lands
[2] Based on 1995 to 2005 ADF&G harvest summary reports
[3] This analysis assumes: 1) maximum timber harvest levels over the 100^{+}-year period, 2) timber harvest from 1954 to 1995 occurred in the high volume stratum (SD 5N, 5S, 67), 3) in 2105 25 percent of the second-growth would be in stand initiation (<25 years) and 75 percent would be in stem exclusion (26-100 years),
[4/] Estimates incorporate the model implementation reduction factor (MIRF), which is the reduction in the number of suitable acres actually harvested during plan implementation (see *Timber* section for further description).

Table 3.10-8
High Quality Deer Winter Range Suitable for Harvest by Alternative

WAA	Vicinity	Range of HSI Scores[1/]		Percent of High Value Deer Winter Range Suitable for Harvest[2/, 3/]						
				Alternative						
		Low	High	1	2	3	4	5	6	7
101	Gravina Is.	0.0	1.0	0	12	16	18	17	17	20
303	Duke Is.	0.0	1.0	0	0	0	0	0	0	0
404	Eastern Revilla Is.	0.0	1.0	0	0	0	0	0	0	0
405	Thorne Arm (Revilla Is.)	0.0	1.0	2	16	17	17	16	19	20
406	Carrol Inlet (Revilla Is.)	0.0	1.0	7	16	17	28	19	19	32
407	George Inlet (Revilla Is.)	0.0	1.0	6	19	20	29	22	22	31
408	Ketchikan	0.0	1.0	0	3	3	3	3	3	3
509	Naha Area (Revilla Is.)	0.0	0.8	1	7	7	15	9	8	16
510	Neets Bay Area (Revilla Is.)	0.0	0.8	6	13	14	24	18	15	30
511	Northern Revilla Is.	0.0	0.5	0	0	0	0	0	0	0
612	Eastern Cleveland Pen.	0.0	0.8	0	0	5	43	27	26	49
613	Helm Bay (Cleveland Pen.)	0.0	1.0	0	0	0	41	0	0	52
614	Meyers Chuck (Cleveland Pen.)	0.0	1.0	0	0	0	47	0	0	49
715	Redoubt Lake, Neckar Is.	0.0	0.8	0	0	0	0	0	0	0
716	Unuk Drainage (Cleveland Pen.)	0.0	0.5	0	0	0	0	0	0	0
717	Lower Chickamin (Misty Fiords)	0.0	0.5	0	0	0	0	0	0	0
718	Upper Chickamin (Misty Fiords)	0.0	0.5	0	0	0	0	0	0	0
719	Rudyerd Bay (Misty Fiords)	0.0	0.5	0	0	0	0	0	0	0
820	Wilson/Blossom Drainages (Misty Fiords)	0.0	0.5	0	0	0	0	0	0	0
821	Smeaton Bay (Misty Fiords)	0.0	0.8	0	0	0	0	0	0	0
822	Boca De Quadra Drainages (Misty Fiords)	0.0	1.0	0	0	0	0	0	0	0
823	Pearse Canal (Misty Fiords)	0.0	1.0	0	0	0	0	0	0	0
824	Peabody Mtns (Misty Fiords)	0.0	0.5	0	0	0	0	0	0	0
825	Upper Portland Canal (Misty Fiords)	0.0	0.5	0	0	0	0	0	0	0
826	Hyder (Misty Fiords)	0.0	0.5	0	12	13	30	15	15	33
901	Suemez Is.	0.0	1.0	7	21	24	33	25	26	40
902	Outside Is.	0.0	1.0	0	0	1	0	1	1	2
1003	Heceta Is.	0.0	1.0	12	19	20	31	25	22	38
1105	Dall Is.	0.0	1.0	0	0	0	4	4	3	8
1106	Long Is.	0.0	1.0	0	0	0	1	0	0	1
1107	Hydaburg, Hetta Inlet, Sukkwan Is.	0.0	1.0	0	1	1	18	15	15	23
1108	Southwestern Prince Of Wales Is.	0.0	1.0	0	0	0	0	0	0	0
1209	Southeastern Prince Of Wales Is.	0.0	1.0	0	0	4	12	4	4	15
1210	Moira Sound (POW)	0.0	1.0	0	1	15	27	18	16	31
1211	Kitkun, South Arm Cholmondeley (POW)	0.0	1.0	0	17	18	33	20	19	44
1212	Clover Mtn. (POW)	0.0	1.0	0	0	15	18	15	17	20
1213	West Arm Cholmondeley (POW)	0.0	1.0	1	11	12	25	15	13	35
1214	Skowl Arm, Polk Inlet (POW)	0.0	0.8	9	16	18	24	20	19	42
1315	Kasaan Peninsula, Thorne Bay (POW)	0.0	1.0	11	17	21	30	23	23	42
1316	Karta Bay (POW)	0.0	0.8	0	0	0	0	0	0	0
1317	Twelve Mile Arm, Harris River (POW)	0.0	0.8	7	14	20	29	22	22	47
1318	Craig, Klawock Areas (POW)	0.0	1.0	5	17	23	39	28	25	43
1319	Thorne River Drainage (POW)	0.0	0.8	6	11	13	28	17	17	40
1323	Western Prince Of Wales Is.	0.0	1.0	3	11	12	21	13	13	29
1332	Trocadero Bay, Waterfall Area (POW)	0.0	1.0	2	3	12	20	14	13	31
1420	Coffman Cove, Luck Lake, Ratz Harbor (POW)	0.0	1.0	13	20	24	29	26	26	39
1421	Sweetwater Lake, Logjam Creek (POW)	0.0	0.8	8	13	14	12	16	16	33
1422	Staney Creek, Naukati, Sarkar (POW)	0.0	1.0	14	23	25	31	28	28	38
1524	Warren Is.	0.0	1.0	0	0	0	0	0	0	0
1525	Southern Kosciusko Is.	0.0	1.0	11	18	21	21	22	24	34
1526	Holbrook Mt., Northern Kosciusko Is.	0.0	1.0	0	0	0	4	3	3	6
1527	Prince Of Wales El Capitan Area	0.0	1.0	10	21	23	25	26	26	34
1528	Salmon Bay (POW)	0.0	0.8	4	6	7	11	11	11	28
1529	Mt. Calder, Red Bay, Port Protection (POW)	0.0	1.0	7	12	13	28	17	14	37
1530	Exchange Cove, Whale Passage (POW)	0.0	0.8	6	9	13	17	15	14	27
1531	Tuxekan, Marble, Sea Otter Sound (POW)	0.0	1.0	11	18	19	28	26	21	38
1601	Fanshaw-Farragut Area	0.0	0.8	0	0	0	36	29	26	41
1602	Farragut River Drainage	0.0	0.8	0	0	0	0	0	0	0

Table 3.10-8 (continued)
High Quality Deer Winter Range Suitable for Harvest by Alternative

WAA	Vicinity	Range of HSI Scores[1/]		Percent of High Value Deer Winter Range Suitable for Harvest[2/, 3/] Alternative						
		Low	High	1	2	3	4	5	6	7
1603	Thomas Bay	0.0	0.8	0	0	12	18	15	13	23
1604	Baird Glacier	0.0	0.2	0	0	0	0	0	0	0
1605	Muddy River, Patterson Glacier	0.0	0.8	0	10	23	36	25	25	39
1706	Horn Cliffs, Le Conte Bay	0.0	0.8	0	0	0	0	0	0	0
1707	North Arm Of The Stikine	0.0	0.8	0	0	0	0	0	0	0
1708	Stikine River Drainage	0.0	0.6	0	0	0	0	0	0	0
1809	Cone Mtn.	0.0	0.5	0	0	0	0	0	0	0
1810	Virginia Lake, Garnet Mtn.	0.0	0.8	0	0	27	48	30	30	48
1811	Aaron Creek Drainage	0.0	0.8	0	0	8	16	10	9	21
1812	Marten Lake, Harding River Drainage	0.0	0.8	0	0	4	4	4	4	6
1813	Bradfield River Drainages	0.0	0.5	0	6	10	16	13	11	17
1814	Eagle River, S. Shore Bradfield Canal	0.0	0.8	0	0	7	13	7	8	17
1815	Anan Creek	0.0	0.8	0	0	4	6	5	4	10
1816	Seward Passage	0.0	0.8	0	5	18	23	20	20	27
1817	Vixen Inlet, Union Bay	0.0	0.8	0	0	2	17	15	15	47
1901	Northern Etolin Is.	0.0	1.0	3	15	17	33	20	19	42
1902	Deer Is.	0.0	0.8	0	0	6	11	6	6	20
1903	Wrangell Is.	0.0	0.8	6	20	21	38	23	23	44
1904	Woronkofski And Stikine Mouth Is.	0.0	0.8	0	4	14	21	17	16	32
1905	Zarembo Is.	0.0	1.0	8	20	21	37	23	23	42
1906	Kashevarof Islands	0.0	1.0	0	15	16	18	18	18	29
1910	Southern Etolin Is.	0.0	1.0	0	0	2	3	2	2	4
2007	Mitkof Is.	0.0	1.0	9	21	22	32	24	26	40
2008	Woewodski Is.	0.0	1.0	0	0	39	45	43	43	56
2202	Sullivan River And Island	0.0	0.8	0	0	0	10	5	5	13
2203	Endicott River Drainage	0.0	0.5	0	0	0	3	1	1	3
2304	St. James Bay	0.0	0.5	0	0	0	28	27	24	32
2305	Southern Chilkat Range	0.0	0.5	0	7	8	28	8	9	30
2306	Excursion Inlet	0.0	0.5	0	13	14	25	15	15	28
2408	Eldred Rock-Pt. St. Mary	0.0	0.5	1	2	12	23	13	13	25
2409	Berners Bay	0.0	0.5	2	4	9	13	8	9	15
2410	Berners River Drainage	0.0	0.5	0	0	0	0	0	0	0
2411	Lace River Drainage	0.0	0.5	0	0	0	0	0	0	0
2412	Antler River Drainage	0.0	0.5	0	0	0	0	0	0	0
2413	Gilkey River Drainage	0.0	0.5	0	0	0	0	0	0	0
2514	Cowee, Davies Creeks	0.0	0.5	0	1	7	16	16	7	19
2515	Eagle River-Mendenhall River Area	0.0	0.8	0	0	0	0	0	0	0
2516	Juneau Ice Field	0.0	0.1	0	0	0	0	0	0	0
2517	Juneau And Lower Taku	0.0	0.8	0	0	0	15	11	10	21
2518	Taku River	0.0	0.5	0	0	0	0	0	0	0
2519	Turner Lake, Southern Shore Taku Inlet	0.0	0.5	0	0	0	11	7	8	15
2620	Lincoln Is.	0.1	0.1	0	0	0	0	0	0	0
2621	Shelter Is.	0.0	0.8	0	0	0	0	0	0	0
2722	Douglas Is.	0.0	0.8	0	0	0	19	0	0	0
2823	Snettisham Inlet, Speel,Whiting Rivers	0.0	0.5	0	0	0	12	7	6	15
2824	Holkham Bay-Tracy Arm	0.0	0.5	0	0	0	0	0	0	0
2825	Endicott Arm	0.0	0.5	0	0	0	0	0	0	0
2926	Windham Bay, Chuck River, Hobart Bay	0.0	0.5	0	0	1	11	9	9	12
2927	Port Houghton-Cape Fanshaw	0.0	0.8	0	0	1	22	13	12	25
3001	Nakwasina, Neva Strait Area (NW Baranof)	0.0	1.0	0	3	5	20	5	5	23
3002	Sitka Road System	0.0	1.0	0	1	1	4	1	1	4
3003	Silver Bay, Deep Inlet	0.0	1.0	0	2	8	19	8	8	21
3104	Northern Kruzof Is.	0.0	1.0	0	13	15	25	17	16	29
3105	Southern Kruzof Is.	0.0	1.0	0	0	4	4	4	4	5
3206	Redoubt Lake, Neckar Islands	0.0	1.0	0	0	0	0	0	0	0
3207	Crawfish Inlets, Neckar Bay (Baranof Is.)	0.0	1.0	0	0	0	0	0	0	0
3308	Kook Lake, Sitkoh Bay, False Is.	0.0	0.8	1	12	16	25	18	17	29
3309	Northern Shore Hoonah Sound	0.0	0.8	0	0	0	9	7	7	10
3310	South Arm Hoonah Sound	0.0	0.8	0	0	0	0	0	0	0
3311	Ushk Bay-Kakul Narrows	0.0	0.8	0	0	0	16	14	11	19
3312	Duffield Penin., Bear Bay	0.0	0.8	0	9	9	22	10	10	24
3313	Rodman And Saook Bay Drainages	0.0	0.8	0	15	17	32	28	24	35
3314	Fish Bay Drainages	0.0	0.8	0	1	1	25	1	1	27

Table 3.10-8 (continued)
High Quality Deer Winter Range Suitable for Harvest by Alternative

WAA	Vicinity	Range of HSI Scores[1/]		Percent of High Value Deer Winter Range Suitable for Harvest[2/, 3/]						
				Alternative						
		Low	High	1	2	3	4	5	6	7
3315	Catherine Island, Lake Eva, Hanus Bay	0.0	0.8	0	11	11	18	12	12	20
3416	Khaz Penin., Slocum Arm (Chichagof Is.)	0.0	1.0	0	0	0	0	0	0	0
3417	West Coast Chichagof	0.0	1.0	0	0	0	0	0	0	0
3418	Yakobi Is.	0.0	1.0	0	0	0	0	0	0	0
3419	Upper Lisianski Inlet, Lisianski River (Chichagof Is.)	0.0	0.6	0	0	0	0	0	0	0
3420	Idaho Inlet Drainages	0.0	0.6	0	0	0	0	0	0	0
3421	Port Althorp, Lower Lisianski, Inian Is.	0.0	0.8	0	0	0	0	0	0	0
3523	East Side Port Frederick, Game Creek (NE Chichagof)	0.0	0.8	2	6	6	12	7	6	27
3524	Hoonah Area	0.0	0.8	0	21	22	30	25	24	31
3525	Freshwater Bay Drainages (NE Chichagof)	0.0	0.8	6	12	13	22	15	14	29
3526	North Shore Tenakee Inlet (NE Chichagof)	0.0	0.8	3	9	9	15	10	10	29
3551	Whitestone Harbor, False Bay Drainages (NE Chichagof)	0.0	0.8	4	11	12	19	13	13	31
3627	Corner Bay, Trap Bay (Chichagof Is.)	0.0	0.8	5	10	13	18	15	14	20
3628	Kadashan (Chichagof Is.)	0.0	0.8	0	0	0	0	0	0	0
3629	Southern Shore Tenakee Inlet (Chichagof Is.)	0.0	0.8	0	4	10	25	19	18	28
3630	Upper Tenakee Inlet (Chichagof Is.)	0.0	0.5	0	0	0	19	13	7	20
3731	Kelp Bay-Takatz Bay (Baranof Is.)	0.0	0.8	0	2	3	10	3	3	14
3732	Warm Springs Coast (Baranof Is.)	0.0	0.5	0	0	0	0	0	0	0
3733	Whale Bay Drainages, Wilderness Coast (Baranof Is.)	0.0	1.0	0	0	0	0	0	0	0
3734	Southern Baranof Is.	0.0	0.8	0	0	0	0	0	0	0
3835	Northern Mansfield Penin.	0.0	0.8	0	0	0	0	0	0	0
3836	Hawk Inlet, Young Bay Drainages (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
3837	Wheeler, Greens Creeks Drainages (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
3938	Gambier Bay Drainages (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
3939	Pybus Bay Drainages (Admiralty Is.)	0.0	1.0	0	0	0	0	0	0	0
3940	Pt. Gardner, Eliza Harbor (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
4041	Whitewater Bay, Wilson Cove (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
4042	Angoon Area (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
4043	Central Admiralty Lakes	0.0	0.8	0	0	0	0	0	0	0
4044	Shee-Atika Drainages (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
4054	Fishery, Thayer Creeks (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
4055	Hood Bay, Chaik Bay Drainages (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
4145	Tiedeman Is.-Mole Harbor Area (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
4146	Windfall Harbor, Swan Cove Drainages (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
4147	Upper Seymour Canal (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
4148	West Side Glass Penin. (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
4149	East Side Glass Penin. (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
4150	Grand Is., Oliver Inlet, Stink Creek (Admiralty Is.)	0.0	0.8	0	0	0	0	0	0	0
4222	Pt. Adolphus, Mud Bay Area (Baranof Is.)	0.0	0.8	0	2	4	14	4	4	14
4252	Humpback, Gallagher Creeks (Baranof Is.)	0.0	0.8	0	22	23	35	23	25	36
4253	Neka Bay Drainages (Baranof Is.)	0.0	0.8	0	8	10	20	11	11	22
4256	Lemesurier, Pleasant Islands	0.0	0.8	0	0	0	0	0	0	0
4302	Lower Chilkat, Kelsall River Valleys	0.0	0.5	0	0	0	22	21	10	28
4304	Chilkat Penin.	0.0	0.4	0	0	0	0	0	0	0
4407	West Side Taiya Inlet	0.0	0.5	0	0	0	0	0	0	0
4408	Katzehin River-Eldred Rock	0.0	0.5	0	0	0	0	0	0	0
4503	Yakutat Forelands E. Of Dangerous River	0.0	0.8	0	0	0	0	0	0	0
4504	Yakutat Bay Islands	0.0	0.5	0	0	0	0	0	0	0
4505	Russell Fjord Drainages	0.0	0.5	0	0	0	1	0	0	1
4506	Eastern Shore Disenchantment Bay	0.0	0.5	0	0	0	0	0	0	0
4508	Yakutat Forelands W. Of Dangerous River	0.0	0.8	0	4	10	13	11	11	13
4607	Nunatak Bench	0.0	0.1	0	0	0	0	0	0	0
5012	Northern Kuiu Is.	0.0	0.8	0	20	23	31	26	25	36
5013	Port Camden, Bay Of Pillars	0.0	0.8	0	3	6	15	12	12	18
5014	Eastern Kuiu Is., Conclusion Is.	0.0	1.0	0	0	0	31	24	24	39
5015	Coronation Is.	0.0	1.0	0	0	0	0	0	0	0
5016	Tebenkof Bay	0.0	1.0	0	0	0	0	0	0	0

Table 3.10-8 (continued)
High Quality Deer Winter Range Suitable for Harvest by Alternative

WAA	Vicinity	Range of HSI Scores[1/]		Percent of High Value Deer Winter Range Suitable for Harvest[2/, 3/]						
				Alternative						
		Low	High	1	2	3	4	5	6	7
5017	Southern Kuiu Is.	0.0	1.0	0	0	0	15	0	0	20
5018	Rocky Pass/Kuiu	0.0	0.8	0	4	14	23	19	20	25
5130	Rocky Pass/Kupreanof	0.0	1.0	2	3	14	26	21	19	31
5131	Hamilton Creek, Big John Bay	0.0	0.8	5	11	12	17	14	13	18
5132	Kake Area	0.0	1.0	4	13	13	21	18	15	23
5133	West Duncan Canal	0.0	1.0	1	2	4	27	23	22	32
5134	South Shore Kupreanof	0.0	1.0	0	0	5	16	10	10	18
5135	North Shore Kupreanof	0.0	1.0	5	12	13	14	14	14	22
5136	Portage Bay, Nw Kupreanof	0.0	1.0	10	22	27	40	32	30	48
5137	Petersburg Creek (Kupreanof Is.)	0.0	1.0	0	1	1	1	1	1	1
5138	Southern Lindenberg Penin. (Kupreanof Is.)	0.0	1.0	10	27	28	38	31	31	50
Average				**1**	**4**	**6**	**13**	**9**	**8**	**16**
Forest-wide				**1**	**2**	**2**	**5**	**3**	**3**	**5**

1 Scores range from 0 to 1.0, with higher numbers indicating higher habitat quality.
2 High quality habitat was defined as the top 25 percent of acres within each WAA with the highest HSI scores. The analysis excluded all lands with HSI scores of 0 before identifying high quality habitat; WAA 202 contains only two polygons, both with HSI scores of 0, and therefore was not included in this table
3 This analysis assumes maximum timber harvest levels and takes the Model Implementation Reduction Factor (MIRF) into account (see the *Timber* section for additional discussion).

Alternatives 4 and 7, in increasing order, would have the greatest potential to lead to over-hunting of mountain goats and black bears because of increased access.

Both mountain goats and black bears are also susceptible to disturbance associated with helicopter overflights and landings. In a study of mountain goat responses to helicopter disturbance, Cote (1996) documented temporary displacement from the area of disturbance, the disintegration of social groups, and injury while fleeing. Cardiac responses (i.e., elevated heart rate) have been documented in bighorn sheep which occupy similar habitats. Distance between animals and helicopters appears to be the most important factor affecting mountain goat responses and disturbance can occur as far away as 2 kilometer from a helicopter flight (Cote 1996). Though no studies have been completed to date that examine the long-term consequences of this disturbance on mountain goats (Wilson and Shacklston 2001), it has been suggested that behavioural disruptions in response to disturbing stimuli result in demographic consequences (e.g., Côté 1996). For example, disturbance increases energy expenditure due to the flight response, and has the potential to affect foraging, socialization, and other life-history strategies which could ultimately affect mortality and natality. This would be most likely when mountain goats are already under seasonal nutritional or energetic stress such as when they are on winter range or kidding areas,.

Recent trends indicate that use of helicopters by the tourism industry to reach remote areas has increased since 1997 and is anticipated to continue increasing (see Recreation section for further discussion). However, Forest Plan standards and guidelines in place address helicopter use at the project scale, though there is still some uncertainly related to their adequacy due to the lack of long-term studies on disturbance effects.

River Otter

River otters prefer habitats immediately adjacent to coastal and fresh water aquatic environments, with most use occurring within 500 feet. Old-growth forests in these areas provide the highest value habitat, providing cover and burrow and den sites (Suring et al. 1988). The majority of otter habitat is secure under the existing Forest Plan because of beach, estuary, and riparian Forest-wide standards and guidelines; therefore, there is no increased risk associated with Alternatives 1, 2, 3, 4, 5, and 6, which maintain existing 1,000-foot Beach and Estuary Buffer standards and guidelines. Alternative 7 proposes to reduce the beach fringe buffer to 500 feet. Although most use by river otters occurs within this distance, the additional 500 feet are important for providing connectivity. Consequently, the reduced buffer under Alternative 7 may result in more road construction and timber harvest closer to areas inhabited by otters thereby providing less protection of otter habitat.

American Marten

The most important factors related to viability of the marten populations on the Tongass are the large amount of habitat in OGRs and non-development LUDs, followed by habitat characteristics of the matrix. Within the matrix, forest structure at the stand level (e.g., forest cover and components that contribute to structural diversity such as large trees, snags, and downed logs) and landscape connectivity are important factors. Marten are strongly associated with late-seral and old-growth forests below 1,500 feet in elevation. They are also wide ranging and require large tracts of contiguous habitat to move across the landscape, as well as habitats capable of supporting an adequate prey-base of small mammals.

The elevation preferences for marten presents the potential for a viability concern in that high quality habitats generally contain a greater, relative proportion of mature forest and thus have also historically received a disproportionately high level of harvest and associated road effects of harvest. That is, new roads may lead to increased human access and thus the potential for increased trapping pressure. Consequently, beach and riparian zones are particularly important for this species in terms of landscape connectivity and prey habitat diversity. As noted under the Affected Environment section, recent research has shown that prey availability and harvest play significant roles in the population dynamics of this species.

There are currently approximately 1.83 million acres of high volume (SD5N, SD5S, and SD67 categories) old growth below 1,500 feet in elevation on the Tongass. Under Alternative 5 (No Action), a maximum of 9.7 percent of these acres could be harvested over the next 100+ years. Alternatives 1, 2, 3, and 6 would each protect more acres of high-volume old growth below 1,500 feet elevation than Alternative 5, with potential harvest ranging from 2.0 percent of the acres under Alternative 1 to 9.3 percent of the acres under Alternative 6. Alternatives 4 and 7 would protect fewer acres of high-value marten habitat, with the potential harvest ranging from 13.8 percent to 17.2 percent, respectively.

Based on the 1997 expert panel assessments for marten (DeGayner 1997), it can be concluded that Alternative 5 (which is the equivalent of Alternative 11 in the 1997 Forest Plan Revision Final EIS) would have a moderate likelihood of sustaining viable, well-distributed marten populations because it incorporates three key features thought important for marten use: wider riparian management buffers; 1,000-foot beach and estuary buffers; and a system of small, medium, and large reserves (Appendix D). Subsequent to the panel assessment, Alternative 5 was strengthened by incorporating additional measures, including the requirement for special prescriptions for managing high-value marten habitat in timber harvest areas to retain important components of forest stand structure in higher risk biogeographic provinces where timber harvest has reduced the abundance of habitat components important to marten. The overall objective was to avoid the creation of additional significant gaps in marten habitat that could inhibit interaction between subpopulations by limiting harvest units to 2 acres in size and applying even-aged harvest at a 200-year rotation in highly fragmented VCUs and, in less fragmented

VCUs, retaining structures that will allow harvested units to regain value as marten habitat in a relative short amount of time by retaining coarse woody debris and green trees to act as a source of woody debris during the next rotation (Appendix N, 1997 Final EIS). These Marten Habitat standards and guidelines only apply to areas identified as high value habitat by the marten habitat capability model.

Alternatives 1, 2, 3, and 6 maintain key features and management prescriptions under Alternative 5, propose the less cumulative harvest of POG (acres after full implementation of the Forest Plan), and protect more POG and a higher percentage of larger tree POG types in reserves. These alternatives also replace the existing Marten Habitat and Goshawk Foraging standards and guidelines with a Forest-wide Legacy Structure standard and guideline. The Legacy Forest Structure standard and guideline continues to meet the objectives of maintaining sources of coarse woody debris important for marten and of reducing fragmentation to facilitate movements of marten between OGRs and is to be applied in the high risk VCUs Forest-wide, including the biogeographic provinces that have not had concentrated past timber harvest activity but where concentrated harvest could take place in the future. Additionally, it specifies a clumped distribution of reserve trees and therefore would implement a larger number of acres of even-aged management, whereas the existing standards and guidelines specify that reserve trees be uniformly distributed across a unit (see Section 2.5 of Appendix D for a detailed analysis and comparison). In addition, the potential road densities are lower under Alternatives 1, 2, 3, and 6, thereby reducing the chances of increasing trapping pressure on marten through increased human access. Therefore, Alternatives 1, 2, and 3 provide better protection of key marten habitat components and connectivity across the landscape than Alternatives 5 (No Action), and are more likely to continue to support well distributed, viable marten populations on the Tongass. Alternative 6, which harvests slightly less timber than Alternative 5, would also be expected to have a moderate likelihood of sustaining well-distributed viable populations of marten (Appendix D). Similar to Alternative 5, Alternative 6 was strengthened by incorporating additional measures that would increase the likelihood of maintaining habitat to sustain viable marten populations. Measures include increased protections of old growth in both the reserve system and within non-development LUDs, standards and guidelines regarding trapping mortality and road density and the Legacy Forest Structure standards and guidelines. Given the smaller suitable land bases and implementation of the Legacy Structure standards and guidelines under Alternatives 1, 2, and 3, these alternatives are expected to have a very high (Alternative 1) to high (Alternatives 2 and 3) likelihood of sustaining viable, well-distributed populations of marten over the long-term (Appendix D).

Alternatives 4 and 7 propose to harvest amounts of POG similar to Alternatives 6 and 2 of the 1997 Forest Plan Revision Final EIS, respectively (greater than under Alternative 5), reduce or eliminate the OGRs system, and eliminate the Goshawk Foraging and Marten Habitat standards and guidelines. In addition, there is no Forest-wide Legacy Forest Structure requirement. Alternative 7 would also reduce the beach fringe from 1,000 to 500 feet. Based on the 1997 expert panel assessments (Iverson 1996a, DeGayner 1997) both Alternatives 4 and 7 would be rated as having a moderate chance of maintaining habitat sufficient to support well-distributed viable marten populations across the Tongass (Iverson 1996a, DeGayner 1997). As a result,it is likely that under these alternatives more isolated populations could result. The extensive planned roading, potentially leading to increased trapping pressure, continued fragmentation of habitat, and the higher harvest rate for the important high-volume old-growth forest component were factors cited by panelists that contributed to these conclusions.

Brown Bear

The quality and quantity of riparian habitats play an essential role in sustaining brown bear populations, both in terms of the maintaining adequate vegetative cover to support anadromous fish production (i.e., regulate stream temperature) and providing visual obscurity of bears from humans and other bears. The existing Brown Bear standard and guideline requires a minimum no-harvest buffer of 500 feet around important brown bear foraging sites. Additionally, the reserve system serves as an important source of roadless refugia for bears, reducing the possibility of human-bear interactions. The 1997 Forest Plan panel members viewed factors that increased road construction and repeated human entry into a watershed as adverse to brown bears. Of particularly concern are activities that are dispersed or occur over an extended time period because once an area is roaded for one development activity, it often results in additional developments that increase human-bear interactions, and ultimately reduce the area's capability for supporting high bear populations. Wilderness and LUD II areas were determined to essentially ensure brown bear persistence somewhere in Southeast Alaska over the 100-year planning horizon.

Alternative 5 (No Action) emphasizes protection of known high value brown bear areas, protection of riparian habitats, control of human access, sanitation management, and the system of OGRs to maintain viable and well distributed brown bear populations on the Tongass. Based on the 1997 Final EIS expert panel assessments, Alternatives 5 and 6 (equivalent to Alternative 11 of the 1997 Final EIS) would be ranked as having a high likelihood of maintaining viable brown bear populations over the long-term due to the reserve system (related to road effects) and the riparian buffer requirements (Meade 1997). Alternatives 1, 2, and 3, which maintain the conservation measures in place under Alternative 5 related to brown bears but propose less timber harvest and road construction, would have a very high (Alternatives 1) or high (Alternatives 2 and 3) likelihood of maintaining well-distributed, viable brown bear populations over the long term (Appendix D).

As noted in the description of the Affected Environment in this section, brown bears are primarily found north of Frederick Sound. Alternative 4 maintains some protection of known high value brown bear areas by requiring OGRs in the Northeast Chichagoff Island biogeographic province within ADF&G GMU 4 (Admiralty, Baranof, Chichagof, and surrounding islands), which supports the highest concentration of brown bears in the world. It is important to note though that Northeast Chichagof Island continues to support this population despite already having experienced a high level of timber harvest with roads having been built in nearly every watershed, many of which are closely associated with major fish streams (ADF&G 2000). In addition, Alternative 4 would also locate an individual reserve, the Eva Lake reserve, which is currently designated as Semi-remote Recreation LUD, in an ADF&G brown bear special use zone on Baranoff Island. Alternative 7 would completely eliminate the OGR system. Based on the 1997 panel assessment (Meade 1997, Iverson 1996b) Alternatives 4 and 7(equivalent to Alternatives 6 and 2 of the 1997 Final EIS, respectively) would be ranked as having a moderately high relative likelihood of maintaining well-distributed, viable brown bear populations with some potential for the development of temporary gaps in distribution, due to the reduction in the reserve system (Appendix D). Although, risk would be greatest under Alternative 7 due to the more extensive timber harvest, associated road construction, and absence of an OGR system. OGRs serve as important roadless refugia for bears where human-bear interactions can be minimized, and that provide connectivity between upland areas and habitats used by bears for foraging (riparian areas, beach fringe, and estuaries). Therefore, Alternatives 4 and 7 are the most likely to adversely affect brown bears by reducing the amount of roadless refugia secured from timber harvest, which could prevent access to important habitats, impede movement through corridors, and increase the risk of over-harvest and DLP mortality.

Road densities are another measure of the potential impact of the alternatives on brown bears. Primary concerns include increased hunting or poaching, and disturbance during critical life stages (e.g., late-summer feeding periods for bear). Habitat fragmentation, as well as habitat loss secondary to activities that are facilitated by vehicular access (e.g., timber harvest, mining, residential development) are other potential impacts. Open roads, which receive the highest and most consistent use, are likely to have the greatest effect on brown bears, although closed roads still facilitate access (e.g., off-highway vehicle, pedestrian) to roadless areas. There is no road density threshold for brown bears, per se, however it can be assumed that increased road density elevates the potential for human-bear interactions.

Road density was evaluated by WAA in ADF&G GMU 4, which includes Admiralty, Baranof, Chichagof, Kruzof, Yakobi, and neighboring islands, and is the only island group in Southeast Alaska with a persistent, high density population of brown bears. Current road densities (all roads included) are highest on Chichagof Island, Northeast Chichagof Island, and North Kruzof Island. These WAAs are likely to experience the greatest cumulative effects of road access (increased potential of human-bear interactions) associated with increased road density. They are also where the greatest increases in road density are proposed under the alternatives. Within these higher risk WAAs, road density increases would be greatest under Alternative 7, followed by 4, 5, 6, 3, 2, and 1; one exception is WAA 3311 where road density would only increase under Alternatives 4, 5, 6, and 7. There are also two WAAs on Baranof Island (3314 and 3315) that could become areas of higher risk under all alternatives;no road density increases would occur under any of the alternatives on Admiralty Island.

Alexander Archipelago Wolf

Two principal management concerns associated with maintaining well-distributed and viable wolf populations in Southeast Alaska are that 1) current mortality rates in localized areas such as north Prince of Wales Island (POW), may result in local declines in the wolf population, and 2) long-term reductions in deer habitat capability resulting from timber harvest may negatively affect wolf populations (Interagency Wolf Conservation Assessment; Person et al. 1996). Though wolves exploit a variety of food resources across the Tongass, deer are their primary prey and predator/prey interactions between wolves and deer have been demonstrated to be implicitly linked to wolf persistence. That is, if deer habitat capability in a territory is reduced to such an extent that it can no longer support a reproductively successful pack, it could create a gap in wolf distribution, particularly on islands that experience a substantial decline in deer numbers, or result in a lower density wolf population with larger pack home range sizes (Mech et al. 1998, Person et al. 2001, Fuller et al. 2003). This concept was identified as the most important factor limiting wolf viability by the 1997 Forest Plan panel assessment. Recent research (*Alexander Archipelago Wolf*, presented at the Tongass Conservation Strategy Review Workshop 2006) has shown that the population on POW Island is genetically isolated from other Tongass populations, which presents profound implications for maintaining well-distributed wolf populations in light of local declines, given that these populations are are more sensitive to human activity and habitat disturbance than wolf populations elsewhere in the state (Schoen and Person 2007). Local declines on POW Island have been linked to the influence of road densities that provide greater trapping and hunting access to significant proportions of the wolf range, which increases wolf vulnerability to both legal and illegal mortality. The following analysis focuses on GMUs 2 and 3, which support 60 to 70 percent of the wolf population in Southeast Alaska.

To address impacts to wolves, the potential effects of the alternatives on the availability of deer to wolves were evaluated. Though prediction of the response of the wolf population to changes in the deer population is speculative at best, a decline in the deer population would likely result in a decline in the wolf population and a reduction in wolf density. Resonating effects could include reductions in opportunities to harvest wolves. The Wolf standards and guidelines state that habitat to support a density of 18 deer per square mile is necessary to provide wolves and hunters with adequate foraging/hunting opportunities (see TPIT clarification letter regarding correct interpretation of deer density stated in Wolf standards and guidelines and additional discussion below regarding subsequent modification). This density does not represent actual population density and is not related to wolf viability, but represents the functioning of the predator-prey system dynamic. Although the Tongass and the ADF&G conduct limited deer pellet surveys to estimate deer population trends, robust deer density estimates are not available for the Tongass because surveys are conducted in a very limited number of areas (they focus on areas with heavy hunting pressure) and are inconsistently conducted from year to year. Given these limitations, impacts to actual deer density cannot be quantified per se; however, some generalizations can be made about the effects of changes in habitat capability on deer numbers if information about current population trends is known.

It can be assumed that the carrying capacity for deer, or the maximum population size that a given area can support, influences how a deer population might react to changes in habitat capability. That is, if habitat capability were substantially reduced in an area, a deer population may simply slow in growth or stabilize if the population is below carrying capacity, or it may dramatically decline if it is at, or exceeding, carrying capacity because resources would no longer be adequate. This in turn relates to the influence of wolf predation on the deer population in that predation can be compensatory if the population exceeds carrying capacity (i.e., wolves kill deer that normally would have died of starvation), or additive if the population is below carrying capacity (i.e., wolves kill healthy deer that normally would have survived the winter). In the latter case wolf predation may contribute to a locally declining deer population and may actually suppress recovery of deer populations following severe declines (Person et al. 1996, Person 2001, Bowyer et al. 2005). This effect is sometimes referred to as a predator pit. For example, the slow rebound in the deer population on some of the south central islands in the Alexander Archipelago following severe winters in the late 1960s and early 1970s have been attributed to a combination of factors, including several severe winters, low-quality winter deer habitat in some locales (such as Kupreanof Island), and predator suppression (Kirchhoff 2003). Clearly, deer populations and the ability of a habitat to support deer are influenced by a myriad of factors not accounted for in this comparison. Weather, hunter effort, current deer population trends, allowed hunting pressure, and the presence of other predators are some of the factors that influence deer numbers and the magnitude of impacts related to changes in habitat capability. Moreover, there are time-lag effects associated with changes in habitat capability.

The 2005 ADF&G deer management report provides general information on deer population trends by GMU (Porter 2005, Lowell 2005). Both GMU 2 and 3 populations have historically fluctuated with the most severe declines having been associated with winter weather; however predation and illegal harvest have extended these declines. Current ADF&G management goals, which are to increase population levels in these units, indicate that deer populations are below carrying capacity. Deer populations in GMU 2 are reported to be at moderate levels but expected to decline; deer populations in GMU 3 are reported to be stable with some localized variation. Continued logging is anticipated to result in a decrease in carrying capacity over the long-term due to reductions the amount of available winter range. In GMU 2 a reduction in carrying capacity of up to 60 percent has been projected (Porter 2005). This means that over the long-term reductions in habitat capability could cause deer numbers to decline, reducing the number of deer available to wolves.

Timber harvest of important deer winter range reduces modeled deer habitat capability over the long term. Immediate concerns with all action alternatives focus on the cumulative effects of past timber harvest on the reduction in deer habitat capability on Prince of Wales and Kosciusko Islands (GMU 2), where a substantial amount of harvest has already occurred. In the 25 WAAs on Prince of Wales and Kosciusko islands, reductions in deer habitat capability would be greatest under Alternatives 4 and 7. Alternatives 1, 2, 3, and 6 would result in an equal or smaller reduction in deer habitat capability on these islands than Alternative 5 (No Action) (Table 3.10-7). The risk of not sustaining a well distributed, viable wolf population increases under Alternatives that have multiple WAAs within a single biogeographic province where large reductions in deer habitat capability would occur and where deer habitat capability is already low, but would be further reduced (e.g., WAAs on North Central Prince of Wales and South Prince of Wales biogeographic provinces). In several cases, deer habitat capability under Alternative 7 would be reduced to below 40 percent of that existing in 1954 prior to large-scale timber harvest. Of the 16 WAAs on Kuiu, Kupreanof, and Mitkof islands (GMU 3) maximum estimated reductions in habitat capability range from 2 to 47 percent. Risks to wolves would be slightly lower on these islands due to the lower level of planned timber harvest.

An index of the ability of the alternatives to support deer populations capable of maintaining sustainable wolf populations and meeting human harvest demands can also be approximated by using the deer habitat capability model to project habitat capability in terms of deer density (i.e., the number of deer per square mile an area may be capable of supporting) for comparison with the Wolf standard and guideline described above. In the wolf conservation assessment (Person et al. 1996), a population density of 13 deer per square mile, was recommended to maintain sustainable wolf populations, assuming an annual deer reproductive rate of 30 percent. This equates to approximately 17 deer per square mile at carrying capacity (Person et al. 1996). That is, to provide for a population of 13 deer per square mile there needs to be an average long-term habitat capability of 17 deer per square mile over broader areas. This number was later revised to the current value of 18 deer per square mile as stated in the standard and guideline. It must be emphasized that these model outputs do not represent actual deer densities and cannot be used to predict changes in the prey base available to wolves and hunters, rather they are intended as one method of making relative comparisons among the alternatives. At the project level, other factors such as local knowledge of habitat conditions, spatial location of habitat, and other site-specific information need to be considered

Based on ADF&G recommendations, habitat capability in terms of deer density was calculated by assuming a density of 100 deer per square mile for an HSI of 1.0. Only WAAs where wolves potentially occur (GMUs 1, 2, 3, and 5) were included. Table 3.10-9 shows long-term wolf habitat capability in terms of deer per square mile.

The Wolf guideline is intended to apply to biogeographic provinces where deer are the primary prey of wolves. Thus, the number of WAAs that appear to fall below 18 deer per square mile in terms of habitat capability is inflated because many either do not naturally contain much suitable deer habitat or are areas where wolves also prey heavily on species other than deer such as moose, beaver, or mountain goats. All of the alternatives increase the number of WAAs that do not maintain habitat capable of supporting 18 deer per square mile, the greatest number being added under Alternative 7, followed by Alternatives 4, 5/6, 3, 2, and 1, respectively. Most of the WAAs that currently meet the Wolf guideline, but may not meet it in the future after 100+ years of implementation, are located in the North Central Prince of Wales and Revilla Island/Cleveland Peninsula biogeographic provinces.

Table 3.10-9.
Comparison of Alternatives in terms of their Long-term Ability to Meet the Wolf Guideline of Providing Sufficient Habitat to Support 18 Deer per Square Mile after 100+ Years of Forest Plan Implementation [1]

	Increase in Percent of WAAs, Relative to 1954 Conditions, with Model-generated Habitat Capability <18 Deer/Sq. Mi. [2]	Biogeographic Provinces of WAAs Affected by Implemention of the Alternatives [3]
1954 Conditions[4]	--	-
Current Conditions	+12%	-
Alternative 1	+16%	14, 15
Alternative 2	+17%	11,14, 15, 18
Alternative 3	+25%	11, 14, 15, 18
Alternative 4	+22%	9, 10, 11, 12, 14, 15, 18, 20
Alternative 5	+22%	9, 10, 11, 12, 14, 15, 18, 20
Alternative 6	+22%	9, 10, 11, 12, 14, 15, 18, 20
Alternative 7	+25%	9, 10, 11, 12, 14, 15, 18, 20

[1] Assumes full implementation of Forest Plan at ASQ levels.

[2] Excludes WAAs where wolves do not occur (Admiralty, Baranof, and Chichagof islands and associated small islands) and WAAs with naturally very low deer densities (WAAs 4302-4607). Habitat capability in terms of deer density calculated using a multiplier of 100 deer per square mile equating to a habitat suitability index score of 1.0.

[3] Biogeographic Provinces: 9 = Northern Coast Range; 10 = Kupreanof/Mitkof Island; 11 = Kuiu Island; 12 = Central Coast Range; 14 = North Central Prince of Wales; 15 = Revilla Island/Cleveland Peninsula; 18 = South Prince of Wales; 20 = South Misty Fiords (some WAAs may overlap more than one biogeographic province)

[4] Approximately 69 out of 122 WAAs (57%) were estimated to have had deer habitat capabilities <18 deer per square mile in 1954.

As noted above, human access on roads may result in wolf mortality by both legal and non-legal harvest. Therefore, road densities are a factor to consider in sustaining wolf populations. Person et al. (1996) suggested that roadless and unfragmented reserves should be established in biogeographic provinces where extensive timber harvesting is planned to reduce long-term risks to wolf viability. Reserves of approximately 50,000 acres for each 192,000 acres of landscape area were considered necessary to support relatively secure core wolf populations. Spacing among reserves was not a critical criterion due to the extensive movement capability of wolves. The 1997 Forest Plan established habitat reserves in excess of this amount in Prince of Wales/Kosciusko islands and Kuiu/Kupreanof/Mitkof islands, including one reserve greater than 200,000 acres in size in the North Central Prince of Wales biogeographic province. Based on reductions in deer habitat capability and the existence of roadless refugia, Alternative 11 in the 1997 Final EIS (Alternative 5 here) was determined to meet the reserve criteria identified by Person et al. (1996) and was ranked as having a high likelihood of sustaining persistent core wolf populations and reducing risks to long-term viability in the two principal areas of concern in Southeast Alaska (GMU 2 and 3) as well as the remainder of the historic wolf range on the Tongass (Iverson 1997c, 1996c) (Appendix D). Alternatives 3, 4, and 6 would also be rated high (Appendix D). Given the higher level of timber harvest and reduction of the Old-Growth Habitat

LUD under Alternative 7 would have a moderately high likelihood of maintaining well-distributed, viable wolf populations.

The current Wolf standards and guidelines state that “where road access has been determined through analysis to significantly contribute to wolf mortality…open road densities of 0.7 to 1.0 mile per square mile or less may be necessary to reduce mortality to sustainable levels.” This metric is appropriately applied at the project level to areas that are the approximate size of an average wolf pack territory (about 74,000 acres; Person et al. 1996). For this analysis, total road densities were calculated by WAA, the average size of which is 90,000 acres. Thus, road densities reported here are likely slightly lower than what could actually be experienced within a wolf pack territory. Currently, out of the 54 WAAs in GMUs 2 and 3, there are 19 WAAs with total road densities greater than 1.0 mile per square mile (including both NFS and non-NFS lands). After full implementation of the Forest Plan (100+ years), the total number of WAAs where this is exceeded would be greatest under Alternative 7 (30 WAAs), followed by Alternatives 4 (29 WAAs), 5 and 6 (28 WAAs), 3 (27 WAAs), 2 (25 WAAs), and 1 (23 WAAs) Although additional research is needed to determine whether or not a direct correlation exists between local wolf population dynamics and road density, research indicates that the likelihood of maintaining viable wolf populations would be lowest in areas that have the highest road densities, due to higher trapping and hunting harvest rates (*Alexander Archipelago Wolf*, presented at the Tongass Conservation Strategy Review Workshop 2006), though this is situation-specific in that it depends on how accessible roads are (i.e., whether they are near main road systems or human settlements). In addition, harvest levels can be controlled through regulations. However, Alternatives 4 and 7, in increasing order, would be most likely to result in increased harvest pressure and illegal mortality associated with higher road densities. However, if a viability concern emerged, there are other Forest-wide standards and guidelines in place that would mitigate road-related effects including road closures that effectively prohibit motorized vehicle traffic (e.g., bridge and culvert removal) and off-highway vehicle restrictions.

Bald Eagle

Bald eagles primarily nest in old-growth trees along the coast and within riparian areas. Over 90 percent of the known nests on the Tongass are within 50 feet of the saltwater beach. The Bald Eagle and Riparian Forest-wide standards and guidelines are specifically designed to protect nesting habitat and the current Forest Plan includes 1,000-foot beach and estuary buffer requirements. The amount of nesting habitat in OGRs, non-development LUDs, and the 1,000-foot beach and estuary buffer protects virtually all bald eagle nesting habitat on the Tongass. All of the action alternatives considered here would maintain these standards and guidelines and provide the same level of protection as the current Forest Plan, with the exception of Alternative 7, which proposes to reduce the beach fringe buffer to 500 feet. Therefore, only slight effects to bald eagles are expected under Alternatives 1, 2, 3, 4, 5, or 6. Under Alternative 7, protection of bald eagle nests occurring beyond 500 feet from saltwater would be reduced to the required 330-foot nest buffer, which would limit protection of nesting habitat to the area around known nests. This would reduce the overall amount of habitat potentially available for nesting in areas where road construction and harvest occur.

Red-breasted Sapsucker, Hairy Woodpecker, Brown Creeper, and Red Squirrel

These species rely on legacy components (e.g., large diameter trees, snags) of the old-growth forest ecosystem for nesting and foraging. A simple index of the level of habitat protection provided by each alternative is the amount of suitable old growth schedule to be harvested. After full implementation of the Forest Plan, the greatest percentage of existing POG could be harvested under Alternative 7 (16 percent), followed by Alternative 4 (13 percent), Alternatives 5 and 6 (9 percent), Alternative 3 (6 percent), Alternative 2 (4 percent), and Alternative 1 (2 percent) (see Table 3.10-5). Thus, Alternatives 7, 4, 5, 6, 3, 2, and 1 would have an increasingly greater chance of maintaining habitat capable of supporting well distributed, viable populations of these species.

Under Alternative 5 (No Action), non-development LUDs provide broader protection for old-growth forest, where as Reserve Tree/Cavity-nesting Habitat, Goshawk Foraging, and Marten Habitat standards and guidelines provide protection to old-growth habitat components within matrix lands. The application of two-aged and uneven-aged management under Alternative 5 provides further habitat protection for these species. The current Goshawk and Marten standards and guidelines are applied to areas of the Forest with the greatest amount of disturbance. Although the new Legacy standard and guideline proposed under Alternatives 1, 2, 3, and 6 would affect less overall area, it would be applied on a Forest-wide basis and require that retained trees and snags be representative of the existing stand age, species composition, and structural components (Appendix D). In contrast, neither the Goshawk Foraging, the Marten Habitat, nor the new Legacy Forest Structure standards and guidelines would be implemented under Alternatives 4 and 7. Therefore under these alternatives there would be no quantitative direction for the retention of structure, and consequently, together with the higher rate of harvest, Alternatives 4 and 7 would have greater effects on these species.

Vancouver Canada Goose

Vancouver Canada geese use wetlands (forested and non-forested) in the estuary, riparian, and uplands areas of the forest. Habitat needs for these species are specifically provided for under the waterfowl standards and guidelines, which apply to specific sites, and a 100-foot buffer around lakes or streams. The beach, estuary, and riparian Forest-wide standards and guidelines provide additional protection to habitats used by Canada geese. Consequently, there is no increased risk of habitat loss associated with any alternatives considered under this Forest Plan amendment, with the exception of Alternative 7, which proposes to reduce the beach fringe buffer to 500 feet and could result in the loss of suitable habitat in areas outside of this buffer if timber harvest and associated activities occur.

Other Species of Concern

Marbled Murrelet

Distributional and ecological information about marbled murrelets in Southeast Alaska is largely lacking but high value habitats appear to be those found within large, contiguous blocks of high volume, low-elevation old-growth forest. Fragmentation and loss of overstory cover are two threats associated with development activities, such as timber harvest, that are correlated with increased predation. Alternative 11 of the 1997 Forest Plan Final EIS (Alternative 5 here) was determined to provide a very high likelihood of sustaining well distributed murrelet populations throughout Southeast Alaska due to the reserve system, which includes at-risk landscapes with high levels of past timber harvest, as well as beach and riparian protection.

Alternative 7 proposes to harvest the greatest amount of existing POG (16 percent), and thus provides the least protection to marbled murrelets due to direct habitat loss and fragmentation and the limited reserve system. This is followed, in decreasing order of potential impacts, by Alternative 4 (13 percent), Alternatives 5 and 6 (9 percent), Alternative 3 (6 percent), Alternative 2 (4 percent), and Alternative 1 (2 percent) (Table 3.9-5). Alternatives 1, 2, 3, 5, and 6 would be judged as having a very high likelihood of maintaining viable and well distributed marbled murrelet populations, Alternative 4 was judged high, and Alternative 7 was judged moderately high (Appendix D).

Spruce Grouse

Spruce grouse have historically inhabited forests showing a disturbance-related patchwork of various stages of regeneration. Timber harvest can produce similar patterns, but only if clearcut areas are small and if sufficient quantities of forested habitat are preserved. Spruce grouse inhabit some of the most highly modified landscapes on the Tongass (e.g., Prince of Wales Island) where additional timber harvest could threaten the long-term survival of these highly isolated and scattered low-density populations. This has particularly important conservation implications since the subspecies that occurs in Southeast Alaska is endemic. Conservation measures including a system of non-development LUDs and standards and guidelines that maintain connectivity within matrix lands (e.g., various buffer requirements) are essential to facilitating dispersal and interchange between isolated populations. Spruce grouse are also vulnerable to hunting and exploitation, correlated with road access, because they are not wary of humans, though viability is not an immediate concern given the level of harvest permitted in this area.

Spruce grouse are an important prey species for goshawks and marten. In a study of goshawk diet during the breeding season in Southeast Alaska, birds (including spruce grouse) comprised a larger proportion of goshawk diet on Prince of Wales Island than elsewhere due to the limited number of prey species, many of which are sensitive to timber harvest activities (Lewis et al. 2006). This study concluded that the ability of goshawks to successfully reproduce in Southeast Alaska and on Prince of Wales Island in particular, appears to be affected by the extensive landscape alteration in this region in combination with the restricted prey base. Thus, alteration of spruce grouse habitat could have a resonating effect on predator populations.

Given the current level of habitat modification in areas of the Tongass occupied by spruce grouse, the greatest protection would be provided by alternatives that propose the least amount of POG harvest and those with provisions for maintaining landscape connectivity. As described above under the marbled murrelet analysis, the greatest amount of habitat protection would be provided by Alternative 1, followed by Alternatives 2, 3, 6, 5, 4, and 7. Alternative 1, 2, 3, and 5, also include the most measures for maintaining landscape connectivity through the existing system of OGRs, where as Alternatives 4 and 7 reduce or eliminate the OGR system, respectively. Thus the alternatives in this order would have a decreasing likelihood of sustaining spruce grouse populations capable of providing an adequate prey base for goshawks and other predatory species and sustaining current levels of harvest.

Prince of Wales Flying Squirrel

Given that flying squirrel density in Southeast Alaska is highest in POG and closely tied to the abundance of large trees and snags, and that timber harvest occurs in forests where these habitat components are most abundant, the number of acres suitable for timber harvest is an appropriate measure of the relative effects of the alternatives on this species. The recent research described in the Affected Environment indicates that this risk is likely less than presumed because abundant noncommercial forests appear to contribute to breeding populations. Alternative 7 proposes the most acres of harvest, followed by Alternatives 4, 5, 6, 3, 2, and 1 (see Table 3.10-5 and the Marbled Murrelet discussion above). In addition to decreasing the abundance of these habitat components, timber harvest can also create openings that may be too large for flying squirrels to travel through, resulting in smaller, isolated populations that may be at risk of local extirpation. Consequently, a system of OGRs and retention requirements for forest legacy components are important for sustaining well distributed populations of flying squirrels.

Alternative 5 maintains the existing system of OGRs and Goshawk Foraging and Marten Habitat standards and guidelines that apply reserve tree requirements to matrix lands in the highest risk biogeographic provinces that have experience the highest cumulative effects of timber harvest (e.g., North Central Prince of Wales). Alternatives 1, 2, 3, and 6 also maintain the Forest-wide reserve system and replace the Goshawk Foraging and Marten standards and guidelines with the Forest-wide Legacy Structure standard and guideline; Alternatives 4 and 7 provide less protection because they include more area in development LUDs and do not include any of these standards and guidelines (see discussion under Red-breasted Sapsucker, Hairy Woodpecker, Brown Creeper, and Red Squirrel). In addition, Alternative 4 limits the OGR system to four of the most heavily logged biogeographic provinces, one of which is North Central Prince of Wales, and thus is not anticipated to affect Prince of Wales flying squirrels in that respect. Alternative 7 eliminates the Old-Growth Habitat LUD entirely. Consequently, Alternative 7 would have the greatest risk of creating isolated populations of flying squirrels susceptible to local extirpation both directly through habitat removal and through increased fragmentation by not incorporating provisions intended to maintain landscape connectivity.

Migratory Birds

Direct habitat and disturbance related effects to migratory birds would occur under all of the alternatives. The primary effect to birds would be nest destruction or abandonment if management activities occur in suitable nesting habitat during the breeding/nesting period, which generally begins in May and ends in September when young birds have fledged. The magnitude of the effects will vary depending on the alternative that is selected and the season in which disturbance would occur. It can be assumed that species most likely to be affected are those that nest in hemlock/Sitka spruce forests (e.g., blue grouse, rufous humming bird, and Pacific-slope flycatcher) where timber harvest occurs, and thus the amount of harvest proposed under the alternatives is a measure of the extent of potential effects.

Alternative 7 would remove the most POG after full implementation of the Forest Plan (roughly 100+ years) followed in descending order by Alternatives 4, 6, 5, 3, 2, and 1, respectively. Total percentage of POG harvest would range from 16.7 percent of existing POG under Alternative 7 to 1.7 percent of existing POG under Alternative 1. In addition, Alternatives 1, 2, 3, 5, and 6 include some provisions for retaining additional legacy forest structure either through the existing Goshawk Foraging, Marten Habitat, and Cavity-nester standards and guidelines (Alternative 5), or through a Forest-wide Legacy Structure standard and guideline. Therefore, these alternatives would provide more available legacy structure to migratory birds for nesting, roosting, and foraging than Alternatives 4 and 7, which do not include any legacy retention requirements.

Other effects of timber harvest and associated activities include the fragmentation and patch size reduction of suitable habitat. For species such as the varied thrush and Townsend's warbler, habitat removal would potentially reduce the effectiveness of interior habitat and increase the potential for nest-site predation from avian predators that are associated with forest edges and fragmented landscapes. The Conservation Strategy was designed to retain large blocks of old-growth distributed across the Forest, such that interior nesting habitat would be retained across the landscape. In addition, other retention in the matix, including the 1000' beach and estuary buffer, benefits migratory birds and mitigate negative effects of fragmentation in the matrix. Therefore, effects to species associated with interior forest conditions would be greatest under Alternatives 4 and 7, in increasing order, because they reduce or eliminated the OGR system, respectively. Effects to other species that are more closely associated with forest edge, riparian, or more open habitats would likely be negligible under Alternatives 1, 2, 3, 4, 5, and 6, which maintain species-specific and/or Forest-wide standards and guidelines that provide protection measures for key habitats (e.g., beach, estuary, and riparian buffers). However, the beach fringe buffer would be reduced to 500 feet under Alternative 7, thus decreasing the amount of protected nesting habitat in these areas and reducing the amount of interior habitat available. Some species, particularly those associated with edge habitats, may benefit from timber harvest proposed under any of the alternatives due to the creation of new habitat. Greatest adverse impacts to migratory birds would occur in the four most heavily disturbed biogeographic provinces where a majority of future timber harvest is concentrated (e.g., North Central Prince of Wales Island, Kupreanof/Mitkof islands, Revillagigedo Island/Cleveland Peninsula, and Etolin Island provinces).

Endemic Mammals

The 1997 Forest Plan Final EIS panel assessments evaluated 14 species or subspecies endemic to Southeast Alaska (Shaw and Smith 1995, Iverson 1997b). All of these species occupy restricted ranges, limited to a subset of islands in Southeast Alaska. Under the current Forest Plan all islands less than 1,000 acres were removed from the timber base to eliminate risk to these species associated with habitat loss or alteration from timber harvest. The 1,000-foot beach buffer, riparian corridors, and OGR system are also features of the current Forest Plan that provide functional habitat for species with relatively small home ranges. In addition, implementation of various standards and guidelines that apply within matrix lands will result in significant old-growth retention, which also benefits many endemic mammals. These protective provisions would be maintained under all the alternatives, with the exception of Alternative 7 under which the beach fringe buffer would be reduced to 500 feet and the system of OGRs eliminated.

The panel assessments emphasized that just being an endemic represented a naturally elevated viability risk and that all alternatives had some likelihood of causing extirpation of endemic species based on historical and proposed timber harvest activity and that this likelihood increased with higher levels of proposed harvest. This is consistent with recent science suggesting that the areas of greatest conservation concern in the Alexander Archipelago are biodiversity hotspots (i.e., areas where multiple endemic mammal lineages occur), many of which coincide with the most heavily impacted areas (Cook et al. 2006). Based on the 1997 expert panel assessments for endemics (Iverson 1997b), it can be concluded that Alternative 5 (which is the equivalent of Alternative 11 in the 1997 Forest Plan Revision Final EIS) and Alternative 6, which proposes to harvest slightly less timber, would have a moderate likelihood of sustaining viable, well-distributed populations of endemic mammals (Appendix D). Alternatives 1, 2, and 3, which propose to harvest less timber than Alternatives 5 and 6, would only build on the above scenario, but also would be ranked as having moderate likelihoods of sustaining viable, well-distributed populations of endemic mammals over the long-term. Because of the level of past harvest, the panel also rated a no-harvest alternative as having a moderate likelihood

Based on the expert panel assessments (Shaw and Smith 1995, Iverson 1997b) Alternative 4 (equivalent to Alternative 6 in the 1997 FEIS) would be rated as having a moderately low likelihood of maintaining viable, well-distributed populations of endemic mammals given proposed harvest levels. Alternative 7 (equivalent to Alternative 2 in the 1997 FEIS) would have a very low likelihood of sustaining well-distributed, viable endemic populations, and would have the highest likelihood among the alternatives to result in endemic populations that exist only in refugia (e.g., northern flying squirrel) or become extirpated (e.g., Keen's myotis).

Invasive Species

Although a number of non-native wildlife species have been accidentally introduced or transplanted in Southeast Alaska, the only species considered invasive (i.e., based on the definition that they cause harm to the economy, environment, or humans) at the present time is the Norway rat; elk in Southeast Alaska may be considered invasive in certain geographic areas due to their effects on habitat in areas to which they were not intentionally introduced. Although the current Forest Plan does not specifically address invasive species, its intent is to manage for native species, as evidenced by the Goals of the Forest Plan, and in the Biodiversity and Forest Health sections, albeit these sections emphasize invasive plants.

At the time of this writing, none of the alternatives propose changes to the management framework of the Tongass in relation to invasives and neither the Norway rat nor elk are addressed under the Forest Plan Monitoring section or standards and guidelines. However, the Alaska Region of the Forest Service is currently developing an invasive species strategy that will apply the principles of prevention, early detection, control, and rehabilitation in cooperation with various agencies and partners.

Activities that create or enhance the habitats preferred by invasive species may facilitate range expansion. This premise can be used as a measure of how the alternatives potentially contribute to, or reduce, the invasive species problem. Norway rats inhabit coastal habitats where the main cause of range expansion, or source of new introductions, is shipping activity. Management activities on the Tongass have no effect on shipping activity and therefore will not influence the occurrence of Norway rats.

In contrast, elk in Southeast Alaska have similar habitat requirements to black-tailed deer and therefore may benefit from habitat enhancement resulting from timber harvest. Timber harvest has been a precursor to both deer and elk population expansions in many parts of the western United States, due to the resulting increase in forage. Although, forest management activities on the Tongass will have no influence on the ability of elk to move between islands, they may affect the success of elk in colonizing new islands, particularly those in the vicinity of Zarembo and Etolin Islands where elk sightings are becoming more frequent, or the likelihood of expanding their distribution on larger islands where smaller populations exist.

Elk, like deer, require a mosaic of habitat types for foraging, finding shelter, and obtaining security from predators and humans. Timber management activities that create gaps in the forest canopy create a favorable environment for the establishment and growth of early seral vegetation, thus increasing the abundance and variety of forage available to elk (Skovlln et al. 1989). However, because of their wariness, elk generally forage in proximity to hiding cover and are not likely to use the interior areas of large gaps due to the lack of accessible cover (Thomas 1979). Elk have also been shown to avoid ongoing road construction and timber harvest, using adjacent areas of cover (e.g., late seral stands) until the conclusion of these activities. Therefore, over the short-term, elk will likely avoid areas of proposed timber harvest activities while activities are ongoing. However, over the long-term all of the alternatives have the potential to promote elk establishment in areas where they propose timber harvest. However, the extent to which this affects the expansion of the elk population is dependent upon the timing and location of timber harvest and associated activities. It is important to note however, that elk are a desired non-native species on Zarembo and Etolin islands where they were introduced. The Forest Service and ADF&G are working collaboratively to identify research needs including determining existing population levels and documenting the distribution of elk on these islands and elsewhere.

Alternate Risk Assessment Method

To determine whether the alternatives provided sufficient habitat to sustain all indigenous wildlife across the planning area the Forest Plan FEIS relied in part on the findings of structured panel assessments. As described above these panel assessments provided estimates of the relative risk, in the form of a probability, that implementating the range of management alternatives would pose to the continued persistence across the landscape of an array of species. Scores from individual panel members were averaged to assign probabilities to 5 possible outcomes related to population distributions: occupancy of historic range (Outcome I), temporary gaps in distribution (Outcome II), permanent gaps in distribution (Outcome III), existence in refugia (Outcome IV), and local extirpation (Outcome V).

Recently, Smith and Zollner (2005) argued that using the most vulnerable species to assess impacts of land management likely underestimates the probability of extinction of wildlife species across the planning area because the risk of local extirpation increases with the number of extinction prone species considered. Additionally, the management alternative that poses the greatest risk to the most vulnerable wildlife species may not pose the greatest risk to the wildlife community as a whole (Smith and Zollner 2005). The authors present an alternative method for assessing risk to wildife viability that considers the risk of “any” extinction among species at risk in the planning area. To accomplish this, an equation is used which calculates the joint probablitity of at least one extinction among the set of selected species to compare the relative, rather than absolute, risk of extinction among land management alternatives (see Appendix D and Smith and Zollner (2005) for the equation and for statistical details).

This method was used to rank the current alternatives in terms of relative level of viability risk, in order to consider an alternate method for risk assessment. The likelihood scores assigned by the 1995/96 and 1997 expert panels were used to develop the index. Section 3.6 in Appendix D presents the results of this alternate risk assessment for Alternatives 4, 5, 6, and 7, which are the alternatives most easily related to the alternatives assessed by the risk assessment panels.

Applying this risk assessment method indicates that, when all evaluated species are considered jointly, Alternatives 4 and 7 would have the greatest risks. This difference is driven primarily by potential risks to the endemic and widely distributed mammals groups, which have the highest risks of any species or group evaluated (Appendix D). The risk index was substantially lower for Alternatives 5 and 6. Because Alternatives 1, 2, and 3 would harvest less timber than Alternative 5 or 6, but maintain equivalent or more protective conservation measures, their risk indices would likely be lower than the corresponding indices for Alternatives 5 and 6. As expected based on harvest acres, the lowest risk indices would be associated with Alternative 1.

Monitoring and Evaluation Program

One facet of the Forest Plan amendment is a rigorous review of the Monitoring and Evaluation Program, including the MIS approach. As noted above, the MIS concept allows a manageable subset of species, whose response to land management activities can be used to predict the likely response of other species with similar habitat requirements, to be used in planning. Consistent with planning regulations under the NFMA, the Tongass has selected the list of 13 MIS described above and has developed monitoring strategies for each species to track population trends.

Forest Plan Standards and Guidelines narrow the selection of suitable indicator species to emphasize management for indigenous wildlife species and natural habitat (WLD112 I(B)), and to provide the abundance and distribution of habitat necessary to maintain viable populations of existing native and desirable introduced species well distributed in the planning area (WILD112 II(B)). To achieve this, the MIS monitoring effort has been designed to determine if population trends for MIS and their relationship to habitat changes are consistent with expectations.

An assessment of monitoring data collected since 1997 indicates several shortcomings. First, monitoring data are not collected at a scale, or with sufficient statistical rigor, to determine population status or trends for an area as expansive as the Tongass. Moreover, due to the inherent difficulty of monitoring many species, which is a fundamental problem underlying the MIS approach on the Tongass, data are derived from the best available sources, yet they are generally not appropriate for answering specific forest management monitoring questions. That is, they are not useful in identifying a link between habitat modification and population trends. Thus, there are few species actually able to provide insight into whether or not the Conservation Strategy is meeting wildlife objectives, as established by the Forest Plan. One challenge related to this is that limited funding may preclude the development of new monitoring strategies, or may be insufficient to support an increase in monitoring efforts to improve statistical rigor. It is important to note however, that these problems are not unique to the Tongass, as many national forests are evaluating their MIS lists, as well as the value of the MIS approach in general.

One potential option for revising the Monitoring and Evaluation program under consideration is to shift the focus to a select number of 'focal' species that could be more intensively monitored. These species would likely be those that are most easily monitored, have the greatest economic and/or cultural value, or whose viability is of greatest concern. Another approach would be to use surrogate measures for monitoring impacts to species of concern, such as habitat characteristics (e.g., snag abundance) or prey species, which may be more conducive to monitoring. For example, focusing monitoring efforts on red squirrels, and establishing a relationship between their population trends and habitat modifications, may provide a better insight as to how management activities are affecting marten and goshawks than actually surveying for these species. The redesignation of MIS for the Tongass is continuing to be evaluated and new MIS are not being proposed at this time. Broader adjustments to the proposed Monitoring and Evaluation Program have been incorporated into the accompanying Forest Plan.

Cumulative Effects

Activities that occur on other land ownerships within and adjacent to the Tongass have the potential to affect the overall context within which effects of Forest management on wildlife population distribution and viability are considered. Such reasonably foreseeable activities include, but are not limited to, timber harvest, residential development, mining, recreation and tourism, and road construction. Typically these activities have the potential to negatively impact wildlife populations through habitat conversion, fragmentation, and disturbance associated with road building, though some activities can have short-term or long-term beneficial impacts, depending on the species (i.e., improved forage quality and quantity for deer following timber harvest). Prediction of the future extent and intensity of such activities has a high degree of uncertainty associated with it on a Forest-wide basis over a broad time scale. As such, cumulative effects associated with specific projects are most appropriately assessed at the project level. Therefore, this analysis will examine effects associated with general trends in activities on non-NFS lands.

Many private lands in Southeast Alaska are already highly developed in terms of roading and timber harvest and are likely to experience a continuing decline in old-growth forest in the future. Therefore, the cumulative long-term trend within the Forest boundary under all alternatives is likely to be a decline in optimum habitat for most old-growth associated species, with non-NFS land contributing to this trend. When combined with other management activities occurring on non-NFS lands, all alternatives would produce additional impacts to some species, but to varying degrees. Cumulative effects are anticipated to be the greatest under Alternative 7, which proposes the highest amount of timber harvest, followed by Alternatives 4, 5, 6, 3, 2, and 1 in decreasing order, and would be most evident in areas where timber harvest is concentrated. Table 3.9-20 in the *Biodiversity* section summarizes the maximum long-term cumulative percent of the original POG that would be harvested in Southeast Alaska on all ownerships by biogeographic province. This table shows that the current cumulative past harvest on public and private lands equals 13 percent of all POG in Southeast Alaska (87 percent POG retention). Looking 100+ years into the future, cumulative POG harvest levels on all lands of Southeast Alaska would vary by alternative, ranging from 18 percent (80 percent POG retention) under Alternative 1 to 29 percent under Alternative 7 (71 percent POG retention). Under Alternatives 5 (no action) and 6 (proposed action), projected cumulative harvest levels would be 24 percent (76 percent POG retention). The highest rates of cumulative harvest would be in the North Central Prince of Wales biogeographic province (49 percent under Alternatives 5 and 6), Dall Island and Vicinity (45 percent under Alternatives 5 and 6), the Chilkat River Complex (44 percent under Alternatives 5 and 6), and Kupreano/Mitkof Island province (39 percent under Alternatives 5 and 6).

Cumulative harvest of high-volume and large-tree POG are summarized in Tables 3.9-21 and 3.9-22 of the *Biodiversity* section. These results show that because of historic disproportionate harvest, especially on private lands, the current cumulative past harvest of high-volume and large-tree POG in Southeast Alaska is estimated at 18 and 32 percent, respectively. Looking 100+ years into the future, cumulative high-volume POG harvest levels would again, vary by alternative, ranging from 25 percent (75 percent high-volume POG retention) under Alternative 1 to 35 percent under Alternative 7 (65 percent high-volume POG retention). Under Alternaties 5 (no action) and 6 (proposed action), projected cumulative harvest levels would be 30 percent (70 percent high-volume POG retention). Similarly, for large-tree POG, cumulative harvest levels would range from 38 percent under Alternative 1 to 48 percent under Altenative 7. Under Alternatives 5 and 6, projected cumulative harvest levels for large-tree POG would be 43 percent.

Evidence from theoretical and empirical studies suggests that the likelihood of a population persisting over time is related to some threshold level of habitat loss across the landscape (Fahrig 1997, 1999, 2003; Flather et al. 2002; Andren 1994). Haufler (2006) reviewed the literature and found that, based on modeling, habitat loss and reduction of population size are linearly related, up to some threshold. Below this threshold, the additional effects of habitat fragmentation increase the rate of population reduction, and in turn, the risk of extinction. Haufler (2006) also concluded that empirical studies provided support for this relationship.

Reported threshold levels for the percentage of habitat maintained at which the rate of landscape extinction increases range from 20 percent (Fahrig 1997) to 50 percent (Soule and Sanjayan 1998), depending in part on the dispersal capability of the species under consideration. In a modeling analysis, With (1999) demonstrated that landscape connectivity became a concern for species with some dispersal capability (e.g., wolves) when habitat was reduced to below 20 percent of the landscape, whereas when the landscape consisted of less than 40 percent habitat it became a concern for species with limited dispersal capabilities (e.g., flying squirrels). Natural fragmentation of habitats can also affect the level of additional fragmentation that can be supported.

None of the alternatives would result in less than 71 percent of the original POG remaining on the Southeast Alaska landscape after 100+ years. In addition, at least 51 percent of the original POG would be retained within each of the 23 individual biogeographic provinces under Alternatives 1, 2, 3, 5, and 6. Only under Alternatives 4 and 7, would this percentage fall below 50 percent, and then only in one province – North Central Prince of Wales (Table 3.9-20). Likewise, on a Southeast Alaska basis, none of the alternatives would result in less than 65 percent of the original high-volume POG remaining after 100+ years. At least 41 percent of the original high-volume POG would be retained in all 23 individual provinces under Alternatives 1, 2, 3, 5, and 6. In Alternatives 4 and 7, this percentage would decline to 39 and 33 percent in the North Central Prince of Wales province (Table 3.9-21). Finally, under each of the alternatives at least 52 percent of the large-tree POG would be retained over the entire landscape in Southeast Alaska after 100+ years. Under Alternatives 1, 2, 3, 5, and 6, this minimum percentage would range from 57 to 62 percent. For individual provinces, this percentage could drop as low as 31 to 33 percent in the East Baranof Island and Chilkat River Complex provinces under each of the alternatives, except Alternative 7 (Table 3.9-22). Under the latter alternative, the minimum percentage in the Kupreanof/Mitkog province could decline to 29 percent.

Although some wildlife species make higher use of the larger forest types defined by high-volume and large-tree POG, none of the wildlife species of concern are restricted to these habitats. In fact, all wildlife species make at least some use of types other than mapped POG (e.g., unproductive old-growth and older young-growth forests). Therefore, based on the reported habitat loss thresholds, it is unlikely that cumulative timber harvest would result in significant viability concerns for any species of wildlife in any of the provinces, except under Alternatives 4 and 7. The reduction of POG to below 50 percent in North Central Prince of Wales province, coupled with the greater reduction of larger forest types, would result in greater long-term viability concerns in this province under Alternatives 4 and 7. Under these alternatives, species with low dispersal capabilities, in particular, would have landscape connectivity concerns over the long term.

Additional effects, associated with the cumulative timber harvest described above, include road construction, which has the potential to impact wildlife species through habitat fragmentation, and access-related disturbance. Species that may be especially sensitive to this include forest interior species and large predators. Table 3.10-10 summarizes existing and proposed total (open and closed roads) road density by the number of WAAs within road density categories on NFS and combined (NFS and non-NFS) land ownerships. Generally road densities on private and state lands are greater than those found on adjacent NFS lands. In addition, there are no road closure/access management guidelines in place on these lands to reduce effects to sensitive species. The greatest cumulative road densities (NFS and non-NFS lands) would occur under Alternative 7, followed by Alternatives 4, 5 , 6, 3, 2, and 1. Maximum (i.e., proposed under Alternative 7) cumulative road densities would be greatest on Prince of Wales, Kupreanof, and Chichagof islands where a number of WAAs would exceed total road densities of 2 miles per square. Therefore the potential for habitat fragmentation, increased human access, and overharvesting of some species would be greatest under Alternative 7 followed by Alternative 4, followed by Alternatives 5, 6, 3, 2, and 1.

Cumulative habitat disturbance is especially problematic for archipelagos such as the Tongass, where habitat is already naturally fragmented among oceanic islands, average population size is smaller than in mainland habitats, source populations are isolated, and demographic stochasticity and inbreeding depression increase risk of extinction (Cook et al. 2006). This is particularly pertinent for endemic taxa (e.g., POW flying squirrel) that already exist in isolated populations by default, and for species that are less mobile (e.g., spruce grouse). The Conservation Strategy was designed to address this through the network of non-development LUDs, including the OGR system, and Forest-wide standards and guidelines both of which were intended to maintain habitat components important to a variety of species and maintain connectivity across the landscape. Alternative 5 would continue to do so by maintaining all elements of the current Forest Plan. By proposing less harvest and strengthening some of the existing standards and guidelines, Alternatives 6, 3, 2, and 1 in increasing order would have a greater chance of maintaining wildlife habitats and connectivity. However, because the Conservation Strategy is weakened under Alternatives 4 and 7, and these alternatives proposed the greatest amount of harvest and road construction, these alternatives would result in greater habitat loss, fragmentation and population isolation, and therefore have the greatest relative risk of not sustaining well distributed, viable wildlife populations across the Tongass over the long-term.

While this analysis is informative and updates the analysis of cumulative effects, it is important to note that the conclusions drawn by the wildlife viability panels done for the 1997 Forest Plan and brought forward for this Amendment fully considered the level of past and likely future harvest and associated development on non-NFS lands. Likelihood scores recognized the combined effects of harvest and road development on these land ownerships. Therefore, the viability ratings represent a cumulative effects prediction for each alternative. The goshawk, deer, marten, and marbled murrelet panels identified habitat loss as a key impact of the alternatives on these species. The old-growth reserve system was specifically identified as being important to the likelihood of maintainging viable, well-distributed populations of marbled murrelets, marten, and goshawks. Population isolation resulting from habitat fragmentation and barriers to migrating individuals in some biogeographic provinces was also identified as a key impact of the alternatives on endemic mammals. Effects associated with human access associated with road development were identified as key impacts to brown bears (in relation to DLP mortality and hunting pressure) and wolves (in relation to legal and illegal hunting and trapping).

Because wildlife populations exist across all land ownerships, managing adverse effects of management activities on wildlife often must be dealt with collaboratively. In addition, the population viability and distribution of wildlife on the Tongass is influenced in part by state and federal regulatory mechanisms such as harvest limits, season length, and population management objectives. Overall, the wildlife resources and associated habitat on the Tongass remain in good condition and are mostly dominated by old growth. As development continues through timber harvest, associated activities, and community expansion, particularly in areas where extensive development has already occurred (i.e., Prince of Wales Island) maintaining connectivity and roadless refugia will become increasingly important, particularly for wide-ranging species whose distribution depends on the availability of travel corridors and known "pinch-points" to access important habitats and move across the landscape. In addition, the management of human resources will continue to play a role in the viability and distribution of wildlife across the Forest.

While research since 1997 has provided a wealth of information on wildlife populations and habitat relationships in Southeast Alaska, there continue to be gaps in knowledge about the ecology and distribution of many species and direct correlations between land management activities and population impacts. The conservation strategy itself is a major step toward maintaining landscape connectivity on the Tongass, however, the effectiveness of its reserves and buffers in relation to their size, landscape pattern, and geographic distribution has yet to be scientifically tested (Powell et al. 1997). The future importance of individual elements of the conservation strategy in terms of their ability to support well-distributed and viable wildlife populations given potential cumulative effects of activities on forest system and non-forest system lands will depend on the direction of future managment activities (i.e., whether road construction will be prohibited in currently roadless areas, whether timber harvest will occur in pristine watersheds, etc.; Hanley 2005). However, despite these uncertainties, the risks associated with implementation of the Forest Plan are very low. The life of this amendment is expected to be 10 to 15 years at most, at which time another review will be undertaken. The current levels of harvest and road construction are at a 5-decade low and even if timber sales are made available and the timber industry responds very rapidly, there will be a period of preparation and transition prior to reaching the maximum harvest level allowed by the ASQ, particularly if one of the higher ASQ alternatives is selected.. Therefore, it is estimated that old-growth harvest levels are likely to be well below the maximum values evaluated in this EIS.

The effects of climate change may also contribute to cumulative effects. Warmer temperatures and decreased precipitation are anticipated to result in changes to vegetation and thus, the suitability of wildlife habitat, among other impacts (see *Climate and Air* section). Although many species may benefit (e.g., greater overwinter survival of deer, and thus a greater prey base for wolves, resulting from warmer winter termperatures during normal years), habitat changes resulting from a longer growing season, wind, fires, insect infestations, and disease may have variable effects on others. For example, Juday et al. (1998) concluded that the dramatic increase in gale force winds in coastal Alaska since the 1970s suggests that the risk of windthrow will be much greater in the future.

The greatest concerns for wildlife populations in relation to climate change, however, are the weather extremes that can be expected to occur periodically (Bermann et al. 1998). Periodic severe winter snowfalls, which may seem counterintuitive given the general warming trend, are anticipated (Juday et al. 1998). These stochastic events would be of greatest concern for populations that are limited in number or distribution. The predator-prey dynamic of wolves and deer provide an example of one system where these effects may be realized. Preliminary modeling has shown that during periodic severe winters reduced deer habitat capability due to snowfall would result in a disproportionately greater decline in the deer population (Person 2001). This could have repercussions on the wolf population, whose trends in size and volatility are sensitive to the available habitat capability for deer. At this time, no models exist that can be used in Forest Planning to accurately predict these effects. Some authors have noted though that the most effective means for managing for climate change impacts is through the development of ecosystem resistence which can be accomplished by maintaining a reserve system where active management is minimized (WWF 2003, Noss 2001). Thus the Forest Plan, with the reserve system through the conservation strategy represents a valid method to maintain a resilent ecosystem in the face of uncertain, future change.

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Table 3.10-10.
Estimated Maximum Average Road Density and Percent of WAAs in Road Density Categories on NFS Lands[1] and on All Lands Combined[2] for All Roads and for Open Roads Only within the Tongass National Forest Boundary by Alternative over 100+ Years

Road Density Category (miles per sq. mi.)	Percentage of WAAs															
	Existing		Alt 1		Alt 2		Alt 3		Alt 4		Alt 5		Alt 6		Alt 7	
	NFS Lands Only	All Lands	NFS Lands Only	All Lands	NFS Lands Only	All Lands	NFS Lands Only	All Lands	NFS Lands Only	All Lands	NFS Lands Only	All Lands	NFS Lands Only	All Lands	NFS Lands Only	All Lands
All Roads																
0	38.8%	34.6%	38.3%	15.7%	37.8%	15.7%	33.0%	15.2%	27.1%	13.1%	31.4%	14.7%	30.9%	14.7%	27.1%	13.1%
0 to 0.7	47.3%	46.1%	44.7%	58.1%	41.5%	55.5%	43.6%	54.5%	44.1%	49.7%	41.0%	50.8%	41.5%	50.8%	42.0%	47.6%
0.7 to 1.0	5.9%	5.2%	5.9%	6.3%	4.3%	5.8%	5.9%	6.3%	5.9%	8.9%	8.5%	8.4%	9.6%	9.4%	5.9%	7.9%
1.0 to 2.0	7.4%	11.0%	8.5%	13.1%	13.8%	15.2%	13.8%	15.2%	18.1%	18.3%	14.9%	17.3%	13.8%	16.2%	17.6%	18.8%
2.0 to 3.0	0.5%	3.1%	2.7%	5.2%	2.7%	6.3%	3.7%	7.3%	4.8%	8.4%	4.3%	7.3%	4.3%	7.3%	7.4%	11.0%
>3.0	0.0%	0.0%	0.0%	1.6%	0.0%	1.6%	0.0%	1.6%	0.0%	1.6%	0.0%	1.6%	0.0%	1.6%	0.0%	1.6%
Average Total Road Density – All WAAs	0.19	0.31	0.26	0.43	0.29	0.46	0.32	0.49	0.40	0.56	0.35	0.52	0.35	0.52	0.43	0.59
Open Roads																
0	54.3%	45.5%	53.2%	18.3%	52.1%	18.3%	46.3%	17.3%	36.2%	14.7%	41.5%	16.2%	41.0%	16.2%	35.6%	14.7%
0 to 0.7	40.4%	40.8%	41.5%	63.9%	42.6%	63.4%	48.4%	63.9%	58.5%	66.5%	53.2%	64.9%	53.2%	64.9%	59.0%	65.4%
0.7 to 1.0	4.3%	5.8%	4.3%	4.7%	3.7%	5.2%	3.2%	5.8%	3.2%	5.8%	3.2%	5.8%	3.7%	5.8%	3.2%	6.8%
1.0 to 2.0	1.1%	6.8%	1.1%	8.9%	1.6%	8.9%	2.1%	8.9%	2.1%	8.9%	2.1%	8.9%	2.1%	8.9%	2.1%	8.9%
2.0 to 3.0	0.0%	1.0%	0.0%	3.1%	0.0%	3.1%	0.0%	3.1%	0.0%	3.1%	0.0%	3.1%	0.0%	3.1%	0.0%	3.1%
>3.0	0.0%	0.0%	0.0%	1.0%	0.0%	1.0%	0.0%	1.0%	0.0%	1.0%	0.0%	1.0%	0.0%	1.0%	0.0%	1.0%
Average Open Road Density – All WAAs	0.10	0.23	0.10	0.23	0.10	0.23	0.11	0.23	0.11	0.23	0.11	0.23	0.11	0.23	0.11	0.23

[1] For NFS Lands, percentages are based on 188 WAAs that contain at least 100 acres of NFS lands.
[2] For All Lands combined, percentages are based on all 191 WAAs inside the Forest boundary, including Annette Island.

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Human Uses and Land Management

Lands

Affected Environment

This section addresses land ownership administration and adjustments and special uses of Tongass National Forest System (NFS) lands. Transportation and utility systems and land uses related to minerals are discussed in separate sections. Adjustment of land ownership within the Tongass boundaries can occur through Congressionally mandated conveyances, exchanges, and acquisitions, or through Forest Service administrative activities. Authorized special uses on the Tongass include industrial or commercial uses, such as commercial fishing camps, transportation facilities, electronic and other communications sites, and a variety of recreational uses. The *Recreation* section of the EIS discusses the recreation special uses; non-recreation special uses are discussed below. (Appendix E to the Forest Plan lists the approved communications sites on the Tongass.)

The exterior boundary of the Tongass National Forest established by Congress includes lands that had been conveyed to other ownership both prior and subsequent to creation of the Forest. Table 3.11-1 indicates the distribution of acreage by ownership type within the exterior boundary. Of the approximately 17,867,000 total acres (based on GIS analysis), nearly 16,774,000 acres (nearly 94 percent of the total) are federal lands administered by the Forest Service (this total includes lakes surrounded by NFS lands). The State of Alaska accounts for the largest non-federal ownership, with about 286,000 acres or almost 2 percent of the total (this figure does not include lakes surrounded by NFS lands). The Alaska Native regional corporation (Sealaska) accounts for approximately 293,000 acres, and 12 village corporations collectively own another 287,000 acres. The remaining acreage consists of lands owned by units of local government (cities and boroughs), private lands, and miscellaneous ownerships.

Table 3.11-1
Land Ownership Distribution, Tongass National Forest[1]

Ownership Type	Acres	Percent of Total
Federal/Forest Service administered[2]	16,774,000	93.9
State of Alaska[3]	286,000	1.6
Local Governments	44,000	0.2
Native Regional Corporation (Sealaska)	293,000	1.6
Native Village Corporations	287,000	1.6
Private Owners and Unknown	183,000	1.0
Total	**17,867,000**	**100**

[1] Table indicates calculated ownership of total acreage within the exterior boundary of the Tongass National Forest.
[2] Figure includes 296 acres administered by other federal agencies. Figure includes lakes surrounded by NFS lands.
[3] Figure does not include lakes surrounded by NFS lands.
Source: USDA Forest Service 2007

Land Ownership Administration and Adjustment

A number of land adjustments have occurred on the Tongass since the adoption of the 1997 Forest Plan. Some lands have been conveyed from federal to other ownership, and these adjustments need to be documented on the Forest Plan maps. New lands that have become NFS lands during this period have not been formally given LUD designations. Specific designations need to be updated in a Forest Plan amendment.

From 1998 through August 2006, 50,277 acres of Tongass National Forest lands were conveyed to other entities. Most of these land adjustments were conveyances to the State of Alaska and Native corporations as authorized by the Statehood Act and the Alaska Native Claims Settlement Act of 1971 (ANCSA), and conveyances of Alaska Native Allotments as authorized by the 1906 Alaska Native Allotment Act. This acreage figure also includes parcels conveyed through land exchanges, a Small Tracts Act sale, and the disposal of two lighthouse reserves. Through land exchanges, purchases, and donations, the United States acquired 5,864 acres of new lands for inclusion within the Tongass during the same period. The balance of conveyances and acquisitions represents a net decrease of 44,413 acres of federal ownership.

Legislated Alaska Conveyances

Land ownership status within the Tongass is complicated by several ongoing Alaska land conveyances created under various federal legislation (USDA Forest Service 2003b). The Alaska Native Allotment Act of 1906 provided for Native individuals who had occupied lands prior to their designation as national forest to apply for conveyance of up to 160 acres, under conditions prescribed by the Act and federal regulations. As of August 2006, approximately 4,500 acres in 44 Native allotments had been conveyed, with an additional 3,500 acres pending adjudication by the Bureau of Land Management (BLM).

The 1958 Alaska Statehood Act authorized the State of Alaska to select 400,000 acres of vacant and unappropriated land from within the Tongass and Chugach National Forests in Alaska, to further the development and expansion of Alaskan communities. To date, under this provision of the Statehood Act, the state has received title to approximately 258,600 acres located in the Tongass National Forest. Approximately 37,400 acres remain to be conveyed to the state from the Chugach and Tongass National Forests.

ANCSA established processes for transfer of federal land to Alaska Native village corporations and regional corporations, and to Native individuals. ANCSA provided for the conveyance of 23,040 acres of surface estate lands (a full township, 36 square miles) to each of the 10 Native village corporations and 2 urban corporations located in Southeast Alaska. ANCSA provided that the subsurface estate under the village and urban corporation land would be conveyed to the Native regional corporation. ANCSA also included other provisions addressing land conveyances to Native regional corporations. Under Section 12c of ANCSA, 11 regional corporations were to share in the selection of 16 million acres. Section 14(h)(8) set aside a pool of 2 million acres to be transferred to the Native regional corporations in the state after certain other conveyances are completed. After the specified conveyances have been implemented, the remaining land in the pool will be divided among the regional corporations based on population, with approximately 22 percent of the balance going to Sealaska Corporation, the regional corporation for Southeast Alaska. Finally, ANCSA provided for selection and transfer of up to 160 acres to Native individuals who had occupied that land as a primary place of residence on August 31, 1971.

To date, approximately 571,000 acres within the Tongass have been conveyed under ANCSA. Each of the 10 Native village corporations and 2 urban corporations in Southeast Alaska has selected its authorized acreage; virtually all of that land has been conveyed, amounting to a total of approximately 279,000 acres. Approximately 292,000 acres have been conveyed to date to Sealaska Corporation, in addition to the subsurface estate under the lands owned by the village and urban corporations. Sealaska has selected about 171,000 additional acres. It is expected that approximately 64,000 acres of these lands will be conveyed to Sealaska.

Potential Future Conveyances

The major land conveyances described above have been authorized by Acts of Congress and implemented through additional legislation and regulations. In recent years there have been a number of other formal and informal proposals that, if authorized, might result in the transfer of Tongass NFS lands out of federal ownership. Several of these conveyance proposals are summarized below (see Appendix C for more detailed information):

- **Southeast Alaska Native Land Entitlement Finalization Act.** This bill was introduced in Congress in late 2007 as H.R. 3560, and is to provide for the completion of certain land selections by Sealaska under ANCSA and for other reasons. This legislative proposal represents the evolution of a Sealaska proposed land exchange (discussed below under Land Exchanges); however, the bill, as introduced, more closely resembles a conveyance rather than a land exchange. The bill allows Sealaska to select its remaining entitlement from areas outside the ten Southeast Alaska village withdrawal areas. It authorizes Sealaska to select and receive conveyance of its remaining land entitlement from three categories including economic development lands; sites with sacred, cultural, traditional, or historic significance; and Native enterprise sites.

- **University of Alaska Lands Bill.** Under the terms of Senate Bill 293, introduced in Congress on February 3, 2005, the University of Alaska would be allowed to select up to an additional 250,000 acres of federal land that would be managed to provide income for the university system. If enacted, the university would not be allowed to select lands within a federal conservation system area (e.g., a national park or a wilderness area) or Tongass NFS lands other than those within development Land Use Designations (LUDs), and the selections would be limited to areas of second-growth timber where timber harvest occurred after January 1, 1952.

- **Unrecognized Southeast Alaska Native Communities Recognition and Compensation Act.** Senate Bill 1746, introduced on June 29, 2007, proposes to allow Alaska Native residents of Haines, Ketchikan, Petersburg, Tenakee Springs, and Wrangell to organize as five Urban Corporations and to each receive 23,040 acres of surface estate lands and other compensation. (Sealaska Corporation would receive the subsurface estate to these lands.) These five communities were not included among the villages authorized to form corporations and receive land entitlements in 1971 under ANCSA, presumably because they did not meet the eligibility requirements. The language in Senate Bill 1746 does not identify the specific areas that would be available for selection and/or conveyance.

- **Alaska Natives Veterans Land Allotment Equity Act.** Introduced on August 2, 2007, as House Bill 3350, this proposes to redress certain obstacles created by the 1998 Alaska Native Veterans Allotment Act (Public Law 105-276). That Act amended ANCSA to provide Alaska Native veterans another opportunity to apply for a Native allotment of up to 160 acres of land under the repealed Native Allotment Act of 1906 (discussed above). This Act intended to compensate for the fact that Natives serving in Vietnam may not have been able to apply for their allotments prior to closure of the allotment program. The 1998 legislation contained several provisions regarding federal land status, prior use of the claimed land, and eligible military service dates that may be viewed by some as barriers to Native veterans obtaining their allotments.

- **Alaska State Forest Proposal.** State officials or interests have at times advocated the establishment of an additional Alaska State Forest to be managed to provide income for state government programs. One concept for such a management unit was for a 2-million-acre area on or near Prince of Wales Island, which would require transfer of extensive areas of current Tongass NFS lands to the State. To date, no federal legislation to implement such a proposal has been introduced in Congress.

Land Disposal

Federal agencies responsible for administering public lands sometimes dispose of lands to other governments or private parties. Such disposals typically involve relatively small land parcels that have been determined to be "surplus" or "excess" property under federal property regulations.

With respect to the Tongass, one example of land disposal involves the conveyance of historic lighthouse or light station properties in Southeast Alaska that have been managed jointly by the U.S. Coast Guard and the Forest Service. The National Historic Lighthouse Preservation Act of 2000 authorizes the General Services Administration (GSA) to dispose of historic light stations to "eligible entities" that are required to make the light stations available to the general public for education, park, recreation, cultural, or historic preservation purposes (USDA Forest Service 2005c). The Forest Service has been working with GSA to dispose of light stations while granting Forest Service easements to the recipients for occupancy of the underlying NFS lands. Two light stations have been disposed of under this program; four other stations have been identified as candidates for disposal. Most of these stations have small land reserves associated with them, although the Forest Service is working with the Coast Guard and BLM to reduce the acreage of larger reserves associated with some stations.

Land Exchanges

Administrative land exchanges, in which NFS lands can be conveyed to another entity in exchange for lands of equal value, are another form of land ownership adjustment. Complex land exchanges are sometimes authorized by Congress through special legislation. In addition to the Alaska conveyances discussed above, the Forest Service has completed several land exchanges involving Tongass NFS lands. These adjustments are summarized below:

- Under the Kake Tribal Corporation Land Transfer Act (Public Law 106-283), approved by Congress on October 6, 2000, the Forest Service was directed to convey 1,389 acres of Tongass NFS lands (which had previously been selected by the State of Alaska) in the Jenny Creek area near Kake to the Kake Tribal Corporation. This Act also provided for transfer of 1,430 acres of land owned by the Kake Tribal Corporation and Sealaska to the City of Kake an exchange of the subsurface estate (mineral rights) for two areas (each of over 1,100 acres) between the Forest Service and Sealaska. The Act, technically an amendment to ANCSA, was enacted to provide protection and management of the Kake municipal watershed.
- Under the Hood Bay Land Exchange, the Forest Service received a 54-acre parcel that had formerly been a private inholding within Admiralty Island National Monument and the Kootznoowoo Wilderness (USDA Forest Service 2006c). The United States conveyed and relinquished all reversionary interests on 144 acres of land at Sitka to the Alaska Pulp Corporation.
- Through an exchange with the Kennecott Greens Creek Mining Company, Inc., the Forest Service received one 50-acre parcel within the Misty Fiords National Monument Wilderness and two parcels totaling approximately 139 acres within Admiralty Island National Monument Kootznoowoo Wilderness (USDA Forest Service 2006c). The United States conveyed the subsurface mineral estate on 7,301 acres at Hawk Inlet/Young Bay on Admiralty Island.

There have also been discussions regarding potential future land exchanges between the Forest Service, a number of Native corporations, and other entities that could adjust land ownership on the Tongass.

In late 2007, Shee Atika, Incorporated (an Alaska Native Village Corporation) approached the Forest Service about a possible exchange of NFS lands on West and North Yakobi Island and on western Chichagof Island, for Shee Atika surface estate located at Cube Cove. Both parties are discussing the concept and neither party has made any binding commitments on proceeding further.

Also in late 2007, the Trust Land Office (State of Alaska, Department of Natural Resources) representing the Mental Health Trust Authority, presented a conceptual proposal to the Forest Service to exchange approximately 20,000 acres of lands managed by the Trust Land Office in Southeast Alaska for an equal value of Tongass National Forest lands on Prince of Wales Island. The parcels the Trust has offered for exchange are mostly adjacent to NFS lands and are also adjacent to, or in the immediate vicinities of, Skagway, Juneau, Petersburg, Wrangell, Sitka, and Ketchikan. At this point, the Forest Service is considering the concepts of the proposal and has made no agreements on whether or not it will pursue this exchange further.

The potential exchange that has received the most attention and discussion is known as the Sealaska Proposed Comprehensive Tongass-wide Land Exchange (USDA Forest Service 2005d). In August 2002, Sealaska Corporation submitted a proposal to the Forest Service to exchange approximately 100,000 acres of NFS lands for Sealaska Corporation lands and selection rights under ANCSA. The Tongass-wide exchange proposed by Sealaska involves lands throughout Southeast Alaska. The goals of the exchange are to consolidate NFS lands and Sealaska lands, and to finalize Sealaska's remaining land selections under ANCSA. This proposal has recently evolved into the Southeast Alaska Native Land Entitlement Finalization Act which has been introduced in Congress (see above under Potential Future Conveyances).

At present, about 171,000 acres in the ANCSA withdrawal areas are encumbered by Sealaska selections. Other lands within these areas have not been selected by a Native corporation but will remain withdrawn until the ANCSA conveyances are completed.

Based on current information from BLM, Sealaska has approximately 64,000 acres of lands yet to be conveyed. This includes approximately 20,000 acres of unconveyed ANCSA entitlement under Section 14(h)(8), in addition to approximately 44,000 acres of 14(h)(8) lands resulting from the 2004 Alaska Land Transfer Acceleration Act, P.L. 108-452.

The proposed land exchange would enable Sealaska to acquire other lands outside of the ANCSA withdrawal areas, in addition to the Native heritage 14(h)(1) parcels. This is not authorized under ANCSA except by exchange. Land exchanges are discretionary, voluntary real estate transactions between federal and non-federal parties. At present, there is no binding land exchange agreement in place signed by the Forest Service and Sealaska that would enable Sealaska to receive lands outside of the withdrawal areas.

The Forest Service completed a draft feasibility report on the exchange proposal in 2003. After lengthy discussions and several modifications to the proposal, in 2005 the Forest Supervisor informed Sealaska that the Forest Service was not willing to move forward with the exchange because of a lack of substantial agreement on the parcels to be exchanged, concerns over a variety of resource issues, and the need for a revision to the Forest Plan to accommodate the exchange due to the magnitude of the resulting changes in LUDs.

Land Acquisition

Land ownership adjustments can also occur through the outright purchase of lands or the acceptance of land donations for inclusion in the Forest. Purchases typically involve small inholdings, always involve a willing seller, and usually involve parcels surrounded by designated wilderness or other sensitive resource lands. Since 1997, the Forest Service has acquired 17 parcels totaling approximately 5,864 acres of land in various locations within the Forest (USDA Forest Service 2006c). These figures include the parcels obtained through the Hood Bay and Greens Creek exchanges discussed above; apart from these exchanges, the acquisitions total 12 parcels and 5,621 acres. The largest acquisition involved two parcels and 2,939 acres near Petersburg Creek and 1,045 acres at Mt. Verstovia near Sitka. Other purchases included an Unuk River parcel in the Misty Fiords National Monument Wilderness and parcels at Favorite Bay and Hood Bay in the Admiralty Island National Monument/Kootznoowoo Wilderness. Donations included a parcel at Cape Bingham and two at Bohemia Basin, including portions in the West Chichagof-Yakobi Wilderness in both locations, and a parcel at Windham Bay in the Chuck River Wilderness.

The Forest Service obtained the Petersburg Creek and Verstovia parcels through a legislated program with the State of Alaska Mental Health Land Trust, which has as its mission to generate revenue to support mental health services in Alaska.

Congress directed the Forest Service to purchase lands from the Trust and allocated funds for the purchases. The Forest Service is currently working on an acquisition in the Deer Mountain area near Ketchikan, which will be the last component of this program.

Congress has directed the Forest Service to make a similar purchase under the Craig Recreation Land Purchase Act (PL 108-325), passed in October 2004. The Act provides for the Forest Service to acquire the surface rights to approximately 350 acres surrounding and near the Sunnahae Trail from the City of Craig (USDA Forest Service 2005e). The city would use the funds received under this acquisition to purchase 10 acres of property within Craig for harbor expansion, development, and other purposes. Congress has not yet appropriated funds for the purchase of the Sunnahae Trail lands.

Withdrawals/Encumbered Areas

Withdrawals and encumbrances are other key aspects of land ownership administration. Withdrawal is the withholding of an area of federal land from settlement, sale, mineral location, or entry under some or all of the general land laws for the purpose of limiting activities under those laws in order to maintain public values in the area. In general, an encumbrance is a claim, lien, charge, or liability attached to and binding real property (Black 1979, as cited in USDA Forest Service 2003b). In the context of the Tongass, an encumbrance is a land claim of some type that removes NFS lands from the full range of Forest Service administrative functions.

By acreage, the largest withdrawal action applies to the more than 5.7 million acres in designated wilderness areas, which are withdrawn from entry under the mining laws. Many of the administrative withdrawals date back several decades and include withdrawals around lighthouse and light station sites, and a large number of power site withdrawals intended to preserve options for hydroelectric development at promising sites.

The land conveyance processes established by ANCSA delineated areas of federal lands within which Native village corporation land selections were to be located. These areas, totaling an estimated 1.8 million acres (including large areas of saltwater) on the Tongass, were withdrawn and will likely remain encumbered in the land status records until all lands to which the Native corporations are entitled have been conveyed. Other areas of the Forest have not been formally withdrawn, but are similarly encumbered as a result of land selections. For example, while the Alaska Statehood Act did not withdraw specific federal land areas identified for land selection by the state, those lands that have been selected by the state but not yet conveyed are nevertheless encumbered. Likewise, Native allotments that have been claimed but not conveyed and a number of small-scale Sealaska selections under ANCSA Section 14 (h)(1) are outside of the ANCSA withdrawal areas and are encumbered. Altogether, approximately 395,000 acres of Tongass NFS lands are encumbered by such transitional ownership situations (USDA Forest Service 2006e).

Special Use Authorizations

Uses of NFS lands by entities other than the Forest Service can be authorized under a special use permit, subject to applicable regulations found in 36 CFR 251. Generally, most permits are issued for periods of 5 years or less. Complex permits for long-term uses such as hydroelectric facilities may be issued for periods of up to 50 years. As of August 2006, there were 715 special use permits currently issued on the Tongass. The number of permits on the Tongass at any given time may fluctuate between 700 and 750. Nearly half of the permits issued on the Tongass are related to outfitter and guiding and other recreational uses of NFS lands. The remainder involve a wide variety of uses including, but not limited to, communications sites, roads, cabins, organization sites, hydroelectric projects, temporary facilities, aquatic farming activities, military training, sanitary landfills, and fish camps.

Communication and Other Electronic Sites

A communication or other electronic site is a dedicated land use allocation of NFS land. These sites are used for electronic communication systems, including electronic transmitters, receivers, and passive microwave reflectors. These uses of federal land are authorized by the Federal Land Policy and Management Act of 1976 and the Telecommunications Act of 1996. As of August 2006, there were 69 designated electronic sites throughout the Tongass (see Appendix E to both the 1997 Tongass Land and Resources Management Plan and the proposed Forest Plan Amendment). Fifty-two (52) of these sites were occupied under special use permits by non-Forest Service parties, while the remaining sites are for Forest Service facilities. A few of the sites have several special uses authorized. The majority of sites are limited to one user. All sites are currently open to more than one user if the need arises. Some of the sites are operated by the Coast Guard, the Federal Aviation Administration, the National Weather Service, and a variety of other private and public entities. Applicants for new communications uses will be encouraged to co-locate their facilities at existing, approved sites.

Recreation-Related Permits

As of August 2006, the Forest Service administers 390 special use permits for purposes related to recreation. These included 275 outfitter/guide permits, 65 isolated cabins, and 15 recreation residences. Isolated cabins and recreation residences, although similar in many ways, are managed differently because of the different authorities used to grant use and occupancy. Construction of new cabins is regulated by Alaska National Interest Lands Conservation Act of 1980 (ANILCA) and generally prohibited, except under limited circumstances. Existing cabins are expected to decrease in number over time as a result of ANILCA direction limiting the transfer of permits.

Camps and Cabins

Two organization camps operated on the Tongass under special use permit in 2005. Based on prior authorizations, the Forest Service also administered 15 permits for summer homes or recreational cabins. Construction of new cabins is prohibited except under quite limited circumstances, and the existing cabins are expected to decrease in number over time as a result of restrictions on transfer of the permits.

Roads and Rights-of-Way

Inholders and other landowners are allowed reasonable access across NFS lands to use their own lands under provisions of ANILCA and other federal laws. Easements are also issued to the Alaska State Department of Transportation for state-managed highways. The Forest Service administered 39 easements or right-of-way permits in 2006. The types of authorizations include 1 railroad right of way, 1 Department of Transportation easement, 13 Forest Road and Trail Act easements, 4 Federal Land Policy and Management Act easements, and 20 Federal Land Policy and Management Act rights-of-way.

Other Special Uses

Non-recreation special use authorizations accounted for 325 permits in August 2006. Types of uses in this group included hydroelectric projects, mariculture- and agriculture-related activities, uses for schools and municipalities, weather monitoring, filming and photography, and power lines.

Hydroelectric Projects*.* There are 11 existing hydropower projects on the Tongass that are operated under license from the Federal Energy Regulatory Commission (FERC). Of the 11, 8 are also under special use permit from the Forest Service and authorized under the Federal Land Policy and Management Act. As of August 2006, there were an additional 11 proposed projects that are in various stages of the FERC licensing process.

The Forest Service is currently conducting environmental review under the National Environmental Policy Act (NEPA) for the proposed Angoon hydroelectric project, located approximately 6 miles north of the City of Angoon on Admiralty Island. Kootznoowoo, Incorporated, the Native village corporation for Angoon, proposes to develop a 1 megawatt hydro project on Thayer Creek to supply electricity for Angoon. The project is authorized under ANILCA Section 506(a)3(B), subject to conditions imposed by the Forest Service, and is not subject to the Wilderness Act of 1964. FERC has determined that it does not have jurisdiction over the project because Admiralty Island is a Congressionally designated National Monument on NFS lands. Therefore, FERC is not involved in project review. As directed by ANILCA, the Forest Service will issue special use permits, with specified conditions, to allow construction and operation of the project when the environmental analysis is complete and all NEPA requirements are met.

Other Energy Resources. The Tongass has recently received some interest from energy companies exploring for oil and gas and geothermal resources (see related discussion in the *Minerals* section of this chapter). These exploration activities require a special use permit when they occur on NFS lands.

Environmental Consequences

Direct and Indirect Effects

No significant environmental consequences within the Lands category are anticipated for any of the alternatives. The NFS land base is the same for all seven alternatives, at just under 16.8 million acres. An adjustment to the suitable timber land base has been made for each alternative for lands anticipated to be conveyed in the future ("encumbered"). Minor changes to the land base may continue to occur as a result of the ongoing conveyance processes, or from future land exchange, disposal, and acquisition actions. Any such changes that would occur are irrespective of the goals associated with any alternative, as none of the alternatives incorporate any specific land adjustment that is unique to the alternative.

The Forest Service would continue land administration activities under the respective Forest-wide standards and guidelines presented in Chapter 4 of the Forest Plan. Those standards and guidelines reflect minimal changes from the current Forest Plan direction. The only substantive change in the standards and guidelines is the additional statement that motorized access may be authorized as part of a special use authorization, subject to the provisions of 36 CFR 212, 251 and 261. In other respects, administration of special use permits would continue as at present under all alternatives. The number of communication and other electronic sites on NFS lands under special use permit has increased somewhat in recent years, and additional sites may be permitted in the future. Permits for camps and cabins may decrease somewhat over time because of restrictions on new uses of this type. Based on recent trends, minor future increases in special use permits for other recreation purposes, rights-of-way, and other special uses are possible.

Additional special use permits may be granted in the future; the environmental impacts of those actions would be evaluated through the permit approval process. The Forest Service would issue permit conditions to address the impacts of new permits and renewed permits. Special use permits generally apply to small, specific areas and activities that have limited impacts. Impacts from permitted activities can not be predicted at this time, would not vary among the alternatives, and are not likely to be significant. The future addition of electronic sites by private industry could help improve electronic signal coverage Forest-wide.

Cumulative Effects

Forest Service land administration activities under the updated Forest Plan are not considered to have the potential to create or contribute to significant cumulative effects. To the extent that special use permits increase in number and affected acreage, environmental effects from future permits would add to those of permits already in effect. As noted above, however, those effects are not likely to be significant. In general, land ownership adjustments executed by the Forest Service are made in response to direction from others, primarily Congress through legislated land conveyances or exchanges. No land ownership adjustments are proposed under any of the Forest Plan alternatives, and none of the potential adjustments discussed above and in Appendix C is considered reasonably foreseeable. To the extent that any of the potential conveyance or exchange proposals were adopted in the future, they would have a cumulative effect on the NFS land base within the Tongass. There has been a substantial transfer of federal lands in Southeast Alaska to other ownership since statehood.

Transportation and Utilities

Affected Environment

There are three principal types of travel in Southeast Alaska: air, water, and ground. Historically, marine transportation has been the major method of moving freight and passengers; however, during the last five decades, air services have developed to serve the growing demand for rapid transportation between communities within Alaska and to the contiguous United States. Residents of the region are dependent on air and water transportation for travel between most communities, rather than roads or rail. A roaded transportation system has developed on National Forest System (NFS) lands, largely in support of timber harvesting.

Only three cities in Southeast Alaska are connected to the continental road system: Haines, Skagway, and Hyder. Several cities in Southeast Alaska are linked to Bellingham, Washington via the Alaska Marine Highway. Ketchikan is also linked by ferry to the Canadian community of Prince Rupert, British Columbia. In addition, several ferries connect communities on a weekly or twice-weekly basis. Prince of Wales Island has the only road system in Southeast Alaska that interconnects island communities. Several possibilities exist for state highways that could connect some communities of Southeast Alaska to the continental road system. Several new internal corridors are also possible.

The Alaska Department of Transportation and Public Facilities (DOT&PF) issued the Southeast Alaska Transportation Plan (SATP) in August 2004 (Alaska DOT&PF 2004). The SATP requested 34 essential transportation and utility corridors be reserved and incorporated into the Tongass Land and Resource Management Plan. Most corridors are planned for infrastructure construction by Alaska DOT&PF. For other corridors, Alaska DOT&PF has requested the Forest Service improve and connect forest roads. The SATP proposes doubling the forest highway system, which would result in a 1,032-mile system.

Historically, Southeast Alaska has relied on a “marine highway system” to augment its limited roads and highways. The Marine Highway System primarily consisted of long line ferries, which are becoming obsolete with current Coast Guard regulations, and are increasingly costly to operate. The SATP calls for transitioning away from the long line ferries to a system of expanded roads and shuttle ferries. Strategically, the plan calls for centering transportation and access around three major highway linkages: the Juneau Access Road (which would link Juneau to the continental road system via Skagway), a Sitka highway (which would link Sitka with the east side of Baranof Island), and a mid-region connector to the Cassier Highway in British Columbia, Canada (the Bradfield Canal Corridor is one alternative under consideration).

Public Law 109-59, the Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users, was passed in August 2005. It refers to Map 92337, which shows marine access points, log transfer facilities (LTFs), and proposed transportation corridors in Southeast Alaska. This map shows 22 corridors, all but one of which is also in the SATP (the Whale Pass to Exchange Cove corridor on Prince of Wales Island is not included in the SATP).

Because the Southeast Region of Alaska DOT&PF lies largely within the Tongass National Forest's boundaries, many of the proposed road projects would cross NFS lands and require Forest Service coordination and U.S. Department of Transportation easements. The proposed major linkages for the Juneau Access, a Sitka Highway System, and the Cassier Highway connection would each cross Tongass National Forest land. The completion of the SATP has initiated more site-specific planning, and has focused on a request for a change in land use designation (LUD) in the Forest Plan.

The Forest Service signed a Memorandum of Understanding with the State of Alaska in 2006 to provide rights-of-way for the road corridors covered by Public Law 109-59. These corridors are displayed on the alternative maps. The Memorandum of Understanding also grants easements to the Forest Service for marine access points and LTFs listed on Map 92337. To date, eight rights-of-way have been granted to the State, and work is proceeding on the remaining right-of-way grants. The Federal Highway Administration issued a Record of Decision (ROD) in 2006 approving a road on the east side of Lynn Canal from the current terminus of State Highway 7 to the Katzehin River. From there, shuttle ferries would continue to Haines and Skagway. Site-specific planning is also underway for the Sitka Access and the Northern Panhandle Transportation Study. The Forest Service continues to be involved as a cooperating agency with Alaska DOT&PF for all highway National Environmental Protection Agency (NEPA) efforts, identifying the impacts to the Tongass National Forest, and creating opportunities for appropriate mitigation and recreational enhancements. This analysis considers the request for reserving these transportation corridors (refer to the alternative descriptions in Chapter 2).

In addition to the corridor reservation request, the SATP identifies the Forest Service as a "transportation partner" highlighting that there are 3,600 miles of Forest Service roads on the Tongass National Forest that many communities rely on. The SATP also calls out the merits of the Forest Service's role as a public roading agency, recognizing the need for lower standard public road links to Southeast Alaska's smaller communities.

The SATP is based on two fundamental concepts: 1) an integrated multi-modal transportation system (a combination of road segments linked to shuttle and mainline ferry services within key corridors), and 2) a combination of sub-area or zone and regional transportation services and facilities. The four identified major travel corridors or zones are: 1) Juneau-Haines-Skagway, 2) Juneau-Sitka-Petersburg, 3) Petersburg-Ketchikan, and 4) Ketchikan-Prince Rupert, British Columbia. New ferry terminals have been completed at Mitkof Island and Coffman Cove. The Inter-Island Ferry Authority, which operates a route between Hollis and Ketchikan, also operates the new route serving Wrangell, Coffman Cove, and Mitkof Island.

A number of different groups have identified several corridors for consideration as major transportation routes. The SATP identifies several potential extensions of the Inside Passage Highway among its long-term actions. Several possibilities are under consideration, including extensions or new highway construction on Kupreanof Island (to connect Kake and Petersburg), Cleveland Peninsula, and Revillagigedo Island (including an extension of the Revilla road to Shelter Cove, and a road from Carroll Inlet to Shrimp Bay). The SATP recommends reserving these possible future alignments as highway corridors. The SATP also proposes a study to consider the viability of constructing a road to connect Sitka with the east side of Baranof Island, either at Rodman Bay or Warm Springs Bay.

Other potential routes that have been discussed in recent years include a route along the west shore of Lynn Canal, two Juneau-to-Canada routes along Taku Inlet, the East Bradfield River corridor connection to the Cassiar Highway, several other road corridors near Wrangell, a coastal alignment connecting Thorne Bay and Coffman Cove, a road connecting North Whale Pass and the East Prince of Wales road, and a road to the southeastern tip of the Kasaan Peninsula. In addition to the routes listed above, draft Transportation System Concept maps prepared for the Southeast Conference identify a potential route connecting Hoonah and Tenakee Springs, and a short connector route between the Chatham and Corner Bay road systems. The Southeast Conference maps also identify an alternative corridor between Kake and Petersburg via a ferry across Duncan Canal.

When a National Forest Transportation System road (discussed in the next subsection) provides a connection between communities, serves local needs such as mail delivery, or connects public roads within the Tongass National Forest, it can be designated as a forest highway (see 23 U.S.C. 101 for technical definition). Forest highways are usually upgraded to state highway standards, during which jurisdiction passes to the State. To date, the Alaska DOT&PF, Federal Highway Administration, and Forest Service have agreed to designate a potential 362 miles as forest highways; the State would assume jurisdiction and maintenance responsibility for 181 miles of these highways.

Other transportation facilities within Southeast Alaska include more than 300 marine facilities (docks, small boat harbors, refuge floats, and boat launch ramps), 12 major airports, approximately 35 seaplane bases or floats, and numerous heliports and airstrips (Alaska DOT&PF 2004).

National Forest Transportation System Roads

National Forest Transportation System roads are constructed to provide access to NFS lands and are included in the Forest Development Transportation Plan (see Transportation Standards and Guidelines in Chapter 4 of the Forest Plan [USDA Forest Service 1997b]). They are considered NFS roads, as are other roads that are wholly or partially on NFS lands and are intended to be maintained for the long term (see text box on Road Types). They are functionally classified as arterial (serving large land areas and usually connecting to public highways), collector (serving smaller areas, usually connecting to arterials or public highways), and local (terminal roads, may connect to any other type).

NFS roads are also managed by a system of maintenance levels, depending on their intended use and suitability for various types of vehicles. These levels range between level 1 (closed), level 2 (suitable for high-clearance vehicles), level 3 (suitable for passenger vehicles, rough surface), level 4 (suitable for passenger vehicles, smooth surface), and level 5 (suitable for passenger cars, dust free, possibly paved). Maintenance can include reconditioning the original road template, grading the road surface, cleaning roadside ditches, and removing vegetation that may encroach upon the road or block vision. Grading and other maintenance would generally take place more often on a maintenance level 4 road than on a level 3 road, and would be expected to occur less often on a level 2 road. Level 1 roads are left to a self-maintaining condition that requires little or no maintenance.

With the exception of a few administrative sites and campgrounds, most forest roads are single lane, constructed with blasted quarry rock, and designed for off-highway loads. Typical collector and local roads are 14 feet wide with a rough gravel surface. Higher standard arterial roads are normally 16 feet wide, may have a smooth gravel surface, and are designed for speeds of up to 30 miles per hour. Travel speed on lower standard roads is often controlled more by surface roughness than by horizontal alignment or road gradient.

For the Tongass, the demand for roads has primarily been a function of the demand for access to timber resources. The maintenance and reconstruction requirements of the existing system depend mainly on the volume of timber hauled and, to a lesser extent, on recreational use. The amount of future construction is anticipated to continue to be largely determined by the need to access timber resources.

Road Types

National Forest System roads: Roads wholly or partially within National Forest System (NFS) land that the Forest Service determines are needed for the protection, administration, and utilization for the NFS and the use and development of its resources.
Unauthorized roads: Roads that are not forest roads or are temporary roads not included in the forest transportation atlas.
Temporary roads: Roads that are not forest roads and are not listed on the forest road atlas, but are necessary for emergency operations or authorized by contract, permit, lease, or other written authorization.

Currently, there are approximately 3,532 miles of authorized roads on NFS lands, approximately 2,485 miles of which are not maintained for highway vehicles (maintenance level 1 and 2). There are another 607 miles of roads that are on non-NFS lands. In addition, there are about 1,409 miles of unauthorized roads—roads that are not maintained by the Forest Service. These roads provide access to about 8 percent of the Tongass National Forest. Over half of the roads suitable for highway vehicles are connected to communities. Between 1984 and 1993, an average of 168 miles of road was constructed annually. The 1997 Forest Plan estimated that 106 miles of road would be constructed annually in the first decade of the Plan. However, actual construction was well below that level, averaging less than 25 miles annually between 1997 and 2005. During that same time period, approximately 94 miles of road were decommissioned. The result was a net addition of 126 miles of road, compared to the 954 miles predicted for the first 9 years.

The steep, densely vegetated terrain of Southeast Alaska limits the use of typical off-highway vehicles (OHVs) such as three-wheelers and all-terrain vehicles to beaches, communities, road systems, braided river channels, and frozen or snow-covered areas. Most trails in Southeast Alaska do not lend themselves well to the use of such vehicles because of wet ground conditions that often necessitate the use of boardwalks. With the exception of a few specific areas, the Tongass has not experienced the kinds of resource damage typically associated with OHVs elsewhere. The Tongass contains many unauthorized roads, some utilize old roadbeds and some are user-created. Many of these unauthorized roads and trails are used by OHVs for recreation. It is anticipated that travel management plans scheduled for completion by December 2009 will decide which of these unauthorized roads are incorporated into the Forest transportation system and which will be closed as funding becomes available.

Prior to 2005, the Forest was designated open to OHVs except for Wilderness, National Monuments, and Research Natural Areas. Site-specific closures were considered in specific locations where conflicts with other uses, public safety problems, or damage to resources could occur. The goal of OHV management is to ensure resource protection and public safety, minimize user conflicts, and provide diverse opportunities for Forest users. A specific set of closures was consolidated in the Juneau area in November 1985 as the “Off-Road Vehicle Travel Plan” for the Juneau Ranger District. This travel plan was incorporated in the Forest Plan by reference. In November 2005, the Forest Service adopted a final rule for managing motor vehicle use, including OHV use, on national forests throughout the United States. Under this rule, the travel management plans will designate a system of roads and trails for OHV use, and identify if any areas for cross country travel are appropriate and do not cause resource damage. Use maps are scheduled to be completed by 2010.

In early 2001, the Forest Service adopted a new road management policy that requires the agency to maintain a safe, environmentally sound road network that is responsive to public needs and affordable to manage. The policy includes a science-based roads analysis process designed to help managers make better decisions on roads. The Forest completed a Forest-wide roads analysis for maintenance level 3, 4, and 5 roads in 2003. Ranger Districts are in the process of completing roads analysis on maintenance level 1 and 2 roads as well as unauthorized roads.

The transport of harvested timber from isolated islands in Southeast Alaska requires both land and water routes to reach processing facilities. LTFs are used to transfer logs to barges or rafts for towing. About 116 LTFs currently exist on the Tongass and there are 59 marine access points suitable for transferring logs to barges that have current permits on NFS lands. Another 10 marine access points no longer have permits. The Memorandum of Understanding discussed above grants the

Forest Service easements to use the 126 LTFs on state lands listed on Map 92337. In addition, 59 proposed LTF sites have been identified on NFS lands.

Power Transmission Lines

A number of power transmission lines link existing hydroelectric projects with the nearest larger community in Southeast Alaska. The State of Alaska has proposed corridors for transmission lines and/or undersea cables to link many Southeast Alaska communities to each other and to British Columbia. Several projects are either in the NEPA stage or under construction. The Swan Lake–Lake Tyee Intertie corridor runs from the Swan Lake Hydro project near the head of Carroll Inlet, north to the Tyee Hydro project at the head of Bradfield Canal. The route is shown as a potential power transmission corridor on the alternative maps. NEPA was completed in 1997 and construction began in 2002; most of the corridor has been cleared and approximately three-quarters of the power pole foundations have been built. The State Legislature approved $46.2 million for the project. As a result of the Swan Lake-Lake Tyee Intertie, another potential corridor, which runs down the Cleveland Peninsula connecting the Tyee power line with Ketchikan and Meyers Chuck, is not likely to be needed.

Construction of a transmission line connecting Ketchikan with Metlakatla via Saxman is expected to begin soon. The route is shown as a potential power transmission corridor on the alternative maps. This corridor is primarily on private land. It would run from Ketchikan to Saxman, then across the channel to Annette Island, and then southwest and south along the northern portion of the island to Metlakatla.

Kootznoowoo Inc., a Native village cooperative, has proposed developing a hydroelectric facility on Thayer Creek and a transmission line between the Thayer Creek facility and Angoon. The route is shown as a potential power transmission corridor on the alternative maps. This project is authorized by Congress and is currently being analyzed by the Forest Service in an EIS. The 1-megawatt, run-of-the-river hydroelectric project on Thayer Creek (north of Angoon) includes a 10-foot-high diversion dam, a diversion pond, 1.3 miles of pipeline and penstock, a powerhouse, and 6 miles of overhead transmission line (plus a marine segment) to carry the power south to Angoon. The DEIS was released in May 2007.

The Juneau to Hoonah Transmission Line route runs from Juneau across northern Douglas Island and underwater to the north end of Admiralty Island and then underwater again to approximately 10 miles east of Hoonah, where it transitions onto land and continues to Hoonah. NEPA has been completed and the line has been constructed to Hawk Inlet at the north end of Admiralty Island (the Juneau to Greens Creek portion of the transmission line). The route is shown as a potential power transmission corridor on the alternative maps.

The Kake to Petersburg Transmission Line would cross the Wrangell Narrows (going from Mitkof to Kupreanof Island) near the Tonka LTF and proceed west across Duncan Canal. It would follow existing logging roads for the majority of its length. The route is shown as a potential power transmission corridor on the alternative maps.

Other potential projects include power lines between Juneau and Skagway, Juneau and Hoonah (the Juneau to Greens Creek portion has been completed), Hoonah and Pelican, Hoonah and Tenakee Springs, Tenakee Springs and Angoon, Angoon and Sitka, Sitka and Kake, Thorne Bay and Ketchikan, and Klawock and Hydaburg. Also planned are power lines between the proposed Lake Dorothy, Otter Creek, and Sunrise Lake Hydroelectric Projects and existing power lines or communities. A power line from the Tyee hydropower site along a potential Bradfield Canal/Craig River road corridor route to Canada is also a potential route that has been considered.

Transportation and Utility Systems in the Forest Plan

The Forest Plan applies the Transportation and Utility Systems LUD to the potential rights-of-way corridors and associated uses for selected potential and existing transportation systems and utility corridors. These systems include state and federal highways, power lines of 66 kilovolt capacity or greater, and pipelines 10 inches or more in diameter, if they are a public utility. This LUD is intended to minimize potential conflicts, such as over-determining the appropriate visual quality objective, should development of any of these projects occur. With certain exceptions, transportation and utility systems are allowed throughout the Tongass as directed by Title XI of the Alaska National Interest Lands Conservation Act of 1980.

Environmental Consequences

Direct, Indirect, Effects

The following discussions address the direct, indirect, and cumulative effects of the alternatives on the transportation and utilities infrastructure of Southeast Alaska. Analyses examine both the existing system and all reasonably foreseeable changes.

Effects on the National Forest Transportation Road System

Table 3.12-1 displays the maximum anticipated road construction by alternative over the next 100 or more years. These numbers tend to overestimate total road miles because they include unauthorized roads, most of which are likely to be decommissioned during the next few decades. New road construction estimates are directly related to proposed timber harvesting activities; they are based on the maximum harvest levels projected for each alternative. These estimates are primarily based on the logging system and transportation analysis (LSTA) completed in 2007 for the majority of the mapped suitable lands on the Tongass under the alternatives (refer to the *Timber* section). Where suitable lands were not covered by the LSTA (primarily in portions of Alternatives 4 and 7), they were estimated using the ratio of road miles to suitable acres based on the LSTA by Value Comparison Unit.

Table 3.12-1
Estimated Maximum Road Construction and Cumulative Miles of National Forest System Roads by Alternative After Full Implementation (100+ years)[1]

Alternative	New Road Construction	Existing Roads [2]	Cumulative Roads [2]
1	774	4,941	5,715
2	2,079	4,941	7,020
3	2,799	4,941	7,740
4	4,890	4,941	9,831
5	3,874	4,941	8,815
6	3,744	4,941	8,685
7	5,825	4,941	10,766

[1] Estimates are based on the maximum harvest allowed under each alternative; therefore, they represent a maximum estimate. Numbers do not include decommissioning of roads.
[2] Includes unauthorized roads, most of which are likely to be decommissioned.

Roads have the potential to affect fish habitat, soils, and water quality by increasing erosion and landslide potential, changing recreation settings and opportunities, altering scenery, and increasing legal and illegal wildlife harvest. These types of effects are discussed in the subject resource sections of this chapter, as applicable.

Based on current practices, most new roads would be closed to motorized traffic once their initial use is over. These roads are built for silvicultural purposes under exemptions granted under Section 404(f)(1) of the Clean Water Act. The construction or maintenance of forest roads used for the sole purpose of silvicultural activities is exempt from regulation under Section 404 of the Clean Water Act. Roads that remain open for recreation or subsistence use do not qualify under this exemption (U.S. Army Corps of Engineers 2004); therefore, these roads should be closed following completion of silvicultural activities. The roads would either be decommissioned or placed in storage. Bridges and culverts may be removed (or culverts may be bypassed), erosion control measures would be applied as needed, and the roadbeds would be allowed to revegetate naturally.

In addition to normal maintenance that would accompany all alternatives, each alternative would result in reconstruction of a portion of the existing road system in each decade, primarily roads that have been placed in storage (maintenance level 1). Estimates range from 925 miles under Alternative 1 to 2,371 miles under Alternative 7 (Table 3.12-2). Reconstruction of a road maintains the original investment and makes the road suitable and safe for intended use. Reconstruction involves the rehabilitation of the original roadbed, and can include cleaning ditches, replacing drainage structures, re-installing bridges, and grading and shaping.

Table 3.12-2
Estimated Miles of Road to be Reconstructed by Alternative[1]

Alternative						
1	2	3	4	5	6	7
925	1,784	1,932	2,182	2,100	2,046	2,371

[1] Estimates are based on the existing miles of maintenance level 1 and 2 roads, existing miles of unauthorized roads incorporated into the LSTA, and the amount of young growth to be treated over the long term (100 + years) for each alternative.

Effects on Log Transfer Facilities

LTFs can adversely affect the marine benthic habitat (plants and animals that live in and on the ocean bottom). Effects are expected from two sources: structural embankment (placing rock in the water) and bark deposition (bark that accumulates underwater). Structural embankment is estimated to cover approximately one-quarter acre per site.

LTFs have affected approximately 2 acres of marine benthic habitat for the average site (Faris and Vaughan 1985). Bark and debris accumulation may decrease over time due to water currents, but there are no reliable estimates on the length of time required before a bark accumulation is completely eliminated. Using this 2-acre average, about 232 acres of marine benthic habitat associated with the existing LTFs on NFS lands have bark accumulations. This is roughly 0.05 percent of the total estuarine area less than 60 feet deep. The biological effects of LTFs are described in the 1997 Tongass Forest Plan Revision Final EIS (USDA Forest Service 1997a). Currently, many timber sale contracts require logs to be loaded directly onto barges rather that placed in the water and bundled into log rafts. This greatly reduces the amount of bark and wood debris that enters the water. In situations where logs are rafted, placing of LTFs in areas where the current will disperse debris can greatly reduce bark accumulation.

The 1991 Land Management Plan Revision Draft EIS estimated that 200 to 350 acres of benthic habitat could be adversely affected by new LTFs over the next 30 years (approximately another 0.04 to 0.08 percent of estuarine habitat under 60 feet deep). This figure was not recalculated for the 1997 Final EIS. The 1991 estimate was based on harvest levels that ranged from 139 to 513 million board feet (MMBF). Harvest levels associated with the alternatives considered under this analysis range from 49 to 421 MMBF. Based on the 2007 LSTA and modeling conducted for this EIS, it is estimated that a maximum of 115 new LTFs would be needed under Alternative 7, resulting in an estimated maximum of 230 additional acres of benthic habitat disturbance. Also, the 1991 estimate and the 2 acres of disturbance per LTF figure, assume that logs would be placed into the water and rafted, rather than loaded onto barges as is currently required on many sales. Therefore, the effects of the proposed alternatives are likely to be less than those anticipated in 1991 or 1997, especially for Alternatives 1, 2, and 3. The effects of continuing operation at existing LTFs are likely to be similar under all alternatives; except under Alternative 1, which would use fewer existing LTFs.

Effects on Off-Highway Vehicle Access

The Forest is in the process of preparing access and travel management plans for the Tongass National Forest. The travel management plans will designate a system of roads and trails for OHV use, and identify if any areas for cross country travel are appropriate and do not cause resource damage. The proposed alternatives would not affect this process because all alternatives include the roaded land base. Travel management decisions are scheduled to be completed in 2009.

Effects on Transportation and Power Transmission Line Opportunities

The Transportation and Utility LUDs proposed under the action alternatives include the transportation corridors covered by Public Law 109-59 and the subsequent Memorandum of Understanding with the State. There would be no difference in how these corridors would be managed under any of the action alternatives. Under all of the alternatives, the Transportation and Utility LUDs would be given priority over all underlying LUDs, including LUDs that do not normally allow road construction.

None of the alternatives would affect other regional transportation opportunities or power transmission line opportunities. No new Wilderness or LUD II areas are proposed under any of the alternatives. None of the alternatives proposes changing any of the currently roaded areas to LUDs that would not allow road construction, road expansion, or transmission line construction.

Wilderness and LUD II lands are identified in the current Forest Plan as Transportation and Utility System “Avoidance Areas.” Utility sites and corridors may be located in these LUDs if an analysis of potential Transportation and Utility LUD corridors has been completed and no feasible alternatives exist outside this LUD.

Cumulative Effects

Cumulative road miles projected for the next hundred years for each alternative are displayed in Table 3.12-1. In addition, there are approximately 3,756 miles of road on non-NFS lands within the Tongass National Forest boundary (including Annette Island). These include 400 miles on state land, 1,252 miles on Sealaska lands, 1,535 on lands owned by Native corporations, and 569 miles on other lands (including towns and cities). There are another 149 miles on lands outside the Forest boundary. Table 3.12-3 displays the maximum cumulative road miles projected for Southeast Alaska over the next 100 years under the proposed alternatives. The total road miles are likely to be an over-estimate because these numbers include unauthorized roads on NFS lands, most of which are expected to be decommissioned.

The road construction projected for non-NFS lands primarily includes roads needed for timber harvest, but also includes roads likely built to serve communities, such as the Juneau access road on the east side of Lynn Canal, which has an approved ROD. This road and other road corridors covered by Public Law 109-59 would, if approved under NEPA and funded, connect additional areas in Southeast Alaska to the continental highway system and improve transportation between communities. These transportation corridors are displayed on the alternative maps. If all roads envisioned under Public Law 109-59 are built, it would have a major effect on transportation in the region.

Table 3.12-3
Estimated Maximum Road Construction and Cumulative Miles of Roads for All of Southeast Alaska by Alternative After Full Implementation (100+ years)[1]

Alternative	New NFS Roads	New Non-NFS Roads	Existing NFS Roads[2]	Existing Non-NFS Roads	Cumulative Roads[2]
1	774	2,657	4,941	3,906	12,278
2	2,079	2,657	4,941	3,906	13,583
3	2,799	2,657	4,941	3,906	14,303
4	4,890	2,657	4,941	3,906	16,394
5	3,874	2,657	4,941	3,906	15,378
6	3,744	2,657	4,941	3,906	15,248
7	5,825	2,657	4,941	3,906	17,329

[1] Approximately 100+ years
[2] Includes unauthorized roads, most of which are likely to be decommissioned.
Estimates are based on the projected harvest for each alternative; therefore, they represent a maximum estimate. If new wood processing facilities and markets are not developed, these levels of harvest are unlikely to occur. Numbers do not include decommissioning of roads.

Reasonably foreseeable hydroelectric projects include the Ketchikan to Metlakatla transmission line, the Swan Lake to Lake Tyee transmission line, the Kake to Petersburg transmission line, and the Angoon hydro project and transmission line.

There is considerable uncertainty concerning the future development of Southeast Alaska's road and transmission system. New roads linking communities and linking Southeast Alaska to the continental highway system would be expensive to build and maintain, and funds have yet to be approved for their construction. The 2004 SATP estimated in 2004 that the cost would be $1.8 billion over 20 years. Most of the funding was anticipated to come from the federal government. To date, there has been no commitment for this level of funding from either the state or federal governments. Similarly, power transmission lines would be difficult and expensive to build and a lack of funding may limit the development of a power transmission system in Southeast Alaska.

Roads associated with timber harvest are based on the projected harvest for each alternative; therefore, they represent a maximum estimate. If new wood processing facilities and markets are not developed, these levels of harvest are unlikely to occur and new road construction would be less than projected in Table 3.12-3. There is also uncertainty concerning the funds to maintain the existing forest road network, place existing roads into storage status, and to decommission roads that are no longer needed. Risks associated with inadequate funding include adverse affects to fish and water quality and increased safety hazards as older roads and stream crossings deteriorate.

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Timber

Affected Environment

Introduction

The forests of Southeast Alaska are the main source of raw materials for the region's wood products industry. From 1980 through 2005, the Tongass National Forest accounted for between 18 and 49 percent of the total annual Southeast Alaska timber harvest, averaging approximately 42 percent. During this period, timber harvest on all ownerships in Southeast Alaska ranged from peak levels of just under 1,000 million board feet (MMBF) in 1989 and 1990 to a low of 169 MMBF in 2004. Timber harvested on National Forest System (NFS) lands is available for processing by the local wood products industry but most timber harvested on non-NFS lands is exported. The State increased the sales volume from its forest lands in Southeast Alaska in most recent years to help bridge the gap between national forest harvest and local industry needs. The wood products industry and associated regional employment is discussed in more detail in the *Economic and Social Environment* section of this document.

The forests of Southeast Alaska are primarily the western hemlock-Sitka spruce forest type. This forest type is part of the temperate rain forest that occupies a coastal strip 2,000 miles long from northern California to Southcentral Alaska. The most extensive occurrence of the western hemlock-Sitka spruce type is in Southeast Alaska. Within the Tongass, western hemlock-Sitka spruce stands cover 98 percent of the forest lands. Western hemlock and Sitka spruce comprise the majority of the stocking in this forest type, associated species include, depending on location, yellow-cedar, western redcedar, mountain hemlock, and silver fir (Harris and Johnson 1983). The remaining 2 percent of forest lands support relatively small stands dominated by yellow-cedar, lodgepole pine (shore pine), red alder, or black cottonwood. Western hemlock is used for pilings, poles, railway ties, windowsills, doors, and construction lumber, and has been an important fiber source for pulp. Sitka spruce is used for lumber and commodity products, as well as specialty products, such as piano sounding boards, guitar faces, oars, planking, masts, and spars for custom-made or traditional boats, and ladders. For centuries Alaska Natives have used cedar species for canoes and paddles, housing (along with Sitka spruce), and totem poles. Today, redcedar is primarily used as a roofing material and yellow-cedar has many uses, including boats, utility poles, heavy flooring, framing, and marine decking and piling.

Current Condition of the Forest Land Base

The timber inventory on the Tongass, including the forest type composition, age class distribution, and volume classes, is described in Chapter 3 of the 1997 Tongass Forest Plan Revision Final EIS (USDA Forest Service 1997a). This information was updated with inventory data published in 2001 (van Hees, W. W. S. 2001). Current management practices are also described in the 1997 Final EIS (USDA Forest Service 1997a). Vegetation management practices prescribed under the current Forest Plan, including regeneration methods, reforestation, and intermediate treatments, are described in the standards and guidelines of the 1997 Tongass Forest Plan (USDA Forest Service 1997b). Definitions for each of these practices, how they are applied, and the expected effects on the timber resource are provided.

Forests occupy slightly less than 10 million acres, or approximately 60 percent of the Tongass land area. The remaining 40 percent is non-forested, e.g., water, muskeg, ice, snow, and rock. The forests vary from sparse muskeg forests to heavily timbered stands of 50 thousand board feet (MBF) (long-log bureau scale) per acre or more.

Productive forest land – Forest land capable of producing at least 20 cubic feet of wood fiber per acre per year, or having greater than 8,000 board feet per acre.

Approximately 57 percent of the forest land on the Tongass National Forest (approximately 5.6 million acres) is classified as productive forest land; these lands are considered biologically capable of producing industrial wood products. Approximately 0.5 million acres of the productive forest lands on the Tongass have been harvested to date or have been converted to young growth due to fire or wind. This is approximately 3 percent of the total Tongass land base and 9 percent of the productive forest lands and represents approximately 15 billion board feet of harvested timber. In addition to productive forest lands, the Tongass includes approximately 4.2 million acres of "other forest land." These are lands that are not capable of producing industrial forest products, but are important for watershed protection, wildlife habitat, recreation, and other uses. "Other forest land" is land incapable of yielding crops of industrial wood, usually because of adverse site conditions. These conditions may include sterile or poorly drained soil, subalpine conditions, and steep rocky areas where landslides or avalanches curtail timber development. This land has been called noncommercial or nonproductive forest land in previous documents.

An analysis of timber resource land suitability on the Tongass was completed by the Forest Service for the 1997 Forest Plan Revision Final EIS and updated for this analysis (Appendix A). The National Forest Management Act (NFMA) requires the Secretary of Agriculture to identify lands not suited for timber production due to physical and other pertinent factors. NFMA also included consideration of economic factors in the identification of suitable lands, but the Tongass Timber Reform Act (TTRA) exempted economic considerations as a requirement for identifying suitable lands on the Tongass.

Tentatively suitable lands are lands that have the biological capability, and availability, to produce commercial wood products. To be considered tentatively suitable, the forested land must (36 CFR 219.14):

- Be at least 10 percent occupied by trees or have formerly had such tree cover, and not be developed for non-forest uses;
- Be capable of harvest with available technology to ensure timber production without irreversible resource damage to soil productivity or watershed conditions;
- Be capable of being restocked within 5 years after final harvest; and
- Not be withdrawn from timber production by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service.

In the 1997 Forest Plan Revision Final EIS, it was estimated that there were 2.4 million acres of tentatively suitable lands on the Tongass. The estimated tentatively suitable land base was recalculated for this analysis, and remains at slightly less than 2.4 million acres (Table 3.13-1). Small differences in the tentatively suitable land base are due to updates in the Tongass Geographic Information System (GIS) coverages resulting from changes in land ownership and updates from additional field work, as well as from a different computer measurement method, i.e., using polygon areas rather than extrapolation from a grid system. Figure 3.13-1 illustrates the changes that have occurred to the tentatively suitable forest land base on the Tongass as a result of legislation and the land allocation process over the past 100 years. Of the 2.4 million acres of tentatively suitable land, approximately 1 million acres are estimated to be in land allocations that allow timber harvest and, thus, are mapped as suitable for harvest. After considering factors that are not apparent on aerial photos, such as Class III streams that are not visible under the canopy and unstable areas, there are an estimated 781,000 acres of actual suitable land. Appendix A in the Land and Resource Management Plan describes how the suitable land base was derived.

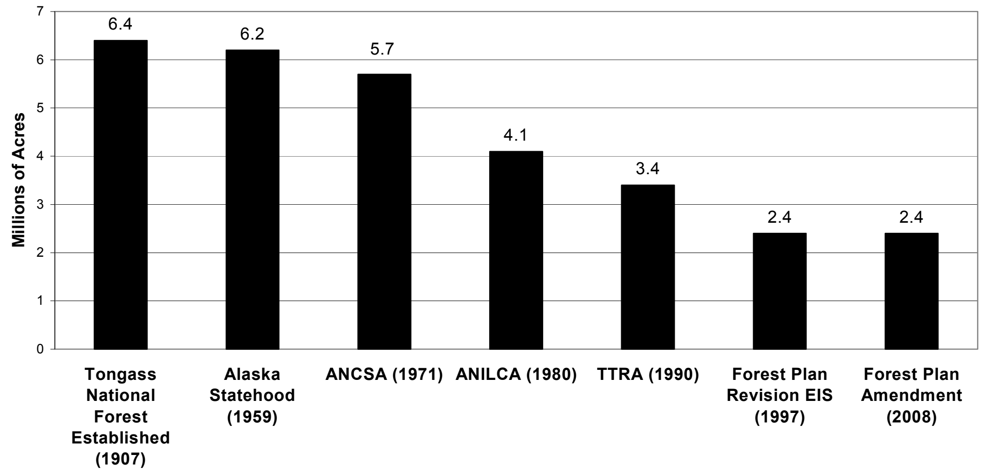
Table 3.13-1
Land Classification (thousands of acres) of Tentatively Suitable and Suitable Lands

Classification	Acres (thousands)[1]
Total National Forest land (items 1 and 2)	16,774
1. Non-forest land (includes water)	6,918
2. Forest land	9,856
3. Forest land withdrawn from timber production	4,234
4. Available forest land (item 2 minus item 3)	5,621
5. Non-productive forest land	2,339
6. Available forest lands (item 4 minus item 5)	3,282
7. Forest lands physically unsuitable for timber management	572
8. Forest lands with inadequate information	345
9. Tentatively suitable forest land (item 6 minus items 7 and 8)	2,365
10. Tentatively suitable forest land allocated to land use designations that do not allow timber management	1,328
11. Mapped suitable forest land (item 9 minus item 10)	1,037
12. Model implementation factor acreage (MIRF)	255
13. Estimated suitable forest land available for timber production	781

[1] Sums and differences may not appear exact due to rounding.
Source: Forest Service GIS database.

A detailed logging system and transportation analysis (LSTA) was completed in 2007. The LSTA covered all suitable land supporting productive old-growth forest and young growth at least 35 years old, utilizing the Forest's GIS database, orthophotos, aerial photos, existing LSTAs, and National Environmental Policy Act (NEPA) documents (EAs and EISs). Suitable lands with productive old-growth forest and with young-growth stands that may be candidates for thinning in 10 to 15 years were divided into logging settings based on a range of factors, such as topography, visual absorption capacity (VAC), scenery integrity objectives (SIO), Land Use Designation (LUD), and logging system. Areas that could not be roaded because of physical limitations or economics were considered helicopter units. Risk factors were assigned to account for possible "falldown" based on photo interpretation and local knowledge. Possible falldown factors included low merchantable volume, slope stability, karst, steep V-notch streams, and riparian concerns. This information was used to complete an operability analysis for all mapped suitable land on the Forest. Table 3.13-2 summarizes the gross acres and volumes (prior to falldown factors being considered).

Figure 3.13-1
Estimated Tentatively Suitable Forest Land (millions of acres) in the Tongass National Forest, 1907 to Present



Notes: ANCSA – Alaska Natives Claims Settlement Act, ANILCA – Alaska National Interest Lands Conservation Act, TTRA – Tongass Timber Reform Act
Source: Forest Service historical data and GIS analysis.

Table 3.13-2
Estimated Gross Acres and Volume by Logging System for Productive Old Growth Based on 2007 LSTA

Logging System	Acres	Volume (MMBF)
Ground Based	161,000	4,000
Short-span Skyline	225,000	6,100
Long-span Skyline	25,000	700
Helicopter less than 0.75 mile	184,000	4,800
Helicopter 0.75 to 2.0 miles	72,000	1,700
Helicopter greater than 2.0 miles	57,000	1,400
Total	**724,000**	**18,600**

Ground Based: areas up to 35 percent slope, 800 foot yarding distance
Short-span Skyline: 1,300-foot yarding distance
Long-span Skyline: 1,300-to 2,000-foot yarding distance
Helicopter less than 0.75 mile: yarding distance less than 0.75 mile
Helicopter 0.75 to 2.0 miles: yarding distance more than 0.75 mile, less than 2 miles
Helicopter greater than 2.0 miles: yarding distance more than 2 miles
Source: Tongass 2007 LSTA includes mapped suitable lands supporting productive old-growth forest and supporting young growth at least 35 years old. Mapped suitable acres do not include falldown factors. Numbers may not appear to add correctly due to rounding.

Current Condition of the Timber Resource

There are six conifer forest types within the Tongass. Western hemlock and western hemlock-Sitka spruce forest types account for approximately 96 percent of the tentatively suitable lands and about 75 percent of all forest lands on the Tongass. The remaining forest lands are occupied by the yellow-cedar (sometimes referred to as Alaska yellow-cedar), western redcedar, lodgepole pine, and Sitka spruce forest types (USDA Forest Service 1997a).

Age Class Distribution. The Tongass is a mix of old-growth stands and naturally regenerated young-growth forest, which consists of both wind-created and harvest-created young-growth forest. Harvest-created young-growth amounts to less than 7 percent of the total forest land area. Suitable forest lands are classified into five stand conditions: 1) old-growth sawtimber, 2) young growth sawtimber, 3) pole timber, 4) seedling and sapling, and 5) non-stocked. For timber inventory purposes, stands of trees 150 years old or older are designated as old growth. More than 85 percent of forest lands meet the criteria for old-growth sawtimber (Table 3-13-3).

To help define tree ages on the Tongass, Farr and McClellan (unpublished manuscript) measured and analyzed age data from 67 plots located throughout the Tongass (excluding the Yakutat Area). They found that 90 percent of all overstory trees were more than 180 years old; 84 percent were more than 200 years; 47 percent were more than 300 years; 15 percent were more than 400 years; and 5 percent were more than 500 years old.

Forests less than 150 years cover approximately 0.7 million acres; forests that are 150 years of age or greater cover nearly 5 million acres. Table 3.13-3 lists the total acres of productive forest land and the acres that are suitable for timber production within two broad age classes.

Table 3.13.3
Estimated Age Class Distribution of All Productive Forest Land and Suitable Productive Forest Land (acres)

Age (Years)	All Productive Forest Lands[1]	Suitable Forest Lands[1,2]
0 to 149	689,000[3]	250,000[3]
150+	4,951,000	532,000
Total	5,640,000	781,000

[1] Numbers may not appear to add correctly due to rounding..
[2] Mapped suitable acres adjusted (reduced) for falldown (MIRF).
[3] Includes natural young growth and regeneration after harvest.
Source: Tongass National Forest GIS database

Table 3.13-4 displays the acres harvested by age class. Approximately 45 percent of the area harvested over that past century is no longer suitable, due to changes instituted by Congress or due to Forest Plan decisions. For example, areas designated as Wilderness or LUD II by Congress are no longer tentatively suitable. Tentatively suitable areas harvested within the 1,000-foot-wide beach fringe, riparian areas, and old-growth reserves are no longer suitable for timber harvest.

Table 3.13.4
Estimated Age Class Distribution of Harvested Stands (acres)

Age Class (Years)	All Forest Lands[1]	Suitable Forest Lands[1,2]
0 to 35	282,000	163,000
36 to 70	162,000	64,000
>70	10,000	1,000
Total	**455,000**	**228,000**

[1] Numbers may not appear to add correctly due to rounding..
[2] Mapped suitable acres adjusted (reduced) for falldown (MIRF).
Source: Tongass National Forest GIS database

Species Mix and Log Types

Timber harvest on the Tongass generally results in a mix of species and log types. The majority of the logs cut in most sales are western hemlock; Sitka spruce is the second most common species. Together these two species account for the majority of the harvest, based on the SPECTRUM model results (refer to Appendix B for a discussion of the Spectrum model) and the estimated species mix identified in the 1997 FEIS for the current Forest Plan. Yellow-cedar and western redcedar account for most of the remaining volume. Cedar, especially yellow-cedar, often commands high prices on the export market and is generally exported (refer to the *Economic and Social Environment* section for discussion of utilization).

Trees harvested from old-growth stands on the Tongass often contain three types of logs: sawlogs, utility logs, and cull logs. Figure 3.13-2 shows one possible example of a tree containing all three log types. Sawlogs are logs that come from that portion of the tree that is of suitable size and quality to be cut into dimension lumber. Sawlogs usually come from the lower portion of the tree, the part of the tree with larger diameter logs. Higher quality sawlogs come from that portion of the tree with fewer branches, which can result in lumber with fewer knots, while lower quality sawlogs often come from that portion of the tree that still retains a live crown. Utility logs are logs that cannot be used to produce lumber but are suitable for chips. They contain at least 50 percent sound wood. Utility wood is also produced from portions of sawlogs that cannot be cut into lumber (refer to Figure 3.13-2). The third type of logs, referred to as cull logs, are logs that do not have enough sound wood to be merchantable, even for chips. These logs are usually left in the woods and contribute to large woody debris (LWD) component and structure left on the forest floor.

Timber Inventory Methodology and Scientific Accuracy

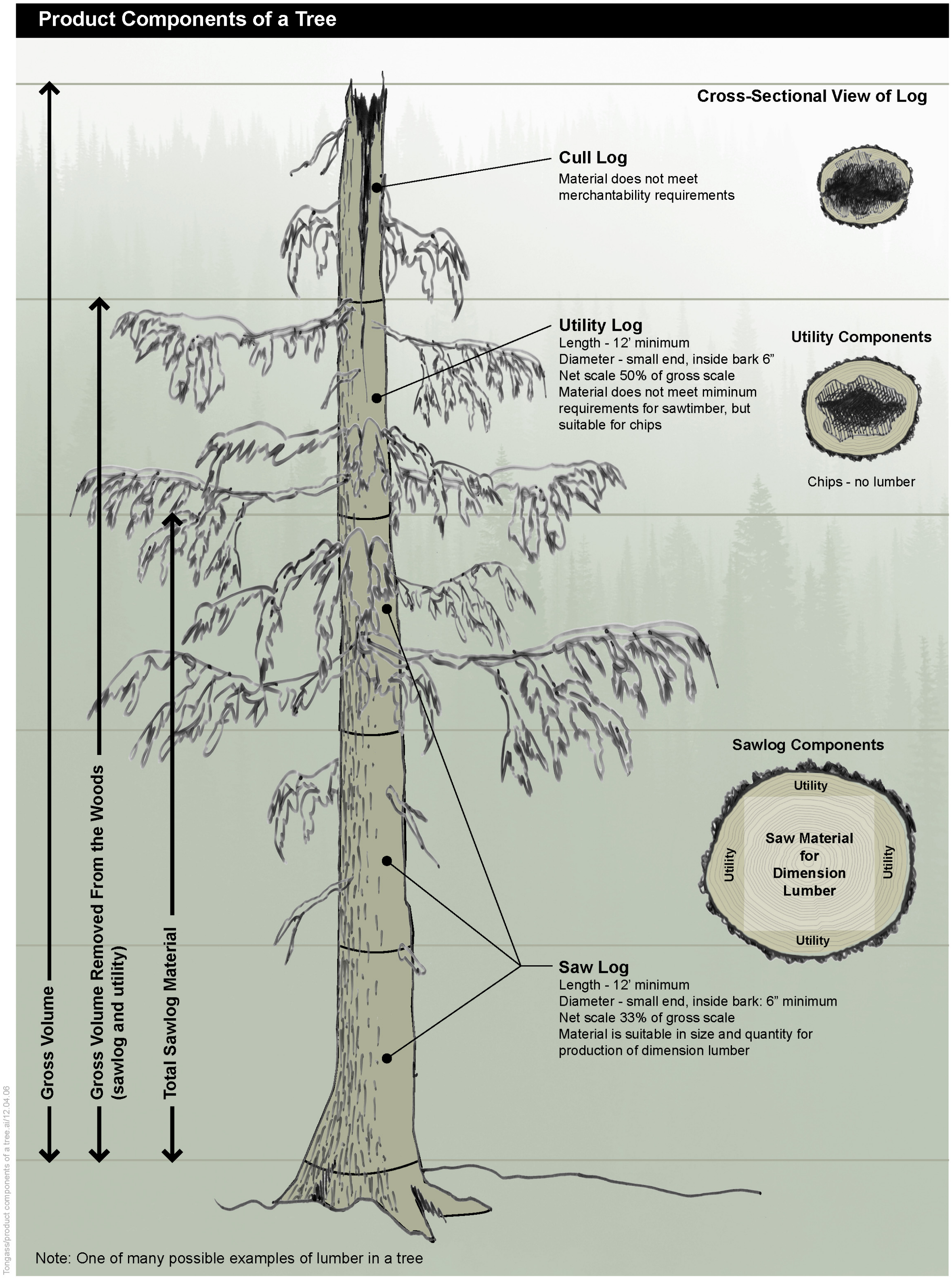
The first Southeast Alaska-wide timber inventory began in 1953 and was completed in 1958. Due to the extensive area to be covered, the inventory was subdivided into Juneau, Sitka, Petersburg/Wrangell, Yakutat, and Ketchikan/Craig working circles. Ten years later, a portion of the original inventory was re-measured to improve estimates of growth and mortality trends in young-growth stands in Southeast Alaska. Young-growth stands, for timber management considerations, were defined as being less than 150 years old and normally less than 20 inches in diameter (measured at “breast height”).

A complete re-inventory program to re-evaluate Southeast Alaska’s forest area and volume began in the early 1970s and was completed by 1975. Several new categories of information were collected, including data to evaluate the level of stocking (the number of existing trees compared to full stocking of trees for a site), strata classes (timber categorized by several attributes such as species, decadence, stocking, site index, and board feet per acre), soils, slope, a better definition of harvest categories, and a redefinition of quality guides. Detailed data, such as risk class and soil microsite, were collected on individual trees to better estimate their potential for timber management considerations.

In 1979, an extensive point sampling system inventory developed for the Tongass Land Management Plan gathered specific information across the Tongass to provide specific information for the completed 1970s forest inventory. In the early 1980s, this inventory was redesigned by the three Administrative Areas (Chatham, Stikine, and Ketchikan, which correspond to the north, central, and southern portions of the Tongass). Field data collection for this inventory was completed in 1985.

The 1980s inventory was designed to estimate the standing volume on the Forest within certain error limitations. The sampling errors for area and volume met the requirements of Forest Service Handbook (FSH) 2409.13 (plus or minus 10 percent per billion net cubic feet at a 68 percent confidence level). A review of the inventory methodology and results was conducted in September 1989 by a Forest Service Biometrician, Jim Brickell. He concluded that the inventory results are reliable as an

Figure 3.13-2
Product Components of a Tree



assessment of forest areas and volumes at the forest and area levels (Brickell 1989). Although the data for the inventory were gathered on a forest-wide basis, the inventory was designed to be specific only to the Administrative Area level. The inventory was not designed to collect all timber resource information, nor was it designed for comparison of individual plot results to timber type map polygons or volume strata.

The results of the 1980-85 inventories showed that the Tongass National Forest had a net growing stock of 22.7 billion cubic feet on 4.3 million acres of available lands (5.3 thousand cubic feet per acre). This would indicate that the 2.42 million acres of tentatively suitable land had approximately 12.8 billion cubic feet of growing stock. The net growing stock for the 5.7 million acres of productive forest land was 31.5 billion cubic feet, or 5.5 thousand cubic feet per acre (approximately 27.5 MBF per acre).

Forest Strata

The Forest established four volume classes of commercial timber in the 1979 Forest Plan (amended 1985). Using net inventory volumes per acre, these classes are:

- Class 4: 8,000 to 20,000 board feet
- Class 5: 20,001 to 30,000 board feet
- Class 6: 30,001 to 50,000 board feet
- Class 7: 50,001 board feet or greater

There were a number of concerns from within and outside the agency regarding the reliability of this information (usually referred to as the volume class map). Therefore, a study addressing concerns about the volume class map reliability was commissioned in 1989. It concluded that there was no statistical difference among volume classes 5, 6, and 7 with respect to mean board feet per acre, and the existing volume class map should not be used to determine volume per acre (Brickell 1989).

The volume class map was used by the Alaska Region to calculate long-term timber sale contract timber volume proportionality, as required by Section 301 of TTRA. However, this procedure was successfully challenged in court by The Wildlife Society, Alaska Chapter. The court disputes over TTRA Section 301 proportional harvest methodology were settled, with issuance of an updated Forest Service Handbook Supplement (Region 10, FSH 2409.18 Supplement No. 2409.18-96-1), and alternative methods of assigning timber volume (or the capability to produce different timber volumes) to lands currently supporting old-growth forests were considered for the 1997 Forest Plan Revision. Five different options were studied and evaluated (Julin and Caouette 1997). Statistical analysis indicated that three strata can be distinguished for the available forest lands (lands not legislatively or administratively withdrawn) using the existing inventory and additional information on soils and slope. The polygon characteristics of the three-strata approach are displayed in Table 3.13-5. In the development of the new size-density model (SDM) (see *Biodiversity* section), these strata were redefined using improved information on hydric soils and aspect. Table 3.13-5 is based on these redefined strata. These strata were used to model timber outputs for this analysis (refer to Appendix B for a discussion of the SPECTRUM model).

Table 3.13-5
Tongass National Forest Strata Characteristics–Productive Old-Growth Forest

Geographic Area	Trees/ Acre	Gross Volume (MBF/ Acre)	Net Sawlog Volume (MBF/Acre)	Net Utility Volume (MBF/Acre)	Total Net Sawlog and Utility Volume (MBF/Acre)
North Islands[1]					
Low	102	17.8	11.1	1.8	12.9
Medium	89	27.8	17.7	3.0	20.7
High	89	39.8	25.6	4.8	30.4
North Mainland[1]					
Low	137	12.3	7.6	0.9	8.5
Medium	148	35.0	19.6	4.5	24.1
High	89	39.8	24.6	4.7	29.3
South Island[1]					
Low	151	20.9	13.7	2.0	15.7
Medium	100	30.3	20.7	2.9	23.6
High	97	41.7	29.3	5.1	34.4
South Mainland[1]					
Low	97	22.9	15.1	2.0	17.1
Medium	100	30.3	21.0	3.0	24.0
High	111	41.3	30.2	5.4	35.6
Yakutat					
Low	21	6.5	4.7	0.5	5.2
Medium	187	40.4	27.7	5.0	32.7
High	196	45.2	32.7	4.1	36.8

[1] North Islands: Chichagof, Baranoff, Admiralty, and associated islands; North Mainland: mainland north of the Stikine River; South Islands: Kupreanof, Mitkof, Kuiu, Prince of Wales, and associated islands; South Mainland: mainland south of the Stikine River.
Refer to USDA Forest Service 2006, SDM Data for documentation on why forests were grouped in these geographic areas. Numbers not exact due to rounding.

While the three-strata approach is useful for estimating timber volume for forest planning purposes, it is not a good tool for identifying other important forest elements, including forest structure, ecosystem diversity, and wildlife habitat. For example, two stands may have the same volume, but one may be a dense stand of medium-sized trees with a single canopy layer, while the other stand may be a combination of widely spaced large overstory trees and two or three lower canopy layers containing small- and medium-sized trees. The SDM, which uses a combination of two common forest measurements, tree sizes and tree densities (Caouette et al. 2001), has proven to be a better tool for representing these other forest elements. Using tree sizes and densities provides a more comprehensive forest measuring system for describing habitat than timber volume (Spies and Franklin 1991). The new SDM (Caouette and DeGayner 2005) is described and used in the *Biodiversity* and other sections.

Non-National Forest System Lands

The State of Alaska, Native village corporations, Sealaska (the Native regional corporation) and individuals own over 1,050,000 acres of land in Southeast Alaska, inside the Forest boundary. Approximately 408,000 acres of this land currently consists of productive old-growth forest and 351,000 acres consists of young growth. This means that approximately 46 percent of the original productive old growth has been harvested (as of 2006 based on GIS analysis and information provided by the landowners). Most timber harvested from state lands in recent years has been processed locally, while timber harvested from University Trust and Mental Health Trust lands has been exported.

Current Practices

Regeneration Methods

Even-aged Systems. This system includes clearcuts, seed tree, and shelterwood harvest methods. These methods are described in detail in Appendix G of the 1997 Tongass Land Management Plan Final EIS. Under an even-aged system, the intention is to replace the entire (or nearly the entire) stand with a new crop of trees that are all of the same age. Under NFMA, clearcutting can only be used when it is the optimum system. This is determined through a site-specific prescription approved by a certified silviculturist. Also under NFMA, a stand must have reached at least 95 percent of culmination of mean annual increment (CMAI). This is the point at which the stand reaches its highest average growth. The exact age that this occurs varies by site and stand treatment. A stand on a high site will generally reach CMAI sooner than one on a lower site. However, stand treatments, such as precommercial thinning and commercial thinning, will generally extend the period of fast growth, causing the stand to take longer to reach CMAI.

Clearcutting, with reliance on natural seeding, has been the most commonly used silvicultural system in the Sitka spruce-western hemlock forest type of Southeast Alaska (Ruth and Harris 1979, Deal et al. 2002). Clearcutting is used where timber production is the primary use and where it is the optimal method. The clearcutting method is favored for several reasons. Clearcutting increases exposure to the sun, which raises soil temperature, speeds up organic decomposition, and thus improves soil productivity. Sitka spruce is less tolerant of shade than western hemlock (USDA Forest Service 1990); therefore, in the mixed spruce-hemlock forests of Southeast Alaska, the open conditions created by clearcutting favor the regeneration of Sitka spruce (Ruth and Harris 1979). Clearcutting in stands infected by dwarf mistletoe substantially reduces infection in the regenerated stand (Shaw and Hennon 1991). Logging costs are lower than with other systems, and the clearcut method has proven very successful in the regeneration (regrowth) of healthy forested stands (refer to Appendix G in the 1997 FEIS for additional discussion).

A variant of this system, referred to as clearcutting with reserves, involves retaining approximately 10 percent of the stand, either in single trees or in small groups. This method is generally used to meet scenery or wildlife needs in areas where timber production is the primary goal.

In 1992, the Chief of the Forest Service directed that the even-aged system (clearcutting) be limited to areas where it is essential to meet Forest Plan objectives. Clearcutting has traditionally been used in the hemlock-spruce forests of Southeast Alaska to reduce mistletoe infection by eliminating infected trees from the overstory, reduce heartrot and stem diseases that may result from logging damage to leave trees, and to eliminate the risk of blowdown of residual trees. In addition, it requires fewer miles of road for a given volume (Ruth and Harris 1979, USDA Forest Service 1983). Because more volume is harvested from each acre than would be the case under uneven-aged management, many fewer acres are impacted for the same harvest volume.

Two-aged Systems. In this system, for example, up to 30 percent of a stand is left as residual (or reserve) trees, either as single trees or in patches, and the rest of the stand is harvested. The reserve trees remain unharvested and provide structural diversity and an older aggregation of trees within the otherwise young-growth stand. This system has been used on the Tongass to meet scenery objectives. Logging costs can be higher because of the need to protect the reserve trees.

Experience in other regions indicated that retaining overstory trees led to regeneration of more shade-tolerant species (which would favor hemlock over Sitka spruce in Southeast Alaska), reduced growth, increased dwarf mistletoe infection in understory trees, and resulted in windthrow of overstory trees (Harris and Farr

1974). However, a retrospective study of 18 partial cut stands in Southeast Alaska found that partial cutting had little effect on tree species composition, diameter growth, or dwarf mistletoe levels (Deal and Tappeiner 2002, Deal 2002). Mortality of residual trees was only marginally higher in partial cut stands than in uncut stands; although the location of these stands may have contributed to the relatively low level of wind damage. The stands sampled in this study were all below 100 feet in elevation and within 1.25 miles of the shoreline. Stands on exposed south-facing ridges and on slopes are likely to have a greater risk of windthrow (Nowacki and Kramer 1998). Windthrow may be of particular concern because one of the predicted outcomes of climate change in Southeast Alaska is an increase in the frequency of severe wind storms. Juday et al. (1998) considered it highly likely that there would be increased blowdown across Southeast Alaska in the future.

Uneven-aged Systems. This system typically involves harvesting of single trees or of small groups of trees (usually less than 2 acres) from within a stand. This method maintains a multi-aged, multi-layered stand structure by removing some trees in all age groups. It has been used on the Forest to meet scenery and wildlife habitat needs. Uneven-aged management often involves higher costs and affects larger areas than would be needed for the same harvest volume under an even-aged or two-aged system (Ruth and Harris 1979). Also, the frequent entries in the stand to remove individual or small groups of trees increases logging costs and the risk of damaging the remaining trees (USDA Forest Service 1983).

There is little scientifically documented experience with uneven-aged harvest in Southeast Alaska (McClellan et al 2000). Deal (2001) concluded that it may closely mimic the natural disturbance regime of Southeast Alaska based on a retrospective study of 18 partial cut stands. Stand structures were similar to uncut old-growth stands, and cutting had no significant effect on species composition (Deal and Tappeiner 2002). Uneven-aged systems have potential benefits, including protection of wildlife habitat, scenery, and slope stability as well as the maintenance of biological diversity (McClellan et al. 2000).

Young-Growth Management

Managing young-growth forests in Southeast Alaska is likely to become an increasingly important component of forest management on the Tongass in the coming years. Young-growth stands can be treated through thinning and other intermediate treatments to concentrate growth in fewer, larger trees, improve lumber quality, and/or to enhance habitat conditions for wildlife. Zaborski et al. (2000) concluded that the types of treatments applied to young stands will have a profound effect on the types of materials available in the future, including log diameter, knot size, and wood strength.

Over 100,000 acres have been precommercially thinned on the Tongass since 1979. In recent years, precommercial thinning has averaged approximately 5,600 acres per year. The Forest has much less experience with other young-growth management techniques, such as pruning and commercial thinning.

Barbour et al: (2005) estimated that a precommercial thinning at age 20 with a spacing of 12 by 12 feet would produce more merchantable wood volume at age 70 than wider spaced thinnings. However, there is a trend toward wider tree spacing in precommercial thinning prescriptions to maintain or enhance understory plant cover. These treatments could increase taper and stimulate the production of epicormic branches (in spruce) and knot size. These changes could adversely affect wood strength and stiffness (McClellan 2005). There is also a concern that wider spacing may increase the occurrence of fluting on sites where this is a problem (Julin et al. 1993, Holsten et al. 2001).

Pruning removes lower branches and can increase future lumber quality; however, care must be taken not to remove too much of the live crown. Petruncio (1994) recommends that 33 percent of the live crown (no more than 40 percent) can be removed in a western hemlock-Sitka spruce forest without affecting tree growth. Pruning may also increase epicormic branches in Sitka spruce. Deal et al. (2003) reported that 232 out of 236 Sitka spruce had between 9 and 11 sprouts per meter of tree bole. Significantly more large sprouts were produced in the highest pruning lift.

There has been increased interest in commercial thinning in recent years, not only to improve timber values, but as a tool to improve wildlife habitat. Studies in other forest types in the Pacific Northwest indicate that stand structures that are similar to old-growth forest conditions can be developed through thinning (Thysell and Carry 2000). However, there are many unanswered questions as to how to implement thinning treatments that provide a sustainable source of high-value wood products while maintaining biological diversity (Zaborske et al. 2000). In a study comparing the lumber harvested from thinned and unthinned, 90-year-old stands on the Tongass National Forest, Christensen et al. (2002) found that there was no difference in volume recovery or lumber grade in thinned and unthinned Sitka spruce. For western hemlock, the unthinned stands produced more wood volume, but the thinned stands produced more high-grade lumber. There was no difference in the bending module of elasticity for lumber produced from thinned or unthinned stands for either species.

There is also increased interest in managing young-growth stands to increase and maintain understory vegetation, especially as forage for deer and other wildlife. Hanley et al. (2005) noted that much research is needed on new approaches involving thinning of older stands and on including red alder in the secondary successional sequence. Zaborske et al (2002) found that thinning greatly increased forage production, though the amount of useful forage produced varied by the type of thinning implemented. Refer to the *Wildlife* section for a discussion of habitat manipulation.

In additional to their continuing research on managing young forests, scientists at the Pacific Northwest Research Station joined with the Tongass National Forest in 2001 to establish an operational-scale adaptive management study of young-growth management options. This program, called the Tongass-wide Young-Growth Studies (TWYGS), is designed to evaluate the potential benefits of treating young-growth stands to increase wildlife habitat and wood production. Currently, TWYGS includes experiments that test the effectiveness of alder interplanting, precommercial thinning, and pruning.

Yarding Methods

On the Tongass, most logs have been yarded downhill using cable logging systems such as highlead and skyline. Access has usually been from valley bottoms, because road building on steep slopes is difficult and costly. Most logging occurs inland, with logs transported via road systems to marine access points, also referred to as log transfer facilities (LTFs), at tidewater (see the *Transportation and Utilities* section). Harvest by tractor (shovel yarding) has proven effective on flat to moderate slopes; it is not practical on steep slopes. Harvest by helicopter has been limited in the past but is increasing; it is typically the costliest method, but also has fewer adverse effects on other resources.

Yarding methods can be divided into three "operability" classes, which relate to the methods necessary to harvest and transport trees under various conditions. Normal operability includes the standard ground-based and cable logging systems used in areas where access is relatively easy and helicopter logging with distances of up to 0.75 mile. These areas have the lowest logging costs. Difficult operability includes long-span cable systems and helicopter logging with distances between 0.75 and 2.0 miles, occurring where ground access is difficult or not possible. Difficult operability involves higher costs. The third class, isolated operability, consists of isolated stands 2.0 miles or more from a helicopter landing site. These tend to be uneconomical under even high timber markets.

The recent LSTA indicates that approximately 89 percent of the suitable timber land would be accessible using normal harvest methods, 10 percent would be difficult, and 1 percent would be isolated. When economic and environmental risk factors are considered, additional areas are likely to be identified as difficult or isolated during project planning. Risk factors assigned by the LSTA team and district personnel, indicate that about 85 percent of the suitable acres with old-growth forest would be in the normal category.

Tongass Timber Sale Program

One objective of the Alaska National Interest Lands Conservation Act (ANILCA) was the maintenance of timber supply for the Southeast Alaska timber industry because of its contribution to the local and regional economies of Southeast Alaska. For similar reasons, TTRA (Section 101) directs the Forest Service to seek to provide a supply of timber from the Tongass that meets annual market demand and the market demand for each planning cycle to the extent consistent with providing for the multiple-use and sustained-yield of all renewable resources. The planning cycle is assumed to be the 10- to 15-year period between Forest Plan revisions.

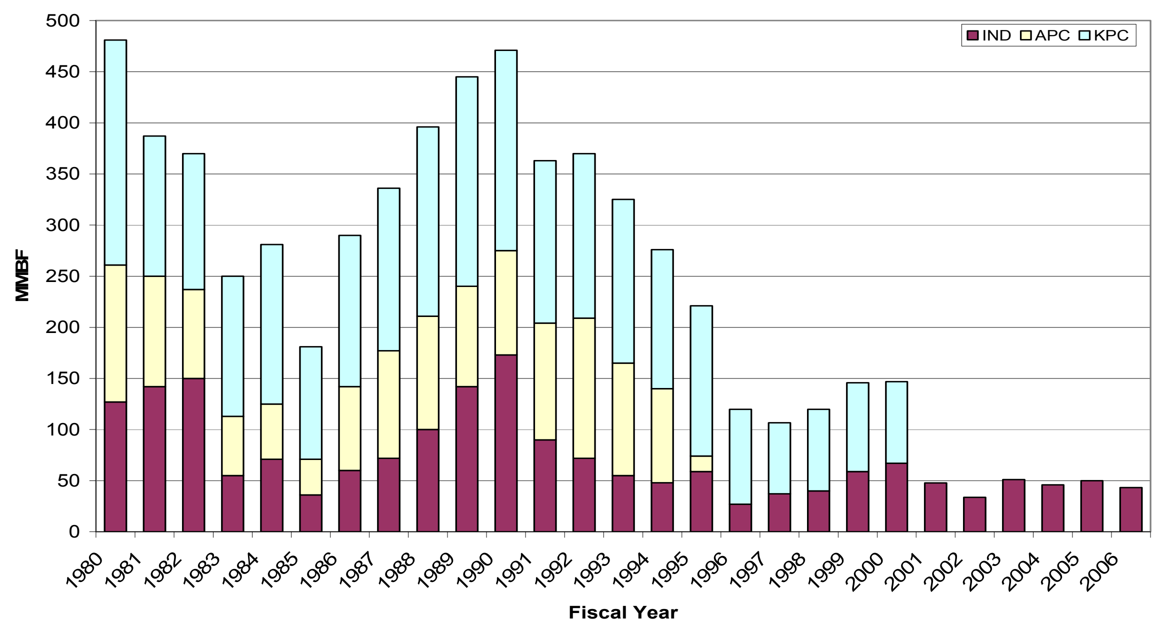
The Tongass timber program is part of a long-term cooperative effort among the federal government, the State of Alaska, and local governments to provide economic diversity and stability in Southeast Alaska and more year-round employment. During the 1920s, the Forest Service proposed several long-term sales to help establish a pulp industry in Southeast Alaska. The objective was to provide a sound economic base in Alaska through establishment of a permanent year-round pulp industry. The Forest Service established requirements to process timber in Alaska, including the construction of pulp mills, via 50-year timber sale contracts awarded in the early 1950s. The first successful sale was made in 1951, and the construction of a pulp mill was completed at Ward Cove near Ketchikan in 1954. This long-term contract was held by Ketchikan Pulp Company (KPC). During the 1950s, the Forest Service offered three additional long-term sale contracts. The belief was that a long-term sale was necessary to ensure the supply of timber and attract an integrated wood products industry to Alaska.

These long-term timber sale contracts are no longer operating. The U.S. Plywood-Champion Paper contract in the Juneau District was canceled by mutual consent in 1976; no operations were performed on the ground. The Pacific Northern Timber Company contract, located on the Wrangell District, required the construction and operation of both a sawmill and pulp mill for 50 years. Only the sawmill was built and operated and the contract was limited to 25 years. All ground activities for the Wrangell Unit were completed in 1981 (USDA Forest Service 1997a). The Alaska Pulp Corporation (APC) closed their Sitka pulp mill in 1993 and the Wrangell sawmill closed in 1995. Their contract was terminated by the Forest Service in 1994. An end to the KPC contract, which was due to expire in 2004, was negotiated in February 1997. The KPC pulp mill closed in 1997.

The average annual timber harvest on the Tongass was about 40 MMBF per year from the early 1900s to 1952. Timber harvest averaged about 358 MMBF per year (sawlog and utility) for the next 45 years after establishment of the long-term contracts in the 1950s. This volume was generated primarily from the KPC, Pacific Northern Timber, and APC contracts. Harvests peaked in 1973 at approximately 591 MMBF and then declined to a low of about 181 MMBF by 1985 (Figure 3.13-3). Harvest levels rose again until 1990 and then declined to their current levels.

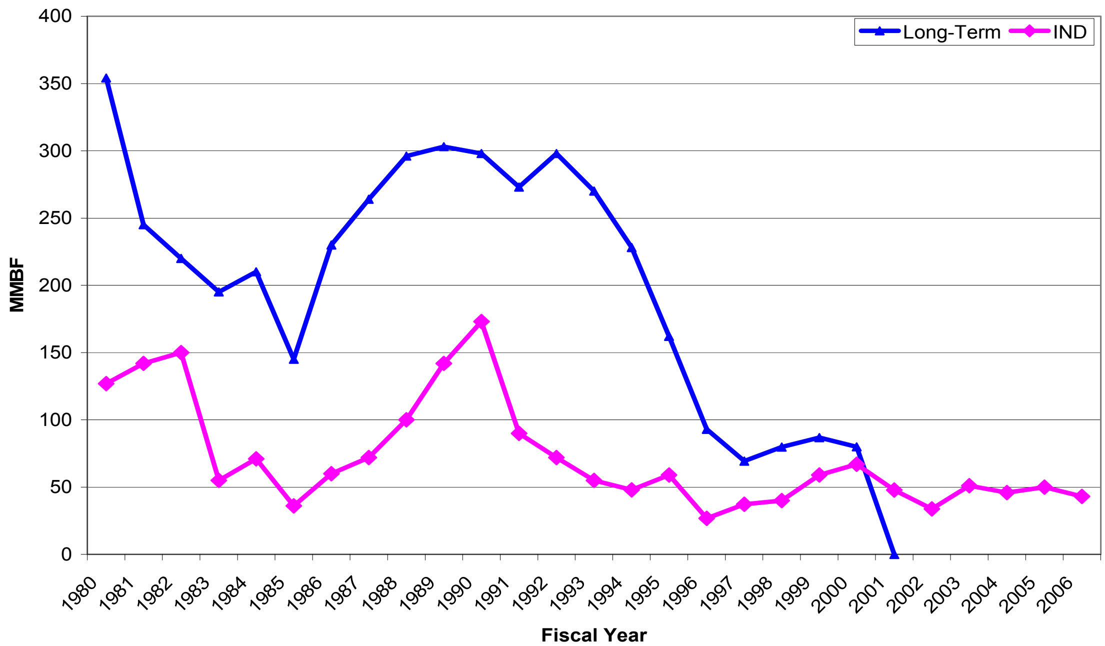
Long-term sales comprised almost three-quarters of the timber volume made available during the period of 1980 through 1991 (USDA Forest Service 1997a; Table 3-74). Between Fiscal Years 1980 and 1995, an annual average of 247 MMBF of volume was made available to the long-term contract holders. Because of market fluctuations, appeals and litigation, and other factors, the long-term contract holder annual average harvest between 1980 and 1995 was about 249 MMBF. Total annual average harvest was approximately 340 MMBF over the same time period. KPC continued to harvest timber until 2000 (Figure 3.13-3). Annual timber harvest averaged approximately 46 MMBF from 2001 to 2005. This represents approximately 13 percent of the total average annual harvest from 1980 to 1995 (340 MMBF). This decrease is largely due to the termination of the long-term contracts with APC and KPC. However, there has also been a decrease in harvest by independent timber operators since 1990 (Figure 3.13-4). Independent timber operators harvested an average of more than 100 MMBF per year between 1980 and 1990. Harvest peaked at 173 MMBF in 1990, about 37 percent of that year's total harvest. Independent harvest decreased sharply in the early 1990s, with a low of 27 MMBF harvested in 1996 (refer to the Economics and Social section for a discussion of this decline). Annual independent harvest has continued to fluctuate since then, ranging from 34 MMBF in 2002 to 67 MMBF in 2000 (Figures 3.13-3 and 3.13-4).

Figure 3.13-3
Tongass National Forest Timber Harvest Histogram for 1980 to 2006



KPC – Ketchikan Pulp Company; APC – Alaska Pulp Corporation; IND – Independent timber operators
Source: USDA Forest Service harvest records

Figure 3.13-4
Tongass National Forest Timber Harvest Line Graph for 1980 to 2006



Long-Term – Long-term contract holders (APC and KPC); IND – Independent Timber Operators
Source: USDA Forest Service harvest records

The current Tongass timber program is composed of a large sale program, a small sale program, and a firewood and personal use program. Harvest volumes averaged 45 MMBF between 2002 and 2006, notably lower than the average annual harvest of 358 MMBF for 1952 to 1997 (Table 3.13-6 in the following sub section) and the Allowable Sale Quantity (ASQ) of 267 MMBF per year approved in the 1997 Record of Decision.

The timber sale program has been in transition since the end of the long-term contracts. Many small operators are in the process of developing direct markets for value-added products, such as molding, tongue-in-groove, paneling, and furniture. There were 15 small mill operators on Prince of Wales Island alone as of August 2005 (Petersen and Bruns 2005). The Forest has created a program to make wood available to small operators, referred to as the microsale program. This program makes dead and down wood with a value of $10,000 or less available to local purchasers by competitive means. The Forest Service and the University of Alaska have created the Ketchikan Wood Technology Center to focus on ways to help the local timber industry. Among other things, the center has developed log grades for Alaskan wood products.

The primary sources of timber in Southeast Alaska are the Tongass National Forest, private corporations (principally Alaska Native Corporations formed through the Alaska Natives Claims Settlement Act [ANCSA]), and the State of Alaska (USDA Forest Service 1997a; Table 3-75). Timber harvest patterns are discussed in greater detail in the *Economic and Social Environment* section of this document.

Timber Sale Management

The Forest Service employs a "pipeline" approach to timber sale planning to provide a stable timber sale program and a continuous flow of timber to regional timber processors. The resulting program is complex and requires that the Forest Service manage four "pools" of timber volume, commonly referred to as the timber pipeline:

- **Timber volume identified in the Forest Service's 10-year Timber Sale Plan.** This pool contains sales available for future timber sale planning and preparation.
- **Timber volume in preparation.** This pool contains sales that are being analyzed and are undergoing public comment through the NEPA process. This can take from 2 to 4 years to complete and ends when a NEPA decision is made.
- **Timber volume available for sale.** This pool contains NEPA-approved sales. Administrative appeals have been resolved, and litigation, if any, has also been resolved. This volume is available to program managers to schedule for sale offerings. Managers need to maintain enough volume in this pool to be able to schedule future sale offerings in an orderly manner and of the size and configuration that best meets regional demand. The Forest Service tries to announce probable future sale offerings at least a year in advance to allow potential purchasers an opportunity to conduct their own evaluations of these offerings in order to determine whether to bid and, if so, how much to offer.
- **Timber volume under contract.** This pool contains sales that have been sold, but not yet harvested. Timber contracts typically give the purchaser 3 to 5 years to harvest or remove the timber purchased. The Forest Service attempts to maintain about 3 years of unharvested timber volume under contract to purchasers. This practice is not limited to the Alaska Region, but is particularly relevant to Alaska because of the nature of the land base. The relative absence of roads, the island geography, and steep terrain mean that much of the timber is isolated and timber purchasers need longer-than-average lead times to plan operations, stage equipment, set up camps, and construct roads prior to beginning harvest.
- Timber sales can take from 3 to 5 years to complete. Sales offered by the Forest Service vary in size to meet the needs of different purchasers. The time taken to complete a sale may vary with the size of the offering. Uncertainty and delays may be introduced through appeals and litigation. The pipeline approach and the variable length of the timber sale process generally make it difficult to draw a direct relationship between particular sales and regional timber demand. Not all of the volume offered for sale since 2001 has been sold. Some sales did not receive bids and many others have been held up by appeals and/or litigation (Table 3.13-6). There were both project- and Forest Plan-related appeals and litigation (i.e., the Roadless Rule).

Timber under Contract

As of May 19, 2006, there were approximately 70 timber sales with approximately 118 MMBF of timber volume under contract on the Tongass National Forest. Although there are nearly 50 timber companies and individuals that either purchase timber or have shown an interest in purchasing timber from the Tongass, over 85 percent of the timber under contract is under contract with four operators: Viking Lumber Company (49.8 percent), Pacific Log and Lumber (26.1 percent), Icy Straits Lumber (7 percent), and Alcan Forest Products (5 percent). These figures do not include all microsales (sales under $10,000). Timber under contract is discussed in greater detail in the *Economic and Social Environment* section.

Long-term sales comprised almost three-quarters of the timber volume harvested during the period of 1980 through 1995 (Figure 3.13-3). During this period, an annual average of 249 MMBF of volume was harvested under the long-term contracts. During this same period, independent sales averaged 91 MMBF per year, ranging from a low of 36 MMBF in 1983 to a high of 173 MMBF in 1990.

The primary sources of timber within Southeast Alaska are the Tongass National Forest, private corporations (principally Alaska Native Corporations formed through ANCSA), and the State of Alaska (Table 3.13-7). Between 1980 and 1990, harvest from the Tongass contributed about 50 percent of the timber supply in Southeast Alaska. However, timber harvest since 1990 has fallen to less than 50 percent of total supply. The Tongass contributed approximately 23.6 percent of the total timber supply in Southeast Alaska between 2001 and 2005.

Table 3.13-6
Volume of Timber Offered, Sold, and Harvested from the Tongass National Forest for FY 2002-2006 (MMBF) [1]

Fiscal Year	Offered	Sold	Harvested
2002	56.9	24.4	33.8
2003	88.8	30.5	51.3
2004	72.6	87.1	46.4
2005	110.4	67.3	49.6
2006	24.0	85.0	43.0
5-Year Average	**70.5**	**58.9**	**44.8**

[1] Volumes do not include re-offered sales, re-sold sales, or credit volumes
Source: USDA Forest Service, Alaska Region. Data on file with Regional Economist, Ecosystems Planning, USDA Forest Service, PO Box 21628, Juneau, AK 99802-1628

Table 3.13-7
Timber Harvest and Imports for Southeast Alaska, 1992-2005 (MMBF)[1]

		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Tongass NF	Sawlogs	303.1	268.3	221.8	181.3	97.4	94.4	107.6	132.8	133.7	39.8	30.0	44.1	40.9	43.3
	Utility Logs[2]	66.6	56.7	54.0	39.8	22.8	12.2	12.2	12.9	13.0	7.9	3.8	6.7	5.4	6.2
State of Alaska[3]	Sawlogs	14.9	5.0	18.1	3.6	4.5	5.2	5.6	7.3	47.8	48.0	48.0	32.7	21.9	40.7
	Utility Logs	0.1	0.0	2.7	2.2	2.5	0.3	1.9	0.1	12.1	5.2	9.3	2.1	2.3	2.2
BIA	Sawlogs and Utility[2]	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0
Alaska Native Corporations[4]	Sawlogs	348.7	328.2	275.0	233.9	292.4	335.9	157.6	193.6	114.6	106.5	93.6	98.1	92.0	99.3
	Utility Logs[2]	97.0	82.2	12.3	81.1	37.7	47.6	59.0	45.4	46.0	13.3	8.1	7.6	6.9	4.6
Southeast Alaska Total	Sawlogs	671.2	601.5	514.9	418.8	394.3	435.5	270.8	333.7	296.2	194.3	171.6	174.9	154.8	183.3
	Utility Logs[2]	163.7	138.9	69.0	123.1	63.0	60.1	73.1	58.4	71.1	26.3	21.2	15.4	14.6	13.2
	Total	834.9	740.4	583.9	541.9	457.3	495.6	343.9	392.1	367.2	220.6	192.8	190.3	169.4	196.5
Alaskan Imports[5]	Sawlogs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--	--	--	--
	Utility Logs[2]	3.0	3.0	3.0	11.5	34.1	0.0	0.0	0.0	0.0	--	--	--	--	--
	Chips	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--	--	--	--

[1] National Forest and Bureau of Indian Affairs (BIA) harvests reported for fiscal years. All other ownerships reported in calendar years.
[2] Utility volume includes logs with less than one-third net sawlog but at least one-half firm usable pulp chips.
[3] Harvests from Alaska Mental Health Trust and University of Alaska lands omitted prior to 2000.
[4] Estimated by telephone survey. Metric tons converted to log scale at a ratio of 2.7 tons per thousand board feet (MBF).
[5] Compiled from trade statistics available from the U.S. Department of Commerce. Metric tons converted to log scale at a ratio of 2.7 tons per MBF.
Source: USDA Forest Service, Alaska Region. Data on file with: Regional Economist, Ecosystems Planning, USDA Forest Service, PO Box 21628, Juneau, AK 99802-1628

Timber Demand

Demand for timber products from the Tongass National Forest is discussed in detail in the *Economic and Social Environment* section.

Environmental Consequences

The analysis of the potential effects of the alternatives addresses the following questions:

- How much land would be allocated to timber production?
- What silvicultural systems and vegetative practices would be utilized?
- What would the ASQ be under each alternative?
- What projected log grade or quality would be provided?
- What would the product mix be, in terms of sawlogs and utility logs?
- What would the long-term sustained yield (LTSY) be under each alternative?
- What are the factors that affect the attainment of the ASQ?
- What would be the future condition of the Forest in 150 years?

The analysis of timber supply and demand for timber products, as well as how existing sales under contract and timber volume in preparation may be affected by the alternatives, is discussed in the *Economic and Social Environment* section.

The effects on the timber industry infrastructure and employment levels are also discussed in that section.

Suitable Timber Lands

There are approximately 2.4 million acres of tentatively suitable lands, as defined by NFMA regulations (36 CFR 219.14(a)) and Section 102 of TTRA. Slightly over 1 million acres of this is mapped as suitable under Alternative 5 (No Action) However, as described below (see factors affecting the ASQ), only an estimated 781,000 acres are suitable for harvest and only 687,000 acres are scheduled for harvest under Alternative 5. This includes old-growth and young-growth forest. Appendix A of the Forest Plan contains a detailed discussion of the tentatively suitable determination process. The amount of suitable land would vary by alternative.

Table 3.13-8 displays the distribution of forest lands, tentatively suitable lands, and suitable lands by alternative. The amount of suitable land that would be scheduled for harvest in order to meet the ASQ under each alternative is also shown. The amount of suitable land would vary from less than 2 percent of the Forest under Alternative 1 to nearly 7 percent of the Forest in Alternative 7. No alternatives have a suitable land base greater than 1.2 million acres. Differences result from assigning the Old-growth Habitat, Remote Recreation, Semi-remote Recreation, and other non-development LUDs. Alternatives 1, 2, 3, 5, and 6 have substantial acres of tentatively suitable lands assigned to the Old-growth Habitat LUD. Alternative 4 uses a different strategy to provide old-growth habitat and primarily assigns land to the Old-growth Habitat LUD in four Biogeographic provinces. In other areas, 33 percent of the productive forest land in each Value Comparison Unit would be maintained in an old-growth condition. Alternative 7 would have the least restriction on harvest in old-growth forest; it does not include Old-Growth Habitat LUDs nor would it have minimum old-growth retention requirements.

Table 3.13-8
Land Classification (thousands of acres), Tentatively Suitable and Suitable Lands[1]

Classification	Alternative 1	2	3	4	5	6	7
Total National Forest land (Items 1 and 2)	16,774	16,774	16,774	16,774	16,774	16,774	16,774
1. Non-Forest land (includes water)	6,918	6,918	6,918	6,918	6,918	6,918	6,918
2. Forest land	9,856	9,856	9,856	9,856	9,856	9,856	9,856
3. Forest land withdrawn from Timber production	4,234	4,234	4,234	4,234	4,234	4,234	4,234
4. Available Forest Land (Item 2 minus item 3)	**5,621**	**5,621**	**5,621**	**5,621**	**5,621**	**5,621**	**5,621**
5. Non-Productive Forests: Forest land not capable of producing crops of industrial wood	2,339	2,339	2,339	2,339	2,339	2,339	2,339
6. Available forest lands (PFL) (Item 4 minus item 5)	**3,282**	**3,282**	**3,282**	**3,282**	**3,282**	**3,282**	**3,282**
7. Forest lands: physically unsuitable	572	572	572	572	572	572	572
8. Forest lands: inadequate information	345	345	345	345	345	345	345
9. Tentatively suitable forest lands (Item 6 minus Items 7 and 8)	**2,365**	**2,365**	**2,365**	**2,365**	**2,365**	**2,365**	**2,365**
10. Tentatively suitable forest lands that are not appropriate for timber production by LUDs:							
a. Semi-Remote Recreation	1,231	853	669	367	494	494	381
b. Remote Recreation	127	122	109	95	77	76	95
c. Old-Growth Habitat	458	458	458	138	432	458	0
d. Wild Scenic or Recreation Rivers	42	42	42	42	42	42	42
e. Special Interest Areas	50	50	50	50	33	50	50
f. Experimental Forest (proposed)	6	6	6	6	-	6	6
g. Scenic Viewsheds-SV (Beach Fringe, Riparian)	8	28	38	90	55	53	63
h. Modified Landscapes-ML (Beach Fringe, Riparian)	24	39	49	92	63	60	65
i. Timber production-TM (Beach Fringe, Riparian)	42	85	105	177	133	126	128
Total (Items 10a through 10i):	**2,116**	**1,682**	**1,526**	**1,058**	**1,328**	**1,364**	**829**
11. Mapped Suitable (Item 9 minus Item 10)	**378**	**683**	**839**	**1,308**	**1,037**	**1,001**	**1,536**
12. Model Implementation Reduction Acreage	65	138	178	309	255	227	362
13. Suitable Acres Available for Timber Production (Item 11 minus Item 12)	**312**	**545**	**661**	**1,000**	**781**	**774**	**1,174**
14. Suitable Acres Scheduled	**144**	**394**	**514**	**892**	**687**	**663**	**1,070**
14a Scheduled Old growth	86	215	313	656	463	445	807
14b Scheduled Young Growth	58	179	200	236	224	218	262
Allowable Sale Quantity (average annual volume)							
1st Decade							
Sawlog (MMBF)	43	132	177	270	232	232	384
Utility (MMBF)	7	20	27	42	35	35	37
Total	**49**	**151**	**204**	**312**	**267**	**267**	**421**
2nd Decade							
Sawlog (MMBF)	43	130	179	310	231	230	384
Utility (MMBF)	7	21	26	50	36	37	37
Total	**49**	**151**	**205**	**360**	**267**	**267**	**421**

[1] Sums and differences may not appear exact due to rounding.
Source: Forest Service GIS database.

Removing land from the suitable land base reduces both potential ASQ and long-term timber growth and yields. While the effect is not perfectly linear, the magnitude of the reduction is generally related to the proportion of lands removed. The timber production lost is irretrievable but is not irreversible. If future designation of these lands is changed to allow timber management, it would be possible to resume timber management activities. Where land is dedicated to road construction or development of facilities, minerals, or rock excavation, the loss of land for timber production is generally irretrievable and may be irreversible.

Silvicultural Systems and Practices

This section describes vegetation management practices prescribed in the Forest Plan, including regeneration methods, reforestation, and intermediate treatments. Definitions for each of these practices, how they will be applied, and expected effects on the timber resource are provided.

Regeneration Harvest Methods

For modeling and planning purposes, the current Forest Plan considered the three regeneration methods discussed under Regeneration Systems: even-aged system, two-aged system, and uneven-aged system (group selection). These same methods were also considered in this Plan Amendment. This does not mean that these are the only these regeneration methods that will be used on the Tongass. Other even-aged methods such as shelterwood, which may be utilized to meet specific objectives, would be similar to clearcut with reserves in regards to appearance and effects (or to clearcuts if the shelterwood is later cut). For this reason, only these three methods were modeled and displayed. Appendix G of the 1997 Land Management Plan Revision FEIS contains detailed descriptions of the various silvicultural systems and their advantages and disadvantages. In addition, other regeneration methods may be applied on a limited scale to test their utility in achieving other forest management objectives.

Implementation of any Forest Plan alternative would include a full array of silvicultural prescriptions, including modification of these methods, depending on the site-specific conditions. The choice of the regeneration method and rotation length would be based upon site-specific analysis done at the project level, would consider multiple resource needs and objectives, and would include the rationale for using the selected regeneration method. This would be documented in the silvicultural prescription, which must be approved by a certified silviculturist.

Table 3.13-9 displays the annual number of acres estimated for each of the three main regeneration methods by alternative for the first and fifth decades of the Plan (based on the SPECTRUM model outputs). The acreages displayed are for modeling purposes in order to estimate Forest Plan outputs and do not limit the manager's ability to use any regeneration method to best meet project goals and objectives. The model used to develop the current Forest Plan (FORPLAN) estimated that 80 percent of the harvest under the selected alternative (the current Forest Plan) would be even-aged and the remaining 20 percent would be two-aged. Sales sold in recent years have averaged 76 percent even-aged harvest, 16 percent two-aged harvest, and 8 percent uneven-aged harvest. The acres modeled for regeneration harvest under the No-Action Alternative vary somewhat from estimates in the current Forest Plan. The regeneration harvest acres in the current Forest Plan were based on FORPLAN model outputs, while the estimates used in this analysis are based on the SPECTRUM model. Changes were made in the assumptions used in the SPECTRUM model based on experience gained under the current Plan.

SPECTRUM models suitable land as either full, modified, or incidental timber yield (Table 3.13.10). For this analysis, lands identified by the model as full timber yield were categorized as likely to be prescribed for even-aged management. Lands identified as modified timber yield were categorized as likely to be prescribed as two-aged management or small patch cuts, while areas identified as incidental timber yield were categorized as likely to be prescribed as uneven-aged management, including openings less than 2 acres.

Table 3.13-9
Vegetative Management Practices

Average Annual Harvest Acres of Suitable Lands Modeled in First Decade

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Regeneration Harvest							
Even-aged[1]	1,180	3,758	5,220	7,226	5,902	6,829	10,033
Two-aged[2]	600	1,534	2,081	3,695	3,819	2,269	5,484
Uneven-aged[3]	2	60	115	351	244	234	429
Regeneration Treatments							
Natural and Artificial	1,780	5,291	7,301	10,921	9,721	9,459	15,516
Precommercial Thinning							
	0	0	0	1,066	617	1,691	2,251
Commercial Thinning							
	0	183	169	629	451	430	435

Average Annual Harvest Acres of Suitable Lands Modeled in Fifth Decade

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Regeneration Harvest							
Even-aged[1]	820	2,367	2,912	7,992	4,445	4,976	8,549
Two-aged[2]	595	1,464	2,064	3,259	3,577	2,583	4,541
Uneven-aged[3]	64	310	386	793	529	563	820
Regeneration Treatments							
Natural and Artificial	1,415	3,831	4,977	11,250	8,022	7,559	13,090
Precommercial Thinning							
	2	1,055	717	2,256	1,355	994	1.330
Commercial Thinning							
	0	571	910	1,779	1,227	1,550	2,307

1 Acres modeled as Full Timber Yield by SPECTRUM.
2 Acres modeled as Modified Timber Yield by SPECTRUM, two-aged harvest or patch cuts.
3 Acres modeled as Incidental Timber Yield by SPECTRUM, uneven-aged harvest or openings less than 2 acres.
4 Natural regeneration refers to seedlings established from seeds falling to the ground from trees growing (or that grew) on the site. Artificial regeneration refers to planted seedlings.

Note: Acres harvested per year decreases with time as more young-growth reaches harvest age. Young-growth forest generally has lower defect rates and higher volume per acre.
Source: SPECTRUM Model (Forest-wide Activity and Output Results)

Table 3.13-10
Timber Management Intensity by Alternative over 100+ Years (acres)[1]

Alternative	High Timber Yields	Moderate Timber Yields	Incidental Yields[2]
1	80,682	48,074	4,865
2	284,729	121,791	30,065
3	397,585	164,152	37,628
4	758,520	263,744	72,679
5	504,600	176,504	48,232
6	563,090	205,897	49,117
7	823,478	445,896	76,133

[1] Suitable timber lands, cumulative treatments over 100 years, including second entry to harvest mature young-growth stands. Not all suitable lands would be harvested.
[2] Suitable land in areas where maintenance of scenic quality is important and sensitive wildlife habitat areas.
Source: SPECTRUM Model

Species composition. Of the four major commercial tree species on the Tongass, western hemlock is the most shade tolerant, followed by western redcedar, yellow-cedar, and Sitka spruce, in that order (USDA Forest Service 1990). Western hemlock is by far the most prevalent species, making up 83 percent of the old-growth forests (Farr and McClellan 1994). Dwarf mistletoe commonly infects western hemlock. Sitka spruce and yellow-cedar are rarely infected by dwarf mistletoe and western redcedar is not infected (Holsten et al. 2001). Having a diverse species mix contributes to wildlife habitat quality, species diversity, and minimizes losses due to insect and diseases that are species specific. In addition, Sitka spruce, yellow-cedar, and redcedar have higher economic values than western hemlock.

Regeneration harvest methods that create open conditions and expose bare mineral soil, such as clearcutting, encourage germination and growth of Sitka spruce (Ruth and Harris 1979). Group selection with openings of at least 2 acres, could also encourage germination and growth of Sitka spruce and the cedars, but may do so to a lesser degree than clearcutting due to side shading. The amount of sun reaching the surface would vary depending on the size, shape, and aspect of the opening. Regeneration methods that create less ground disturbance and smaller openings in the canopy such as single tree selection, smaller sized groups in group selection, overstory removals, and treatments with many reserve trees may encourage growth of western hemlock at the expense of less shade-tolerant species (Sitka spruce and yellow-cedar). However, limited retrospective studies indicate that Sitka spruce can be maintained in mixed hemlock-Sitka spruce stands over a wide range of cutting intensities if enough Sitka spruce trees are present in the stand after harvest (Deal and Tappeiner 2002, Deal et al 2002). Regeneration under two-aged systems would be similar to regeneration under even-aged harvest if leave trees are concentrated near the unit boundaries but may be more like uneven-aged harvest if reserve trees are scattered through the unit, due to shading from the residual overstory.

Alternatives 1, 2, and 3 are projected to have the least amount of two-aged and uneven-aged harvest (Table 3-13-9), followed by Alternatives 6 and 5, respectively. Alternatives 4 and 7 would have the most acres of two-aged and uneven-aged harvest. Alternatives that harvest fewer acres, especially Alternatives 1 and 2, would tend to maintain species composition across the Tongass similar to that found in the old-growth forests, because much less old-growth forest would be harvested. Forested areas in non-development LUDs normally subject to gap wind disturbance effects (refer to the *Forest Health* section) are likely to maintain the current species mix unless one of the predicted effects of climate change, an increase in catastrophic wind events, occurs. Juday et al. (1998) rated many potential impacts on the coastal forests of Southeast Alaska due to climate change. They concluded that there was a high risk of increased large scale blowdown across Southeast Alaska and an increased windthrow around harvest units. If this occurs, more area may come to resemble natural forests currently exposed to catastrophic winds. Alternatives with higher even-aged harvest, especially Alternatives 4 and 7, but also Alternatives 5 and 6, are more likely to create stand conditions that mimic catastrophic disturbance to some extent. However, these stands would lack the large amount of down wood found in natural stands created by catastrophic windstorms and many would be in areas that normally are subjected to gap disturbance.

Damage to residual trees. Western hemlock and Sitka spruce are thin-barked, shallow rooted species and are easily wounded during timber harvest activities (Harris and Farr 1974, USDA Forest Service 1983). These wounds provide an avenue for disease organisms to enter trees, causing rot and reducing their future economic value (Hennon and DeMars 1997). The size and shape of the opening affects the amount of damage. A retrospective study of 18 stands reported that overstory trees did have a greater incidence of wounding in stands that had been partial cut than in uncut stands and that the wounding increased with intensity of cutting; although, the study concludes that there was no significant increase in tree mortality, or in growth loss (Deal et al. 2002). McClellan (2005) reported that a recent operational-level study (part of the Alternatives to Clearcutting Study) found that there were increased problems during tree falling and yarding in group selection openings of less than 30 meters diameter (approximately 100 feet). Alternatives 1, 2, and 3 would have the least amount of two-aged and uneven-aged harvest, followed by Alternatives 6 and 5, respectively. Alternatives 4 and 7 would have the most acres of two-aged and uneven-aged harvest (Table 3.13-9).

Diseased trees may be more susceptible to windsnap and snow breakage (Nowacki and Kramer 1998), although one retrospective study found that many uprooted or broken-stemmed trees had died before falling (Hennon and McClellan 2003). In either case, the loss of residual trees that are left standing to provide structural diversity would result in management objectives not being met. The cedars are also susceptible to damage and subsequent attack by disease organisms. However, their wood appears to be more resistant to decay (USDA Forest Service 1990). Refer to the *Forest Health* section for a discussion of how the alternatives may affect dwarf mistletoe, insects, disease, and windthrow.

Growth rates. Estimation of future yields from young-growth stands created by timber harvest is critical for developing ASQs for the Forest Plan. Growth and yield tables have been developed for even-aged stands in Southeast Alaska (Taylor 1934, Farr 1984). Published growth and yield tables have not been developed for stands regenerated under two-aged or uneven-aged methods. Unpublished yield tables for these harvest types were developed by the Forest Service for use in estimating ASQ. These are part of the planning record.

Given that over 30 percent of the volume in old-growth stands is defective (Farr and Harris 1971), it is unlikely that these trees would respond to the additional growing space made available through partial harvest. While young western hemlock stands respond well to thinning, trees older than 100 years respond poorly to release (USDA Forest Service 1990). Information on growth rates for trees growing under a canopy in Southeast Alaska is limited. Western hemlock is shade tolerant and may grow well under partial shade. Sitka spruce is less shade tolerant than hemlock and it is reasonable to expect some growth loss when Sitka spruce is grown under residual overstory trees. However, Deal and Tappeiner (2002) reported that, in most cases, concerns about greatly reduced stand growth and vigor were unsubstantiated, based on a retrospective study of 18 stands in Southeast Alaska that had been partially cut 12 to 90 years earlier. Analysis of these stands did not detect significant changes in tree species composition, stand growth, hemlock dwarf mistletoe infection, or mortality rates (Deal et al. 2002).

One measure of future growth rates is the total amount of slow-growing old forest that would be harvested over the rotation. Alternative 7 would result in the most harvest, and the most even-aged harvest, followed by Alternatives 4, 5, 6, 3, 2, and 1, in that order. Alternative 7 would result in more than nine times the acres of old forest converted to productive young-growth stands as Alternative 1 (more than 807,000 compared to nearly 86,000 acres) and approximately 75 percent more than Alternative 5, No Action (more than 807,000 compared to nearly 464,000 acres).

Reforestation

The NFMA requires assurance that all areas receiving final removal harvest can be adequately restocked with trees within 5 years of that harvest. On the Tongass, natural restocking is usually adequate to meet this objective because both western hemlock and Sitka spruce are prolific seed producers (USDA Forest Service 1983). The new stand originates from advance regeneration and from seeds that come from residual trees or from trees adjacent to the harvest unit. Since 1988, natural regeneration has accounted for 94 percent of the reforestation program. The remaining 6 percent has been artificial regeneration (planting). The future need for planting would be determined on a site-specific basis to achieve management objectives such as increasing the abundance of Sitka spruce where western hemlock or brush may have a competitive edge or increasing the abundance of yellow-cedar or western redcedar, where natural regeneration of these species is anticipated to be inadequate. The desired species composition, required number of seedlings, and method of regeneration should be displayed in the silvicultural prescription. Table 3.13-9 lists the acreages that would require reforestation (natural or artificial) in the first and fifth decades by alternative.

Intermediate Treatment Methods

Intermediate treatments are any manipulation in a stand that occurs between two regeneration periods (Daniel et al. 1979). The regeneration period establishes the new stand, either through natural regeneration or through planting. Intermediate treatments are done to ensure that the new stand has the desired species composition, tree health, growth, and spacing, as well as to recover product value. They can also be used to create or improve habitat for wildlife. Intermediate treatments may be used if approved as part of a site-specific silvicultural prescription. Currently, the only intermediate treatment commonly used on the Tongass is pre-commercial thinning.

Precommercial thinning is applied in young stands that have not reached merchantable size. It is the most commonly applied intermediate treatment in Southeast Alaska. It is used to:

- Favor preferred tree species.
- Concentrate tree growth on fewer individuals to produce larger trees in a shorter period of time.
- Increase the amount of light reaching the forest floor, thereby retaining understory vegetation that is valuable wildlife forage (DellaSalla et al. 1994).

There are concerns over the effects of precommercial thinning on future wood quality, especially wider spacing of residual trees (McClellan 2005). Thinning can increase epicormic sprouting on the Sitka spruce trees (Deal et al. 2003). Lower density thinnings could increase taper and increase the size and longevity of lower branches, thus reducing future wood quality (McClellan 2005). Larger lower branches increase fluting in western hemlock, which reduces wood quality (Julin et al. 1993) (refer to the *Forest Health* section for a discussion of fluting).

Pruning removes the lower branches of a tree at an early age in order to produce knot-free wood. It is the only way to produce clear lumber in rotations less than 100 years (Daniel et al. 1979). However, pruning Sitka spruce trees can encourage epicormic sprouting in Sitka spruce and can limit diameter growth for all species. Deal et. al. (2003) found that the total number of sprouts was similar among different levels of pruning but significantly more large sprouts were produced when more of the crown was removed.

Commercial thinning is applied to young stands that have reached merchantable age. The primary difference between commercial and precommercial thinning is that the trees cut in a commercial thinning operation are removed and sold. Commercial thinning can be used to:

- Meet market demand for wood products, either from suitable or unsuitable lands (harvest would only be used on unsuitable lands to meet resource objectives, such as improving wildlife habitat, and where no irreversible damage would occur).
- Maintain or increase the growth rate of dominant and co-dominant trees by removing trees in the lower crown classes, increasing merchantable yields over the rotation.
- Stimulate development of more complex canopy structures or enhance forage in the understory in order to meet wildlife habitat needs.
- Improve scenic quality.

By maintaining or increasing growth rates, commercial thinning lengthens the time needed for a stand to reach CMAI, extending the rotation length (Daniel et al. 1979).

Precommercial thinning would be implemented under all alternatives based on funding. Pruning is likely to play a minor role in the foreseeable future under all alternatives. Commercial thinning is expected to play a larger role in meeting future demand under all alternatives over the next few decades, as areas harvested in earlier decades reach commercial size. Over the long term, alternatives with high harvest levels would create more stands, which in time would be available for commercial thinning. Also, alternatives that would facilitate creation of an integrated timber industry, especially Alternatives 4 and 7, are likely to lead to more commercial thinning because there would be a greater demand for smaller logs if, for example, a medium density fiberboard mill is built (refer to the *Economic and Social Environment* section for a discussion of the likely product mix under the proposed alternatives).

Allowable Sale Quantity

Allowable Sale Quantity and Timber Sale Program Quantity

The ASQ of each of the alternatives is an indicator of possible future timber supply level that each alternative could produce. ASQ is the maximum quantity of timber that may be scheduled for harvest from suitable lands on the entire Forest for the next 10 years (36 CFR 219.3). It is usually expressed as an annual average. The yearly quantity may exceed or be less than the annual average for the decade. The ASQ is a ceiling; it is not a future sale level projection or target and does not reflect all of the factors that may influence future sale levels.

The ASQ is an expression of the biological potential of the forest to produce timber within the constraints of other resource needs; it is constrained by harvest limitations necessary to meet LTSY requirements, multiple-use considerations, and environmental restrictions. Changes in the timber land base, timber inventory, or silvicultural prescriptions would affect ASQ. An ASQ is, to some extent, imprecise because it is based on estimating techniques (the SPECTRUM model) and Forest-wide data rather than on detailed, on-the-ground data from the timber sale area. Given the uncertainties inherent in developing an ASQ, shortfalls between the ASQ and timber sales are very possible.

The timber sale schedules for each Ranger District include that portion of the timber inventory that is scheduled for sale for a specific year. The schedule may include harvests from unsuitable lands and convertible products (such as beach log salvage and fuel wood) in addition to sales counting towards the ASQ. Schedules are updated annually or more frequently.

Table 3.13-11 displays the projected timber output for the first and fifth decades that could result from implementing each of the seven alternatives in both board feet and cubic feet. This output is composed of two categories: sawlogs and utility logs. The use and marketability of these log types is discussed in the *Economics and Social Environment* section. Alternatives with higher timber outputs may require a "ramp-up period"; therefore, ASQ is higher for these alternatives in later decades than in the first. Refer to the discussion in the *Economics and Social Environment* section.

Table 3.13-11
Allowable Sale Quantity (First Decade, Average Annual)

Alt	Sawlog (MMBF)[1]	Sawlog & Utility (MMBF)[1]	Sawlog (MMCF)[2]	Sawlog & Utility (MMCF)[2]
1	42.6	49.3	8.5	9.9
2	131.5	151.2	26.8	30.8
3	176.9	204.0	36.4	41.9
4	270.0	311.5	55.2	63.6
5	231.9	267.0	47.7	54.9
6	231.8	267.0	47.6	54.8
7	384.0	421.0	78.5	85.9

Allowable Sale Quantity (Fifth Decade, Average Annual)

Alt	Sawlog (MMBF)[1]	Sawlog & Utility (MMBF)[1]	Sawlog (MMCF)[2]	Sawlog & Utility (MMCF)[2]
1	46.0	49.3	9.6	10.2
2	147.7	153.6	31.9	33.1
3	197.6	204.6	42.7	44.0
4	326.9	360.0	68.4	75.1
5	250.0	267.0	53.1	56.5
6	250.8	267.0	53.8	57.1
7	397.2	421.0	83.0	87.7

[1] MMBF = million board feet, long log bureau scale
[2] MMCF = million cubic feet
Source: SPECTRUM model outputs.

Factors Affecting the Allowable Sale Quantity

Within LUDs where timber harvest is compatible with the resource objectives of the area, there may be "intrusions," "physical factors," and "unmapped" standards and guidelines that limit timber management opportunities. These factors (discussed below), often termed "falldown," have been recognized at the forest level, and the anticipated timber output adjusted appropriately. These limitations may include lands that are not capable of supporting a sustained timber management program. In other cases, where there are physical limitations, a less intensive or perhaps unregulated output may be scheduled for this period. Other factors also contribute to differences between ASQs and timber sales, such as budgets and legal challenges.

The Forest-wide estimates used to develop the ASQ considered many of the factors contributing to differences between ASQs and the actual volumes produced in timber sales. These include factors affecting the suitability determination of forest lands that are usually encountered in on-the-ground examinations (e.g., sale reconnaissance, stand exams, layout, and sale preparation). For each alternative, areas were set aside (not scheduled for harvest) to allow for those factors most often encountered. Data from previous case studies, monitoring, site visits, inventory data, the GIS database, and the new Stand Density Model map were used to develop the acreage estimates (see Appendices A and B for more information).

More specifically, the following questions were considered:

1. Is it tentatively suitable? (36 CFR 219.14[a])

Appendix A of the proposed Forest Plan outlines the process used to determine the tentatively suitable land base. The three most common factors encountered during project implementation are: 1) unmapped streams that need buffers due to TTRA or Forest Plan standards and guidelines; 2) unmapped extreme hazard soils; and 3) forest land incorrectly mapped as capable of growing industrial wood products.

2. Is it appropriate for timber production? (36 CFR 219.14[c and d])

The Forest Plan standards and guidelines were reviewed for elements that are not mapped or in the GIS database and that could cause a loss of suitable acres. Eight factors were identified:

Land Selections – reduction due to the conveyance of selected lands to the State of Alaska and Native interests.

TTRA Stream Buffers – reduction due to unmapped Class I and II stream buffers (i.e., streams that were not mapped as Class I or II).

Non-Commercial Forest – reduction due to volume class mapping errors.

Slope/Soil Hazard – reduction due to unmapped steep slopes (i.e., areas with steep slopes or high hazard soils that could not be identified correctly by GIS mapping).

Cost Efficiency – excludes stands with the lowest economic potential from the suitable base.

Riparian Habitat (Class III streams) – reduction due to unmapped Class III stream buffers (i.e., Class III streams that could not be identified during mapping, usually due to canopy cover).

Karst/Caves – reduction due to upgrading of the karst classification to high vulnerability on some areas during field exams.

Remaining Standards and Guidelines – reduction due to unmapped raptor and murrelet nests, wolf dens, mountain goat habitat, and habitat linkages.

The sum of these subfactors produces the overall Model Implementation Reduction Factors (MIRF) for each category (geographical area, volstrata, operability class, alternative). The process and results are discussed in Appendix B. The average MIRF is 42 percent for the north districts, 17 percent for the central districts, and 23 percent for the southern districts.

Cost efficiency: TTRA provides that:

ANILCA is further amended by deleting section 705(d)(16 U.S.C. 539d(d)) in its entirety and inserting in lieu thereof:

> [d] All provisions of section 6(k) of the National Forest Management Act of 1976 (U.S.C. 1604[k]) shall apply to the Tongass National Forest

> except that the Secretary need not consider economic factors in the identification of lands not suited for timber production. (TTRA, Sec. 102.)

Economics is an important consideration in determining whether lands should be harvested; however, experience has proven that it is not feasible to effectively factor in economics as part of the suitability determination. Economic conditions fluctuate greatly during the course of a plan period. One year a certain area of land or species may be uneconomic to harvest, and another year market conditions may have changed to where the same area or species would be in demand. This makes it difficult to meaningfully assess the economics of harvesting a particular site over a 10-year period. Also, the value of the timber sale program must be considered as a whole rather than by only evaluating individual timber sales or harvest units in isolation, because some sales or units of low value are offset by other higher-value sales or units. The economics of harvesting any particular site can be considered as part of the project decision to approve harvest of the area.

Non-interchangeable components

The ASQ is partitioned into two portions, referred to as non-interchangeable components (NICs). The ASQ is partitioned to prevent overharvest of the best operable ground and to identify that portion of the timber supply that is more economic to harvest. The total ASQ is derived from the sum of the timber volumes from both NICs. For the Tongass, the following are identified as the NICs:

NIC I: Normal Operability (85 percent of the suitable land based on the LSTA). This is volume scheduled from suitable lands using existing logging systems. Most of these lands are expected to be economic under most market conditions. On average, sales from these lands have the highest probability of offering a reasonable opportunity for a purchaser to profit from his/her investment and labor. This is the best operable ground. The percent of volume from NIC I lands that contributes to ASQ varies from 87 to 99 percent, depending on the alternative (Table 3.13-12).

Normal operability includes those systems most frequently used on the Tongass. These systems are tractor, shovel, standard cable, and helicopter yarding up to a distance of 0.75 mile.

NIC II: Difficult and Isolated Operability (15 percent of the suitable land based on the LSTA). This is volume scheduled from suitable lands that are available for harvest using systems not in common use in Southeast Alaska. Most of these lands are presently considered economically and technologically marginal. The percent of volume from NIC II lands that contributes to ASQ varies from 1 to 13 percent, depending on the alternative (Table 3.13-12).

Difficult operability includes those systems used on the Tongass that have significantly higher costs. These may include long-span skyline, multi-span, or helicopter with yarding distances greater than 0.75 mile. This category also includes lands that have limited access as a result of being isolated by prior harvest activities or other management activities.

Isolated operability refers to small stands of isolated timber that are extremely difficult to harvest. The harvest system could vary, but would be more costly due to the location of the stand, with average yarding distances greater than 2 miles.

Table 3.13-12
Estimated Harvest by Operability Class (NIC I and NIC II) in the First Decade (MMBF[1] and percent)

Alternative	NIC I		NIC II		Total
1	48.8	99%	0.6	1%	49.3
2	143.5	95%	7.6	5%	151.1
3	185.5	91%	18.5	9%	204.0
4	271.8	87%	39.8	13%	311.5
5	238.5	89%	28.5	11%	267.0
6	237.7	89%	29.3	11%	267.0
7	366.5	87%	54.5	13%	421.0

[1] MMBF: million board feet
Source: SPECTRUM model. Numbers may not appear to add correctly due to rounding.

Harvest during the first few decades would come primarily for old-growth forests within NIC I areas. Harvest in the later decades would come, almost entirely, from mature young-growth forests (also in NIC I areas), which are expected to have less defect and, therefore, higher volumes per acre.

Other Factors that Affect the Timber Sale Program

Other factors that may affect the amount of timber actually sold include the cost of preparing a timber sale, administrative appeals and lawsuits (which may delay or forestall sales), transportation and fuel costs (which affect the cost of harvesting a sale, especially a helicopter sale), and market conditions that may discourage purchasers from bidding on sales. Additional harvest may occur on lands that are not suitable for timber management, for example, to stimulate development of more complex canopy structures or to enhance forage in the understory in order to meet wildlife habitat needs. This would only occur if it is determined that there would be no irreversible damage to resources. Another example would be incidental harvest on steep slopes. These types of harvest would not contribute to ASQ, but would add to the total timber harvest on the Forest.

Allowable Sale Quantity and Long-term Sustained Yield Capacity

LTSY is the maximum timber yield that can be sustained indefinitely from lands managed for timber production when all stands have been converted to a managed state. This varies by alternative, depending on the amount of suitable land and on standards and guidelines particular to each alternative. LTSY is a function of the total number of acres allocated to timber management, the management intensity, standards and guidelines, silvicultural systems, and the productive capacity (conifer growth) of the suitable lands. The harvest schedule is based on: 1) a harvest schedule that exhibits non-declining yield at or below LTSY capacity, 2) a regeneration harvest age at or beyond culmination (maximum) of Mean Annual Increment, and 3) a planning horizon of 150 years.

The projected yield over the next 15 decades that could contribute to the ASQ is expected to increase over time as second-growth forests mature and become available for harvest. The average volume per acre of old-growth forest is approximately 29 MBF per acre. The expected volume of 100-year-old stands of second growth in the central portion of the Tongass is approximately 56 to 60 MBF per acre (based on the Forest's managed yield tables for this area), depending on stand management (see below). As more 100-year-old stands become available for harvest, the ASQ could increase, or the land base needed to produce a given ASQ could decrease. In addition, commercial thinning would add to harvest volume.

The ASQ does not exceed the LTSY during the 100-year-plus planning horizon. The potential ASQ is expected to be between 49 and 92 percent of LTSY for the rotation under all alternatives based on the LTSY calculations. Table 3.13-13 displays the ASQ and LTSY by alternative. For all alternatives, the ASQ never exceeds the LTSY during the planning horizon. Alternatives that would allocate a greater number of acres for timber management and/or have more acres under intensive management would produce the highest LTSYs.

Table 3.13-13
Allowable Sale Quantity and Long-term Sustained Yield Capacity (MMBF[1])

Alt.	Decades 1 to 5 Average Annual	Decades 6 to 10 Average Annual	Decades 11 to 15 Average Annual	LTSY (MMCF)[2]	Maximum Percent of LTSY
1	49.3	49.8	52.0	21.5	49
2	152.6	153.6	153.8	48.3	69
3	204.5	204.6	204.7	59.9	76
4	350.3	360.0	360.0	92.4	88
5	267.0	267.0	267.0	68.4	87
6	267.0	267.0	267.0	72.9	82
7	421.0	421.0	421.0	102.5	92

[1] MMBF: million board feet
[2] MMCF: million cubic feet. SPECTRUM only expresses long-term sustained yield in the cubic foot measure. Direct conversion from MBF to MCF is complex, varying by tree size and taper but is approximately 5 MBF to 1 MCF

Future Conditions

Approximately 90 percent of the existing timber stands on the Tongass are beyond CMAI. Timber stands that exceed CMAI are either in decline or are not growing at optimal rates for their site's potential productivity. The western hemlock-Sitka spruce forest type is one of the world's most productive forest types (USDA Forest Service 1983); it is capable of producing prodigious amounts of wood. The updated forest yield tables for the central part of the Tongass estimate that a normally stocked stand 40 years old would contain 7 MBF of merchantable wood per acre. By age 70, volume should increase to 29 MBF of wood per acre, assuming no precommercial thinning occurred. The age of CMAI would be around 100 years with a merchantable volume of 56 MBF per acre, assuming no precommercial or commercial thinning. If the same stand is thinned, volume at CMAI is estimated to be 60 MBF, in addition to an estimated 8 MBF of commercial thinning volume obtained at age 60. Yields from uneven-aged silvicultural systems would be considerably less, approximately 28 MBF at age 200, based on the updated forest yield tables.

As a greater proportion of the Forest is converted from slower growing, highly-defective stands to stands well-stocked with vigorously growing conifers, total forest growth would increase. Because of higher volumes and lower defect, managed young-growth would be able to provide higher harvests on the same land base or support the same harvest on a smaller land base. Under a 100-year rotation, between one-forth and one-third of the suitable land would not be needed to provide a given ASQ, depending on alternative. This portion of the timber base could revert to some other land use and be available to provide old-growth habitat, or the ASQ could be increased if market conditions allowed.

Only a portion of the Forest would emphasize timber management; most of the existing mature and old-growth stands on the Forest would be maintained. Various amounts of old-growth conifer stands would be maintained or allowed to develop under each alternative. Alternatives that allocate the most acres to development-oriented land allocations would gradually have more stands in younger timber age classes, and fewer stands of old growth. However, more than 150 years from now, the predominant age class on the Tongass would still be greater than 150 years

(Table 3.13-14). The percent of total productive forest land that would be managed stands of less than 150 years of age is expected to be a relatively small component of the forest landscape on a Forest-wide basis for all alternatives. Old growth would still be the predominant vegetative structure on the Tongass (Table 3.13-15).

Conifer growth in young stands can be accelerated through silvicultural treatments to control conifer stocking. Benefits from such treatments may include larger piece size and consequently lower logging costs, increased stand variability, higher quality wood, and employment opportunities. In addition, treatments may shorten the time period spent in the stem exclusion phase of stand development and offer other resource benefits.

Table 3.13-14
Age Class Distribution of Mapped Suitable Acres after 160 years

	Alternative						
Age Class	**1**	**2**	**3**	**4**	**5**	**6**	**7**
0 to 10	8,537	37,229	50,026	92,198	71,233	69,918	109,874
11 to 20	13,013	26,248	41,859	74,522	63,141	52,245	97,694
21 to 30	11,385	27,044	40,029	79,772	67,128	55,510	104,374
31 to 40	10,591	31,271	44,004	87,118	64,534	62,892	113,901
41 to 50	11,030	34,182	50,868	99,463	78,711	70,789	120,941
51 to 60	9,003	32,245	46,596	93,342	78,763	67,621	119,473
61 to 70	10,549	34,125	49,027	83,138	69,299	62,176	111,485
71 to 80	13,179	14,087	16,509	34,367	29,436	22,621	45,926
81 to 90	7,189	24,038	28,096	50,227	31,847	43,327	54,324
91 to 100	9,044	20,631	16,744	47,864	28,550	35,092	50,097
101 to 110	10,556	22,024	25,545	70,148	42,499	40,866	71,307
111 to 120	10,044	19,336	25,566	30,146	25,399	31,355	21,714
121 to 130	17,419	23,609	34,580	15,481	10,483	21,019	9,019
131 to 140	15,858	29,370	23,570	4,340	5,287	7,096	5,193
141 to 150	8,236	6,586	5,189	1,624	1,423	2,910	2,121
Total 0 to 150 Years	**165,633**	**382,025**	**498,208**	**863,750**	**667,733**	**645,437**	**1,037,443**
Total Greater than 150	**197,345**	**289,455**	**332,588**	**440,743**	**366,324**	**352,761**	**489,463**
Total	**362,978**	**671,480**	**830,796**	**1,304,493**	**1,034,057**	**998,198**	**1,526,906**

Source: SPECTRUM model 2006. Numbers may not add correctly due to rounding. Represents all suitable, not just scheduled suitable.

Table 3.13-15
Forest-wide Stand Structures after 160 Years (acres)

	Alternative						
Stand Structure	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Stand Initiation (0 to 20 Years)	21,550	63,477	91,885	166,720	134,374	122,163	207,568
Stem Exclusion (21 to 120 years)	89,488	300,047	401,448	449,245	526,870	550,762	802,661
Understory Reinitiation (121 to 150 years)	102,570	258,983	342,984	675,585	516,166	492,249	813,542
Productive Old-growth (>150 years)	4,806,213	4,711,868	7,769,622	4,848,450	4,779,014	4,751,489	4,894,171

Source: SPECTRUM model 2006. Numbers may not add correctly due to rounding.

Managing stands to enhance wildlife and fish habitat carrying capacity is one of the objectives of the Tongass National Forest. To help meet this objective, the Forest Service has implemented studies on stand management, including TWYGS, the Alternatives to Clearcutting study, and other Pacific Northwest research, some of which has been discussed in this section. Appendix B of the Forest Plan includes a list of information needs.

Cumulative Effects

Cumulative effects to timber include past and present and proposed harvest discussed above. Table 3.13-13 presents a comparison of harvest and LTSY by alternative, an important measure of the cumulative effect on the growing stock on NFS land. Maximum harvest levels on NFS lands proposed under all alternatives are well within the LTSY. Table 3.13-14 displays the age class of forests on NFS lands by decade for the next 160+ years; Table 3.13-15 displays the projected stand structure over the same period. Cumulative effects on timber resources across Southeast Alaska are presented below.

In 1954, there were approximately 6.5 million acres of productive forest land on all ownerships in Southeast Alaska. The amount of forest land in Southeast Alaska that is available for timber management has declined over the past century, largely due to Wilderness and LUD II designation by Congress and to land allocated to non-development LUDs in the current Forest Plan. This, along with mill closures and changes in timber markets, has contributed to a decline in timber harvest. Harvest on all lands in Southeast Alaska peaked in the 1980s and has been in decline since then. Total harvest on federal, state, and private lands declined from just under 1,000 MMBF in 1989 to less than 200 MMBF in 2005. Approximately 767,000 acres of productive forest land have been harvested since 1954 in Southeast Alaska, approximately 59 percent of this is NFS land and 41 percent is on state, Native corporation, and other private lands.

Currently, there are more than 0.75 million acres of NFS lands considered suitable for timber management on the Tongass. In addition, nearly 0.75 million acres of state, Native corporation, and other private lands are available for harvest. The maximum annual harvest from the Tongass National Forest is 267 MMBF under the current Forest Plan, although actual harvests have averaged near 50 MMBF per year for the last few years. Potential annual harvest on state and private land has been estimated to be approximately 109 MMBF (Brackley et al. 2006a); although, comments from Sealaska Corporation indicate it may be much lower. Based on past experience, most of the harvest on private land would be exported and would not contribute to meeting local demand. Using this estimate, cumulative harvest in Southeast Alaska would range from as low as 158 MMBF under Alternative 1 to approximately 530 MMBF under Alternative 7. Table 3.13-16 displays the cumulative harvest under the proposed alternatives.

Table 3.13-16
Maximum Estimated Annual Timber Harvest in Southeast Alaska during the First Decade (MMBF)

Alternative	National Forest[1]	State and Private[2]	Total
1	49	109	158
2	151	109	260
3	204	109	313
4	312	109	421
5	267	109	376
6	267	109	376
7	421	109	530

[1] SPECTRUM model estimates, 2007
[2] 102 MMBF/year from Native corporation lands and 7 MMBF/year from state land (Brackley et al. 2006a). Most harvest on private land is exported.
MMBF: million board feet.

There are several risk factors and uncertainties that may affect timber outputs; these include the reliability of existing information of forest stands, accessibility, economics, budget, harvest on private land, development of new markets, investments in new processing facilities, and climate change.

The recent LSTA indicates that approximately 85 percent of the suitable timber land would be accessible using normal harvest methods, just under 10 percent would be difficult, and just under 6 percent would be isolated. When economic and environmental risk factors are considered, additional areas are likely to be identified as difficult or isolated during project planning. Risk factors assigned by the LSTA team and district personnel indicate that about 85 percent of the suitable acres with old-growth forest would be in the normal category. However, until field work is completed, actual conditions remain uncertain and there is a risk that some areas considered suitable for timber management are actually unsuitable and that areas considered to be accessible using normal harvest methods will prove to be difficult or isolated. Increasing fuel costs may restrict the use of helicopters, which would mean some areas with suitable timber would be too expensive to harvest. Similarly, increases in road construction costs may affect the economic viability of some sales. In addition, funding levels for preparing timber sales are uncertain they depend on the amount Congress chooses to allocate in any given year.

The harvest levels associated with the alternatives discussed above, especially Alternatives 4, 5, 6, and 7, depend on developing new processing facilities and/or new markets. If these are not developed, harvest levels may not increase much beyond current levels. Also, total harvest projections for Southeast Alaska depend, in part, on how much timber is harvested from state and private lands. The estimates used in this analysis are derived from published reports. However, comments received following publication of the DEIS indicate that actual harvest levels, especially on Sealaska land, may be lower than those estimates. Sealaska indicates that, without the land adjustments they propose, they will be unable to continue to harvest at current levels. Conversely, if suitable land is transferred to Sealaska in exchange for lands that, while valuable for wildlife habitat or recreation, are not suitable for timber production, harvests on NFS lands will likely need to be reduced.

Timber harvest programs under any of the proposed alternatives, as well as on state and private land may be affected by factors related to climate change. Juday et al. (1998) rated many potential impacts on the coastal forests of Southeast Alaska due to climate change. They concluded that there was a high risk of increased large scale blowdown across Southeast Alaska, increased windthrow around harvest units, increased damage from black-headed budworm outbreaks and other insects, and increased risk that new fungal tree diseases will appear in Southeast Alaska. These factors, if they occur, could alter harvest and growth projections outlined in this analysis, as well as have a major affect on wildlife habitat. In contrast, Juday et al. also concluded that there was some likelihood of increased tree growth and increased site productivity; previously non-commercial forest could become commercial forest. Refer to the *Forest Health* and the *Climate and Air* sections for additional information.

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Minerals

Affected Environment

A wide variety of mineral deposit types and mineral resources occur within the boundaries of the Tongass National Forest, including gold, silver, molybdenum, and uranium, and nationally designated "strategic" and "critical" minerals such as lead, zinc, copper, tungsten, and platinum group metals. The Forest Service recognizes that minerals are fundamental to the Nation's well being and, as policy, encourages the exploration and development of the mineral resources it manages. The Secretary of Agriculture has provided regulations (36 Code of Federal Regulations [CFR] 228) to ensure surface resource protection, while encouraging the orderly development of mineral resources on National Forest System (NFS) lands.

Southeast Alaska has a long history of mineral prospecting and mining. The first mineral location in Southeast Alaska was recorded in 1867 by a Russian trader near New Kasaan on Prince of Wales Island. In 1880, gold was discovered in placer gravels near Juneau. This discovery sparked keen interest and, by the turn of the century, dozens of mines were in production from the Juneau Mining District to the Ketchikan Mining District. Mining remained active until World War II. From the close of World War II to the mid-1970s, mineral exploration and production in Southeast Alaska remained low compared to the activity documented at the beginning of the century. Prospecting and exploration generally increased during the mid-1970s, in part due to the Quartz Hill and Greens Creek discoveries, improved metal prices, technological advances, and the deregulation of gold. Metal prices have maintained generally favorable trends since the mid-1980s, resulting in increased exploration and renewed interest in precious metals, mainly gold.

With respect to National Forest management, mineral resources are legally divided into three groups: locatable minerals, leasable minerals, and salable minerals. The authority of the Forest Service to influence and regulate the exploration, development, and production phases of mining operations varies with each group. As a result, the Forest Service manages mineral resource programs that are specific to each group of minerals.

Locatable Minerals

A locatable mineral is any mineral that is "valuable" in the usual economic sense, or has a property that gives it distinct and special value. These are typically what are known as "hardrock" minerals. Locatable minerals may be recovered from load deposits (solid rock) or placer (surficial) deposits. Examples of some locatable minerals on the Tongass National Forest are gold, silver, copper, molybdenum, iron, nickel, lead, and zinc.

The General Mining Law of 1872, as amended, grants every United States citizen the right to prospect and explore public domain lands open to mineral entry. The right of access is guaranteed and is not at the discretion of the Forest Service. Upon discovering a valuable mineral deposit, citizens have the right to locate a mining claim and remove the mineral resources. The citizen holding a mining claim is called the claimant. The claimant is responsible for initiating mining activities and investing the capital required to conduct mineral exploration, site development, mine operation, and reclamation of the site.

The Forest Service works with mining claimants to provide reasonable access to their claims, minimize adverse environmental impacts on surface resources, and ensure reasonable reclamation of disturbed lands affected by mining operations. Protection of surface resources is accomplished by reviewing the mining plan of operations submitted by the claimant, disclosing impacts of the proposed mining operations in a site-specific environmental document, approving only those activities that are reasonably necessary for the proposed operation, monitoring operations to ensure environmental standards are met, and ensuring prompt and reasonable reclamation of disturbed areas.

By law, designated Wilderness, National Monuments, Research Natural Areas, Enacted Municipal Watersheds, and Wild Rivers (when designated by Congress) are withdrawn from mining claim location. These withdrawn areas are, however, subject to mining claims with valid existing rights established before the date the areas were withdrawn from mineral entry. As a consequence, some mining claims located within existing or proposed withdrawn areas could be developed in the future.

On the Tongass, the Primitive Recreation, Semi-Remote Recreation, Old-Growth Habitat, Experimental Forest, Special Interest Areas, Scenic Rivers, and LUD II Land Use Designations (LUDs) remain open to mining activities. Special stipulations and more stringent mitigation measures are required for mining activities in these LUDs; therefore, there is a higher cost to develop minerals in these LUDs. Modified Landscape, Scenic Viewshed, Recreational Rivers, Timber Production, and Minerals LUDs remain open to mineral activities and do not require special stipulations or more stringent mitigation measures; therefore, mineral development in these LUDs would be at an average cost.

Leasable Minerals

Certain types of minerals, primarily energy resources, are not subject to mining claim location, but are available for exploration and development under provisions of the Mineral Leasing Act of 1920. Access to these types of minerals is provided through leases, permits, or licenses that include fee and/or royalty payment conditions. Federally owned leasable minerals include oil, gas, coal, geothermal resources, potassium, sodium, phosphates, and sulfur. The authority to manage these minerals is presently administered by the U.S. Department of Interior, Bureau of Land Management (BLM) in cooperation with the Forest Service.

No leasable minerals are presently being produced on the Tongass National Forest, and the anticipated demand is expected to remain low. BLM recently conducted an assessment of mineral resource potential in support of a resource management plan for the Ring of Fire planning area (BLM 2006), which includes Southeast Alaska. The assessment indicated the potential for oil and gas occurrence in the Yakutat region was considered to be high, based on geologic factors (URS Corporation 2006). While there has been exploration activity in the Yakutat area in the relatively recent past, the resource development potential is considered low; therefore, BLM expects no exploration or development activity within the next 10 to 15 years. Outside of the Yakutat area, oil and gas occurrence potential elsewhere in the Tongass is considered low to none.

Occurrences of coal found at several locations in Southeast Alaska has prompted the identification of the Angoon, Admiralty, and Kuiu coal districts; the coals in the two former districts are classified as bituminous, while the Kuiu deposits are ligmite (URS Corporation 2006). Several small mines on Admiralty Island produced coal during the late 1800s and early 1900s. Lignite deposits also occur at several other locations in Southeast Alaska, although they are of small extent. Similarly, the occurrence potential for coalbed natural gas (coalbed methane) is considered high for the Admiralty and Kuiu Islands coal deposits and the Yakutat area. BLM considers development of these resources to be uneconomic over the next 10 to 15 years, other than possibly for local use, and does not foresee associated exploration or development activity.

Geothermal resources occur in 19 known locations in Southeast Alaska. Thermal springs in several locations have been developed for small-scale commercial uses such as tourism, aquaculture, community bathhouses, and district heating of buildings (URS Corporation 2006). There has been some recent interest in geothermal resources in the Bell Island area, but BLM has undertaken no leasing activity to date. While the occurrence potential for geothermal resources is considered high in several locations and some exploration could occur, BLM does not anticipate geothermal development activity over the next 10 to 15 years.

Salable Minerals

Salable, or “common variety,” minerals on NFS lands are sold rather than located or leased. These minerals include petrified wood and common varieties of sand, rock, building stone, gravel, pumice, clay, and other similar materials. Such common variety mineral materials include deposits that, although they have economic value, tend to be relatively widely available and used close to the source of production. These minerals are most commonly used as building materials and are also used for agriculture, cleaners and abrasives, and as inputs to manufacturing processes.

The predominant salable commodity extracted on the Tongass National Forest is crushed rock used to construct roads. The supply of quality rock sources is largely dependent upon the locations of active logging operations. Presently, there is an adequate supply of rock sources with suitable quality (hardness and durability) in the southern third of the Tongass. However, rock quality is poor in the northern two-thirds of the Forest, and good material sources are difficult to locate in current timber production areas. Sand and gravel sources are scarce throughout the Forest, except within the Yakutat Ranger District.

All roads built in the Tongass require rock for construction because the subgrade soils have poor strength characteristics. The demand for crushed rock will closely follow the need to construct new timber sale roads. The total in-service use of rock for existing roads was 43,962,500 cubic yards, which was used to construct 3,355 miles of road. As the use of forest roads increases, and both the Alaska State Department of Transportation and the Federal Highway Administration assume responsibility for maintenance of some roads, the demand for crushed rock will increase. It will be expensive to locate mining sites with suitable quality and quantity in the northern part of the Forest, and haul distances will increase. Outside NFS lands, new and existing communities will require mineral materials for development of roads and for foundations for homes, schools, and other buildings. The demand for rock from public land in support of these growing communities is likely to increase.

Limestone and marble are abundant in Southeast Alaska, and both have historically been produced from quarries in the region for use as building stone (BLM 2006). Identified marble resources in the region are estimated at over 800 million tons. Large quantities of limestone have been quarried from Prince of Wales and Dall Islands. Continued exploitation of these building material resources could be expected in the future. While several areas in Southeast Alaska also have geologic formations that are favorable for the occurrence of pumice deposits, market and location conditions indicate there will be little or no foreseeable development potential for pumice (URS Corporation 2006).

Mineral Resource Inventory and Development Potential

Most estimates of locatable mineral resource potential use a format developed by the U.S. Bureau of Mines and the U.S. Geological Survey (U.S. Bureau of Mines and U.S. Geologic Survey 1980, as cited in USDA Forest Service 1997a). The U.S. Bureau of Mines was abolished in 1996. Mineral resources are divided into "identified resources" and "undiscovered resources." The Tongass contains both identified and undiscovered reserves.

Identified Mineral Resources

The identified mineral resources on the Tongass were described by the U.S. Bureau of Mines, Alaska Field Operations Center, in An Economic Analysis, Tongass Land Management Plan, Mineral Resource Inventory (Coldwell 1990). For summaries of this report, see the 1991 Forest Plan Revision Supplement to the Draft EIS and the 1997 Forest Plan Revision Final EIS (USDA Forest Service 1991, 1997a).

The methods used by the U.S. Bureau of Mines included the steps discussed below. First, a mineral resource inventory was compiled from all available sources, resulting in the identification of 148 locatable mineral deposit areas within the Tongass National Forest. These 148 deposits were assigned to a mineral deposit model (Berg 1984). Tonnage and grade were determined for each based on published information, or were calculated using models developed by Cox and Singer (1986). The gross metal value for each deposit area was calculated by combining the tonnage and grade figures with an average price from 1978 to 1987 for each commodity. Each deposit area was evaluated to determine its pretax net present value.

Next, the 148 deposit areas were grouped into 52 identified mineral activity tracts that had high mineral development potential (MDP). These 52 tracts were further ranked from 1 to 3, based on the likelihood of exploration and development activity within the next 10 to 15 years. Areas assigned a ranking of 1 have the highest potential for development. Rank 1 areas contained at least one deposit with a positive after-tax net present value (at a 4 percent discounted cash flow rate of return) and/or at least one active gold deposit (site of current industry activity). Rank 2 areas contained at least one deposit with a positive pre-tax net present value (at a zero percent discount rate) and/or at least one "critical" and "strategic" mineral deposit with a vulnerable supply source. Rank 3 areas do not meet these criteria; their lower rankings may be due to a lesser likelihood of mineral occurrence, or because of a lack of available information.

Of the 52 tracts, 22 are categorized as Rank 1, 7 are categorized as Rank 2, and 23 are categorized as Rank 3. The tracts are listed in Table 3.14-1. The gross metal value of the identified mineral resources within the boundaries of the Tongass was estimated at $37.1 billion (expressed as 1988 dollars) in the U.S. Bureau of Mines study (Caldwell 1990). Highest among the individual minerals were molybdenum ($14.4 billion) and iron ($12.7 billion), with gold third at $2.26 billion.

The Coldwell (1990) report is the most recent comprehensive study of mineral resources for the entire Tongass. Additional studies of mineral resources in the Tongass have since been conducted, however. These include Mineral Investigations in the Ketchikan Mining District, Southeastern Alaska (Maas et al. 1995); Mineral Resources of the Chichagof and Baranof Islands Area, Southeast Alaska (Bittenbender et al. 1999); and Mineral Assessment of the Stikine Area, Central Southeast Alaska (Still et al. 2002). These studies conducted further investigations on known mineral deposit areas (KMDAs) within the Tongass. These

Table 3.14-1
Identified Mineral Resources of the Tongass National Forest Displayed by Mineral Activity Tract

Tract Name	Ref. 1 (acres)	Ref. 1 Rank	Ref. 2 MDP	Ref. 3 MDP	Ref. 4 MDP/ MEP	Gold (tons)	Silver (tons)	Lead (tons)	Zinc (tons)	Copper (tons)	Moly (tons)	Iron (tons)	Other Minerals
Chilkat Peninsula	40	3				1	-	-	-	-	-	-	
Sullivan	7,938	1				-	-	-	-	-	-	-	Critical Minerals
Bohemia Basin	9,376	1		H		-	-	-	-	41,000	-	-	Nickel; Cobalt; Critical Minerals
Berners Bay	10,318	1				69	-	-	-	-	-	-	
Juneau Gold Belt	85,699	1				189	164	100,920	100,747	82	-	-	Critical Minerals
Fremming	501	3				0	1	150	2,100	-	-	-	
Douglas Island	1,319	2				12	-	-	-	-	-	-	
Funter Bay	11,499	1				-	-	-	-	1,960	-	-	Nickel; Cobalt; Critical Minerals
Greens Creek	7,528	1				22	2,880	136,500	339,500	-	-	-	Critical Minerals
Taku Mo	3,199	3				-	-	-	-	-	1,000	-	
Enterprise	1,505	3				0	-	-	-	-	-	-	
Apex-El Nido	4,603	2		H		1	-	-	-	-	-	-	
Basaltic Cu	4,484	3		M		-	-	-	-	1,360	-	-	Critical Minerals
Mirror Harbor	2,242	2		M		-	-	-	-	1,265	-	-	Nickel; Critical Minerals
Pinta Bay	1,301	3		H		-	-	-	-	-	-	-	Critical Minerals
Chichagof	12,946	1		M		25	7	-	-	-	-	-	Critical Minerals
Slocum Arm	8,625	3		L		-	-	-	-	-	-	-	Critical Minerals
Silver Bay	22,706	3		L		-	-	-	-	-	-	-	Critical Minerals
Pyrola	3,261	2				-	196	8,255	27,800	-	-	-	Barite; Critical Minerals
Hasselborg	1,860	3				-	-	-	-	-	-	-	Critical Minerals
Crystal/Friday	1,391	2				2	-	-	-	-	-	-	Platinum
Windham Bay	23,909	3				1	1	2	2	-	-	-	Critical Minerals
Sumdum	41,419	3				0	279	112	18,501	156,988	-	-	Critical Minerals
Pt Astley	2,004	3				2	3	1,200	5,893	379	-	-	Critical Minerals
Zarembo	27,886	1			L/H	0	109	5,030	15,774	567	-	-	Critical Minerals
Portage Mountain	1,280	3			L/H	0	2	-	-	-	-	-	Critical Minerals
Duncan	2,393	3			L/H	-	-	-	-	27	-	-	Critical Minerals
Grnd Hog/Glacier	15,859	1			L/H	-	23	63,115	202,115	143	-	-	Critical Minerals
Shakan	42,763	1	M			-	-	-	-	-	248	-	
N, Bradfield Cn	1,120	3			L/M	-	-	-	-	1,710	-	313,500	Critical Minerals
Hyder	56,396	1	M			4	60	26,899	2,337	960	75	-	Tungsten; Critical Minerals
Franks Ridge	5,866	3	L			-	-	-	-	-	-	-	Critical Minerals
Khayyam	23,450	1	M			0	1	-	781	1,436	-	-	Critical Minerals
South Arm	7,943	3	H			-	-	-	-	-	-	-	Critical Minerals
Niblack	8,915	1	H			-	-	-	-	-	-	-	Critical Minerals
Dolomi	8,634	1	M			-	-	-	-	-	-	-	Critical Minerals
Lime Point	900	3	M			-	-	-	-	-	-	-	Barite
Big Harbor	3,535	3	M			-	-	-	-	-	-	-	Critical Minerals
Jumbo	12,326	1	M			1	2	-	-	2,250	-	293,800	Critical Minerals
Hollis	17,148	1	L			-	-	-	-	-	-	-	
Kasaan	8,176	1	M			1	3	-	-	11,494	-	2,437,700	Critical Minerals
Salt Chuck	4,817	1	M			1	1	-	-	1,070	-	-	Palladium; Critical Minerals
Union Bay	17,492	3	M			-	-	-	-	-	-	190,000,000	
Helm Bay	7,204	1	M			4	-	-	-	-	-	-	
Tongass Narrows	4,488	1	M			6	-	-	-	-	-	-	
Thorne Arm	7,657	1	L			4	-	-	-	-	-	-	
George Inlet	6,198	3	M			3	-	156	-	-	-	-	Critical Minerals
Quartz Hill	2,402	2	M			560	69	-	-	-	1,258,698	-	
Barrier Island	4,414	3	L			-	-	-	-	-	-	-	Critical Minerals
Nichols Mountain	16,882	3	L			-	-	-	-	-	-	-	Critical Minerals
Bokan	17,750	2	L			-	-	-	-	-	-	-	Uranium; Critical Minerals
McLeod Bay	2,287	1	L			-	-	-	-	-	-	-	

Notes: Critical minerals are those minerals necessary to supply military, industrial, and essential civilian needs during a national defense emergency, and not found or produced in sufficient quantities to meet emergency needs (as defined in the Strategic and Critical Materials Stock Piling Act of 1979). Examples of critical minerals include lead, zinc, copper, tungsten, and the platinum group metals.
Reference 1: Coldwell 1990; Reference 2: Maas et al. 1995; Reference 3: Bittenberger et al. 1999; Reference 4: Still et al. 2002
L=low; M=medium; H=high; MDP=mineral development potential; MEP=mineral exploration potential

KMDAs included the original tracts studied by Coldwell (1990). Each study reported estimates of MDP as low, medium, and high for each KMDA, as well as for individual mines, prospects, and occurrences. The designations given in Table 3.14-1 for these reports are for the highest rating given for any prospect studied in that tract.

The 1995, 1999, and 2002 area studies give essentially identical definitions for the following MDP designations:

> High—High grades and probable continuity of mineralized rock exist. The property is likely to have economically mineable resources under current economic conditions. A high potential exists for developing tonnage or volume with reasonable geologic support for continuity of grade.
>
> Medium—Either a high grade or continuity of mineralization exist. Mineralization is confined by geology, structures, and/or grades are overall low. It could serve as a material source if economics were not a factor, but is presently uneconomic at existing conditions.
>
> Low—The property exhibits uneconomic grades and/or little evidence of continuity of mineralized rock. There is little or no obvious potential for developing resources or is an insignificant source of the material of interest.

Differences in MDP designations between these area studies and Coldwell (1990) reflect additional geologic and chemical data, changes in prices, and cost and likelihood of development based in part on LUDs at the time of the study. In addition, Still et al. (2002) ranked each mine prospect and occurrence by mineral exploration potential (MEP). The MEP ranking takes into account the potential for extent of mineralized rock but not current land status of the site. The highest MDP and MEP rankings for each area are summarized in Table 3.14-1.

Undiscovered Mineral Resources

The methods used by the U.S. Geological Survey, Branch of Alaskan Geology to identify "undiscovered" locatable mineral resources are detailed in their report, Undiscovered Locatable Mineral Resources of the Tongass National Forest and Adjacent Lands, Southeastern Alaska (Brew et al. 1991). Their work involved the definition of areas or "tracts" that may permit the occurrence of one or more deposit types; the estimation of the numbers of undiscovered deposits of each type in each tract, along with the expected tonnage and grade of each type; and the use of computer simulation using these estimates to produce a probability distribution of the quantities of metal contained in the tract. This resulted in the preparation of location maps along with descriptions of 930 metal-bearing localities. The 930 metal-bearing localities were grouped into four classes, based on the estimated value of undiscovered mineral resources per acre: Class 1 has a relatively high mineral value per acre, Class 2 has a moderate mineral value per acre, Class 3 has a relatively low mineral value per acre, and Class 4 has nominal mineral value per acre.

Each tract is considered likely to contain one or more different types of mineral deposits. The estimation of the number of deposits of a given type in a tract is the single most-critical step in probabilistic mineral resource assessment. It requires re-evaluating all of the factors used in initially defining the tract, together with three additional factors: thoroughness of exploration (tracts already thoroughly explored are less likely to contain undiscovered deposits), size of tracts (smaller tracts are likely to contain fewer undiscovered deposits), and physical dimensions of deposit types (different types of deposits occupy different volumes of rocks).

The U.S. Geologic Survey study (Brew et al. 1991) included estimation of the gross metal value of undiscovered mineral resources for the Tongass National Forest. In 1990, this value was $28.3 billion (expressed as 1988 dollars). Highest among the individual minerals were copper ($6.8 billion), iron ($4.6 billion), molybdenum ($4.35 billion), and tin ($3.4 billion). These totals cover the entire Tongass National Forest, and thus include areas currently withdrawn from mineral activity.

Mineral Resource Demand

The extent to which identified and undiscovered mineral resources on the Tongass will be exploited in the future will depend largely upon the level of demand for those resources. Demand for mineral resources can be inferred based on the amount of money spent by the mining industry to prospect and explore for mineral resources in Southeast Alaska. Increases in the amount of money spent on exploration reflect an increase in demand for mineral resources. Between 1982 and 1987, the mineral industry spent an average of $2.92 million per year on mineral exploration in Southeast Alaska, with a high of $5.85 million in 1987 (USDA Forest Service 1997a). Exploration expenditures increased drastically for the 1988 to 1991 period, when the industry spent more than $20 million each year. Expenditures generally declined for the next 10 years, reaching $1.6 million in 2001, before increasing again to a level of $9.4 million in 2005 (Alaska Department of Natural Resources [ADNR], Alaska's Mineral Industry annual reports and summaries for 1997 to 2005).

Demand for mineral resources can also be inferred by modeling the economic viability of identified mineral resources. Identified mineral resources with high degrees of economic viability will reflect an increase in mineral-related activities or in demand for those resources by industry. The economic viability of 148 mineral deposits located within the Tongass National Forest were modeled by the U.S. Bureau of Mines (Coldwell 1990), as discussed previously. Based on economic criteria or the presence of an active gold deposit, 22 of 52 mineral activity tracts were identified as most likely to be developed (Rank = 1), and 10 were identified as likely to provide a positive rate of return when cash flow was discounted at zero percent.

Mineral Production

Mineral production in Southeast Alaska in recent years has been dominated by the Greens Creek Mine at the north end of Admiralty Island. Greens Creek is an underground mining operation that opened in 1989 and produces silver, zinc, lead, and gold. The mine processed nearly 806,000 tons of ore in 2004 and provided 265 full-time jobs (ADNR 2005). Other Southeast Alaska mining activity in 2004 was comprised of at least 18 different rock, sand, and/or gravel operations. These mines produced a total of nearly 3 million tons of material during the year and supported 83 employees. The Forest Service approved a Plan of Operations for the Kensington Gold Mine north of Juneau in 2005, and Coeur Alaska, Inc. subsequently began construction activities on the site. However, a lawsuit was filed against the U.S. Army Corps of Engineers and the Forest Service, challenging the permitted tailings disposal facility, citing violations to the Clean Water Act. The plaintiffs failed in District Court but were upheld on appeal by the 9th Circuit Court in 2007. The Forest Service anticipates the submittal of a revised Plan of Operations in 2008.

Tongass Land Management for Minerals

As described previously, the Forest Service administers mineral exploration, development, and production activities through the legal/regulatory systems for locatable, leasable, and salable minerals. The Forest Service also accounts for mineral resources in the land management planning process. One way of recognizing the importance and potential of mineral resources is through the designation of Minerals LUDs in the Forest-wide land allocation. The intent of the Minerals LUD designation is to encourage exploration and development of locatable minerals in areas of high mineral potential, while taking other resource values into account. The Tongass Forest Plan includes management prescriptions for those areas, and standards and guidelines specific to minerals and geology.

The current Tongass Forest Plan, as amended, allocates 13 areas of the Forest to the Minerals LUD. These areas total 170,514 acres and are widely distributed across most portions of the Tongass. Several Minerals LUDs are clustered around Juneau and Lynn Canal, and there is another cluster near Clarence Strait and the southern part of Prince of Wales Island.

Unlike other LUDs, the Minerals LUD is an “overlay” designation that applies management prescriptions for minerals to the affected area, in addition to the prescriptions of the underlying LUD. For example, a Minerals LUD in the northern part of Admiralty Island, northeast of the Greens Creek mining area, overlies part of the Young Bay Experimental Forest LUD. The Minerals LUD and Experimental Forest management prescriptions both apply in this area, with the Minerals LUD having priority.

Environmental Consequences

Trend in expenditures for mineral prospecting and exploration, the demand for access to National Forest lands for the purpose of mineral exploration, and development is expected to increase over the next 10 years. Mineral entrants will continue to submit plans of operation to the Forest Service for approval, and regulations under which those operating plans are processed will not change by alternative. Identified and undiscovered mineral resource tracts, characteristics and location of mineral deposits, and Southeast Alaska geology will not vary as a result of implementing any of the alternatives.

Direct and Indirect Effects

Locatable Minerals

Under any alternative, future exploration and development (except for valid, currently existing rights) would be precluded in areas withdrawn from mineral entry, such as Wilderness. The availability of mineral resources of the Tongass National Forest may also be affected by the allocation of other LUDs in each alternative, and the use of Forest-wide standards and guidelines during project implementation. The standards and guidelines of certain LUDs could affect the cost of conducting exploration, development, and reclamation activities, and thus influence the exploration of some areas for their mineral resources.

Most withdrawn lands are designated so by the U.S. Congress (i.e., wilderness withdrawals). On other NFS lands, the Forest Service does not have the authority to approve or disapprove most mineral operations (the exception being salable minerals), but can impose stipulations on how mineral resources are developed in order to protect surface resources. Thus, the potential effects of alternatives on mineral resources can be estimated by analyzing the relative degree to which LUDs and their associated prescriptions could economically constrain proposed mineral activities.

For this purpose, three categories of LUDs are identified: withdrawn areas (which assume higher costs for the development of valid existing rights), and two “open” categories; one with average costs and one with higher-than-average costs. Table 3.14-2 shows the LUDs corresponding to each category.

Wilderness, National Monument, and LUD II acres remain the same for all Forest Plan alternatives, as do existing withdrawals within the Research Natural Area, Enacted Municipal Watershed, and Wild, Scenic, and Recreational River designations. Open areas with higher costs generally correspond to non-withdrawn areas in the Mostly Natural Setting LUD group, while open areas with average costs correspond to those areas within the moderate and intensive development LUD groups. Alternative 5 (No Action) retains the existing acreage in Experimental Forest and Special Interest Area designations, while all of the other alternatives would increase the acreage in these LUDs. In addition, all alternatives except Alternative 5 would add or expand three Minerals LUD overlays; one new area north of Hyder, an

Table 3.14-2
Economic Availability of Minerals Relative to Land Use Designations

Mineral Availability	LUDs
Withdrawn – Existing *(Areas remain open to mineral rights established prior to the area being withdrawn)*	Wilderness National Monument Research Natural Area Municipal Watershed Wild River
Open Areas – High Cost *(Mineral exploration and development requires special stipulations and more stringent mitigation measures)*	Remote Recreation Semi-Remote Recreation Old-Growth Habitat LUD II Experimental Forest Special Interest Area Scenic River Minerals LUD Overlay on Withdrawn Areas (prior rights only)
Open Area – Average Cost	Recreational River Scenic Viewshed Modified Landscape Timber Production Minerals LUD Overlay on All Open Area LUDs

expansion of the area near Niblack (on the north side of Moira Sound) on south Prince of Wales Island, and a new area north and south of the West Arm Cholmondeley Sound on south Prince of Wales Island. The Minerals LUD overlay may have the effect of changing the exploration and development costs from high to moderate, depending on the basic LUD of the area.

Locatable minerals are divided into identified resources and undiscovered resources. As described in the Affected Environment section, there are 52 identified mineral resource tracts on the Tongass. Using the Forest-wide acreage breakdowns of LUD groups (as grouped in Table 3.14-2) by alternative indicates the overall effects on economic availability of mineral resources. Table 3.14-3 compares the Forest Plan alternatives using the cost/LUD group concept for the 52 areas with identified mineral resources (593,000 acres). For all seven alternatives, 25 percent of the acreage of identified mineral resources is in areas that have been withdrawn. Alternatives 7 and 4 have the fewest acres of identified mineral resources in allocations potentially causing higher costs for their exploration and development; Alternative 1 has the most acreage. The other four alternatives fall between these two in a fairly close grouping near the middle of the range.

Rank 1 mineral tracts are those most likely to see mineral exploration or development. Identified mineral resource areas in the Rank 1 category encompass an area of approximately 380,000 acres on the Tongass. Table 3.14-4 compares the Forest Plan alternatives using the cost/LUD group concept for these Rank 1 identified mineral resource areas. The results are similar to those indicated in Table 3.14-3. For all seven alternatives, 15 percent of the acreage of Rank 1 mineral

Table 3.14-3
Effects on Economic Availability of Identified Mineral Resources[1]

Alternative	Withdrawn Areas	Open Areas	
		Higher Cost	Average Cost
Alternative 1	25%	36%	39%
Alternative 2	25%	29%	45%
Alternative 3	25%	26%	49%
Alternative 4	25%	20%	55%
Alternative 5	26%	29%	45%
Alternative 6	25%	25%	50%
Alternative 7	25%	18%	56%

[1] Percentage of total area (593,000 acres) within each category.

Table 3.14-4
Effects on Economic Availability of Rank 1 Identified Mineral Resources[1]

Alternative	Withdrawn Areas	Open Areas	
		Higher Cost	Average Cost
Alternative 1	15%	36%	50%
Alternative 2	15%	28%	58%
Alternative 3	15%	25%	61%
Alternative 4	15%	19%	66%
Alternative 5	15%	31%	54%
Alternative 6	15%	24%	61%
Alternative 7	15%	17%	68%

[1] Percentage of total area (380,000 acres) within each category. Rank 1 mineral tracts have the highest likelihood of being developed.

resources has been withdrawn. Alternatives 7 and 4 again have the fewest acres of Rank 1 mineral resources in allocations potentially causing higher costs for their exploration and development, at 17 and 19 percent, respectively; Alternative 1 has the most (36 percent). The other four alternatives fall between these two in a fairly close grouping near the middle of the range.

A similar analysis has been performed for the 6.6 million acres of undiscovered mineral resources, as shown in Table 3.14-5 below. Here Alternative 1 again has the most acres in allocations potentially causing higher costs, followed by Alternatives 2, 3, and 5 or 6. Alternative 1 has the least area of LUDs assumed to have average costs for mineral development.

Table 3.14-5
Effects on Economic Availability of Undiscovered Mineral Resources[1]

Alternative	Withdrawn Areas	Open Areas	
		Higher Cost	Average Cost
Alternative 1	35%	57%	8%
Alternative 2	35%	51%	14%
Alternative 3	35%	45%	20%
Alternative 4	35%	35%	30%
Alternative 5	35%	41%	23%
Alternative 6	35%	41%	23%
Alternative 7	35%	33%	31%

[1] Percentage of total area (6.6 million acres) within each category.

The undiscovered mineral resource areas are also classified according to their estimated development potential, based on resource value. Class 1 and 2 undiscovered mineral areas are believed to have moderate to high per-acre mineral values. Table 3.14-6 shows the distribution of these Class 1 and 2 areas among the different LUD groups, by alternative. These table entries again show a consistent pattern in which Alternatives 7 and 4 are the least restrictive and Alternative 1 is the most restrictive with respect to likely mineral development costs.

Table 3.14-6
Effects on Economic Availability of Class 1 and 2 Undiscovered Mineral Resources[1]

Alternative	Withdrawn Areas	Open Areas	
		Higher Cost	Average Cost
Alternative 1	38%	50%	12%
Alternative 2	38%	43%	19%
Alternative 3	38%	37%	25%
Alternative 4	38%	26%	36%
Alternative 5	38%	39%	23%
Alternative 6	38%	36%	26%
Alternative 7	38%	25%	37%

[1] Percentage of total area (989,000 acres) within each category. Class 1 has a high mineral value per acre; Class 2 has a moderate mineral value per acre.

Only the 52 mineral activity tracts (identified resources) and adjacent areas were considered for allocation to the Minerals LUD. Table 3.14-7 shows how these allocations are distributed by alternative in terms of likely development cost. Even though all LUDs in the Open Area categories are expected to have average costs if they have a Minerals LUD overlay, it is likely that, even with the Minerals LUD overlay the higher cost LUDs identified in Table 3.14-2 would have slightly higher costs than the average cost LUDs. Therefore, Table 3.14-7 provides an indication of these smaller differences. With Alternative 1, 97 percent of the lands assigned the Minerals LUD overlay have underlying LUDs in the high-cost category. By comparison, Alternative 7 would result in only 43 percent in the high-cost category. Alternatives 2, 3, and 6 are similar to Alternative 1 in placing a higher proportion of the Minerals LUDs in high-cost areas than the average-cost areas, while Alternatives 4 and 5 have percentage distributions closer to Alternative 7.

Table 3.14-7
Effects on Economic Availability of Areas Covered by the Minerals LUD Overlay[1]

Alternative	Withdrawn Areas[2]	Open Areas[3]	
		Higher Cost LUDs, in the absence of Minerals LUD Overlay	Average Cost LUDs, in the absence of Minerals LUD Overlay
Alternative 1	1%	97%	2%
Alternative 2	1%	85%	14%
Alternative 3	1%	69%	29%
Alternative 4	1%	50%	49%
Alternative 5	0%	49%	51%
Alternative 6	1%	58%	40%
Alternative 7	1%	43%	56%

[1] Percentage of total area (249,570 acres).
[2] Note that the 3,000 acres in the Withdrawn Category are in Wilderness and cover prior rights only.
[3] Note that the Minerals LUD overlay converts all of these areas to the Average Cost category; however, there may still be some differences in cost.

Leasable and Salable Minerals

The effects of the Forest Plan alternatives on leasable minerals are not discussed in detail, as there are no aspects of the Forest Plan that would have a specific direct or indirect effect on activity related to leasable minerals. The Tongass has no current leasable mineral activity, and the anticipated demand for leasable minerals is expected to remain low. The Forest Service is aware of some level of interest in oil and gas, coal, and geothermal resources in specific areas of the Tongass. The proposed Forest Plan includes revisions to the standards and guidelines to address management of potential future leasable mineral activity. In general, those revisions provide that any mineral leasing activity would need to be consistent with the standards and guidelines for the respective LUDs affected by leasing. The revisions also include surface occupancy and other prescriptions intended to protect Forest resources in areas of leasing activity. The effects of any mineral leasing activity will be analyzed at the appropriate future time if the Forest Service receives specific requests for access to leasable minerals.

Salable or common variety minerals, primarily crushed rock, are utilized in each of the alternatives. Their predominant use is to construct roads in support of the Tongass National Forest transportation system, and thus the amounts used will correspond closely to the miles of new road construction by alternative. These are shown in *Chapter 2* as well as the *Transportation* section of this chapter.

Effects on Other Resources

The development of mineral resources in the Forest generally requires construction of an underground mine complex, a millsite, road and pipeline systems, tailings and waste rock disposal areas, a marine transfer/docking facility, and lodging accommodations if the mine location is not close to an existing community. Total surface-disturbing acreage can vary markedly with specific project characteristics; the operating Greens Creek mine involves about 320 acres for facility development, and the proposed Kensington mine project will use about 280 acres. The effects of any such development are analyzed at the time a specific project is proposed.

Cumulative Effects

The potential for cumulative effects associated with Forest Service management of minerals on the Tongass will depend upon the extent to which mining interests elect to pursue mineral exploration, development, and production activities on NFS lands in the future under the amended Forest Plan. Impacts from future mineral resource activities on the Tongass would add to the baseline impacts from past, present, and ongoing mineral activity within Southeast Alaska. Alterantive 5 would allocate about 171,000 acres to the Minerals LUD, and all of the other alternatives would allocate about 250,000 acres. This difference may indicate that Alternative 5 has a slightly lower potential for long-term cumulative effects; however, no major projects are proposed on these additional acres and NEPA analyses would need to be conducted prior to any project authorizations. Alternatives 4 through 7 allocate similar proportions (66 to 68 percent) of the Rank 1 known mineral resource tracts to LUDs expected to produce average mineral development costs, while the other alternatives would allocate from 50 to 61 percent of these areas to average-cost LUDs. Therefore, Alternatives 4 through 7 would have a relatively greater, but unknown, potential to contribute to cumulative effects associated with mineral activity. Other than mineral resources that are currently under development (specifically, the Kensington deposit), the Forest Service does not have sufficient information to identify any specific mineral development as reasonably foreseeable.

Recreation and Tourism

Affected Environment

The affected environment portion of the recreation and tourism analysis is divided into two broad sections, the first addressing the supply of recreation opportunities, and the second addressing existing use levels and trends. The supply section discusses the existing supply of recreation opportunities in terms of the Forest Service's Recreation Opportunity Spectrum (ROS) classes and inventoried recreation places on the Tongass. The existing use and trends section discusses overall forest use, resident recreation, tourism, and commercial outfitter/guide use.

The remainder of this introductory section provides a general overview of recreation in Southeast Alaska and the Tongass National Forest, which comprises approximately 80 percent of the region. Southeast Alaska possesses a remarkable and unique combination of features including inland waterways with over 11,000 miles of shoreline, mountains, fiords, glaciers, and large or unusual fish and wildlife populations that provide opportunities for a wide range of outdoor recreation experiences. Southeast Alaska imparts a sense of vastness, wildness, and solitude. These sentiments are enhanced by a small resident population and a relative absence of development compared to most other National Forests.

Recreation and tourism on National Forests encompasses more than the provision of facilities or recreation sites. This is especially true on the Tongass National Forest where most recreation and tourism attractions occur in remote undeveloped areas. Many Alaska residents purposefully live in proximity to such settings as a part of their lifestyle. Most visitors who travel long distances to see Alaska expect to find it in a wild and "unspoiled" state, but also expect comfort and convenience, reliable transportation, and other features requiring some level of infrastructure and development. The challenge to managers is to identify and understand the relationship between the settings and the variety of client groups. Commercial providers of recreation activities base much of their marketing strategy on particular environmental settings and identified recreation places within those settings.

The Tongass National Forest includes approximately 17 million acres of land available for recreation. This land contributes greatly to the feeling of vastness and solitude that dominates the region; however, much of the land is not suitable for outdoor recreation. Difficult and steep terrain, wetlands, icefields, glaciers, and heavy vegetation confine most recreation activities to accessible shorelines, river and stream bottoms, and around the many lakes within the Forest. Extensive use is made of some of the icefields and alpine areas (above tree line), but access to these areas is usually by aircraft. Both residents and visitors use the developed campground and picnic areas, beaches, trails, cabins, shelters, and visitor centers that are located near communities. A current inventory of developed recreation sites on the Tongass is presented in Table 3.15-1.

Table 3.15-1
Tongass Recreation Facilities

Type of Facility	Number
Anchor Buoys	28
Major Campground Developments	10
Number of Sites	207
Minor Campground Developments	15
Number of Sites	28
Major Interpretive Sites (Visitor Centers)	2
Wildlife/Fish Viewing Sites	12
Organized Camps	2
Picnic Areas	24
Number of units	95
Recreation Cabins	
- Wilderness	52
- Nonwilderness	97
Total Recreation Cabins	149
Recreation Residences	15
Isolated Cabins	65
Resorts and Lodges	3
Trails (number of miles):	
- Nonwilderness	419.4
- Wilderness	85.1
Total Trail Miles	504.5
Shelters	38
Developed Trailheads	13

Source: USDA Forest Service 1997a (Table 3-34).

The National Park Service manages 3.3 million acres in three park units in Southeast Alaska. The majority of this land is located within the Glacier Bay National Park and Preserve. The other two park units are the Sitka National Historic Park and Klondike Goldrush National Historic Park.

The State of Alaska also administers land for recreation. Many of the state land selections were made with recreation opportunities for the residents of local communities in mind. Most of these opportunities are still undeveloped. State selections were also made for future development of a system of marine parks. Currently, Alaska State Parks manages about 80,000 acres and 34 park units, including 16 marine parks, in Southeast Alaska. In addition, the Alaska Department of Fish and Game (ADF&G) manages two state wildlife refuges, two critical habitat areas, and one wildlife sanctuary, and the Alaska Division of Forestry manages the 247,000-acre Haines State Forest (Alaska State Parks 2004).

Community road systems are limited and heavily used for access to recreation sites and attractions near local communities. Existing road systems are primarily located near the larger communities of Juneau, Sitka, Ketchikan, Petersburg, and Wrangell. There is an extensive road system connecting the small communities on Prince of Wales Island, to systems developing near the communities of Hoonah and Kake. There is no interconnecting highway system between islands or between communities on the mainland.

Haines, Skagway, and Hyder all have highway connections to Canada and the Alaska Interior, as well as the lower 48 states, and serve as gateways for tourists heading north. Haines and Skagway are also visited by cruise ships and served by the Alaska Marine Highway System (AMHS).

Roads exist in other locations where timber harvest has taken place. Independent visitors from outside the state and residents from other parts of Southeast Alaska use road systems that are accessible from the AMHS ferries or from local communities for recreational purposes. Roads in locations where there are no communities or interconnecting access to the AMHS receive relatively low levels of recreation use. However, recreation-related vehicle use has been growing on some remote islands, including Kruzof, Zarembo, and Etolin Islands, and isolated systems on Kuiu and Kupreanof Islands. While the total amount of recreation use on these islands is low, it can be heavy at times, such as during hunting season.

Cruise ship passengers account for a large and growing share of visitors to Southeast Alaska. For example, the number of cruise ship visitors to Juneau more than doubled over the past decade from 462,542 in 1996 to 948,226 in 2005 (see Table 3.15-10). Other Southeast Alaska ports visited by cruise ships include Ketchikan, Sitka, Wrangell, Skagway, and Haines.

Supply of Recreation Opportunities

The supply of recreation opportunities is described in this analysis using two concepts: ROS and recreation places. These concepts describe the quantity of recreation opportunities. Quality is addressed using the "Home Range" concept and by assigning a value to the recreation places. These concepts are discussed in the following sections.

Recreation Opportunity Spectrum

The Tongass National Forest has the potential to provide a wide variety of recreation settings. The ROS has been developed to help identify, quantify, and describe these settings. The ROS system portrays the combination of activities, settings, and experience expectations along a continuum that ranges from highly modified to primitive environments. Seven classifications are identified along this continuum: Urban (U), Rural (R), Roaded Natural (RN), Roaded Modified (RM), Semi-Primitive Motorized (SPM), Semi-Primitive Non-Motorized (SPNM), and Primitive (P). The ROS inventory may be used to assess the potential effects of the alternatives on recreation settings.

The seven ROS classes are summarized in Table 3.15-2, based on seven elements that are considered in the allocation and management of recreation settings. Forest-wide ROS acres are presented in Table 3.15-3.

Viewed in terms of acres, the Primitive ROS setting is the largest on the Tongass, with approximately 10.4 million acres allocated to this setting (Table 3.15-3). The Wilderness and Natural Setting Land Use Designation (LUD) groups currently account for 47 and 45 percent of this total, respectively. Approximately 36 percent of the areas presently inventoried as SPNM (3 million acres) are located in the moderate development (12 percent) or intensive development (24 percent) LUD groups, with 19 percent located in existing Wilderness. Areas inventoried as SPM account for approximately 1.5 million acres Forest-wide and are mostly located in the Wilderness (31 percent) and Natural Setting (47 percent) LUD groups. Approximately 76 percent of areas allocated to the RN, RM, Rural, and Urban settings are located in the moderate development (23 percent) or intensive development (53 percent) LUD groups (Table 3.15-4).

Existing Wilderness on the Tongass is mostly associated with the Primitive ROS setting (82 percent), with the remaining 18 percent comprised of SPNM (10 percent) and SPM (8 percent). Much of the area inventoried as SPM on the Tongass is accessed via motorized watercraft. The Primitive ROS setting also comprises a large share of the Natural Setting LUD group (65 percent), with the remaining area allocated to other ROS settings, including 19 percent inventoried as SPNM (Table 3.15-4).

Table 3.15-2
Comparison of ROS Classes

	Urban (U)	Rural (R)	Roaded Modified (RM)	Roaded Natural (RN)
Scenic Quality	Alterations to landform and vegetation dominate landscape; nonrecreational activities not to exceed Low SIO - FG; Very Low SIO - MG.	Alterations to landform and vegetation dominate landscape; nonrecreational activities not to exceed Low SIO - FG; Very Low SIO - MG.	Alterations dominate the landscape; nonrecreational activities/structures evident, but do not exceed Very Low SIO.	Alterations to landscape subordinate; nonrecreational activities not to exceed Low SIO though typically Moderate SIO.
Access[1]	Access and travel facilities are highly intense, motorized, and often with mass transit supplements.	All methods of access and travel may occur, but subject to formal regulation.	All methods of access and travel when needed and compatible with intended activities.	All methods of access and travel may occur when compatible with intended activities; zones of non-motorized use.
Remoteness	Remoteness from sites and sounds of human activity not available or important.	Remoteness from sites and sounds of human activity not available or important.	Remoteness from continuous sounds of human activity is expected.	Remoteness from continuous sounds of human activity is of moderate importance.
Visitor Management	Intensive on-site controls are numerous and obvious.	On-site regimentation and control is obvious.	On-site regimentation and controls are few.	On-site regimentation and control is obvious.
On-site Recreation Development	Recreation structures and facilities readily evident, but appropriate for setting; designed for high use levels. Information and interpretive facilities may be large and complex.	Recreation structures and facilities readily evident, but appropriate for setting, designed for high use levels. Information and interpretive facilities may be large and complex.	Recreation structures and facilities may be present, but are provided primarily for protection of the resource rather than user convenience. Facilities are rustic and harmonize with a backcountry setting.	Recreation structures and facilities provided for site protection and user convenience. Facilities are contemporary but of rustic design and harmonize with natural setting.
Social Encounters	High concentrations of people at one time.	Moderate to high concentrations of people at one time.	Moderate concentration of users on roads and little evidence of others or interactions at campsites.	Interactions with others may be moderate to high. Moderate concentrations of people, especially on trails and in dispersed areas.
Visitor Impacts	Very noticeable, but managed to prevent physical resource degradation.	Very noticeable, but managed to prevent physical resource degradation.	Human use noticeable, but not degrading to resources. Site hardening dominates campsites, parking areas.	Visitor use noticeable, but not degrading to resources; established SIOs.

Table 3.15-2 (continued)
Comparison of ROS Classes

	Semi-Primitive Motorized (SPM)	Semi-Primitive Non-Motorized (SPNM)	Primitive (P)
Scenic Quality	Alterations few and subordinate to landscape; designed and located to not exceed Moderate SIO.	Alterations few and subordinate to landscape; nonrecreational activities and structures designed not to exceed High SIO.	Alterations to landscape not evident; structures do not exceed High SIO.
Access[1]	Travel on trails designed for/open to motor vehicles; roads maintained for high clearance vehicles; motorboats operating on waterways; may establish zones of non-motor use for facility/resource protection.	Trails closed to motorized use; nonmotorized boats used on freshwater lakes and streams.	Trails closed to motorized use; non-motorized boats used on freshwater lakes and streams.
Remoteness	Nearby sights and sounds of human activity are rare; distant sounds may occur.	Nearby sounds of human activity are rare; distant sounds may occur.	Sounds of human activity are very infrequent to nonexistent.
Visitor Management	On-site regimentation and controls are few.	On-site regimentation and controls are rare.	On-site regimentation and controls are very rare.
On-site Recreation Development	Recreation structures and facilities may be present, provided primarily for protection of site rather than user convenience. Facilities, when present, are rustic and harmonize with natural setting.	Recreation structures and facilities may be present but provided primarily for protection of site. Facilities, when present, are rustic and harmonize with natural setting.	Recreation structures are rarely present, provided primarily for the protection of the site. Facilities, when present, are rustic and harmonize with natural setting.
Social Encounters	Low interaction between users. Campsites seldom within sight or sound of another group except during peak periods.	Low interaction between users. Campsites seldom within sight or sound of another group except during peak periods.	Very low interaction between users and no other groups in sight or sound of overnight camps.
Visitor Impacts	Human use noticeable, but not degrading to resource or backcountry setting.	Human use noticeable, but not degrading to resource elements.	Human use essentially unnoticeable. Site hardening—boardwalks, boat moorings, food caches.

[1] Subject to ANILCA provisions.
Note: SIO = Scenic Integrity Objective, FG = Foreground, MG = Middleground
Source: USDA Forest Service 1997a (Table 3-30).

Table 3.15-3
Forest-wide Recreation Opportunity Spectrum Acres, 2006

ROS Class	Acres
Primitive (P)	10,358,097
Semi-Primitive Non-Motorized (SPNM)	3,046,573
Semi-Primitive Motorized (SPM)	1,486,874
Roaded Natural (RN)	160,614
Roaded Modified (RM)	1,713,361
Rural and Urban (R and U)	5,728

Note:
The total acres by ROS class shown in this table is slightly lower than the Forest-wide total because the ROS inventory does not include the entire Forest.

Table 3.15-4
Forest-wide Recreation Opportunity Spectrum Acres by LUD Group, 2006

LUD Group	P	SPNM	SPM	RN	RM	R+U
Acres by LUD Group and ROS						
Wilderness	4,840,497	568,994	457,695	21,707	18,949	151
Mostly Natural	4,692,925	1,384,844	701,158	85,471	326,650	4,313
Moderate Development	172,876	363,111	184,202	40,428	388,568	508
Intensive Development	651,799	729,625	143,819	13,007	979,189	747
Percent of ROS Setting						
Wilderness	47	19	31	14	1	3
Mostly Natural	45	45	47	53	19	75
Moderate Development	2	12	12	25	23	9
Intensive Development	6	24	10	8	57	13
Percent of LUD Group						
Wilderness	82	10	8	0	0	0
Mostly Natural	65	19	10	1	5	0
Moderate Development	15	32	16	4	34	0
Intensive Development	26	29	6	1	39	0

Notes:
1. P=Primitive, SPNM=Semi-Primitive Non-Motorized, SPM=Semi-Primitive Motorized, RN=Roaded Natural, RM=Roaded Modified, R+U=Rural and Urban
2. The total acres by ROS class shown in this table is slightly lower than the Forest-wide total because the ROS inventory does not include the entire Forest.

Recreation Places

Recreation Places are areas that are used for recreation activities and are easy to access. These areas are identified based on patterns of use associated with protected boat anchorages and landings, aircraft landing sites, and roads.

The Tongass offers a unique recreation setting because it provides an island and marine environment in close proximity to major mountain ranges and icefields. Forested mountains rising from the saltwater provide unique and remote coastal recreation opportunities not found in other areas of the United States. Recreation enthusiasts are able to view a variety of natural landforms and wildlife, such as glaciers, old-growth forests, humpback whales, spawning salmon, brown bears, and bald eagles. The immense amount of land on the Tongass National Forest provides a great diversity of recreation attractions and opportunities. Most recreation activities take place in, and are dependent on, settings that are primarily undeveloped and widely dispersed. The surrounding saltwater, which is not managed by the Forest Service, allows for motorized boat and floatplane access throughout Southeast Alaska.

The pattern of use associated with known protected boat anchorages, boat landings, aircraft landing sites, and the limited road systems makes it possible to identify specific “recreation places.” Recreation places are those areas that are used for recreation activities and are easy to access. Approximately 1,436 recreation places, totaling about 3.6 million acres (22 percent of the total Tongass National Forest), have been identified. Approximately 22 percent, or 311 of these places, are located in existing designated wildernesses. Although these areas comprise only 22 percent of the Forest-wide number of recreation places, they account for 36 percent of total recreation place acres.

The setting of a recreation place plays a key role in its attractiveness and use. Many recreation opportunities, such as viewing scenery or pursuing solitude, are dependent on this relationship and require a natural type of setting, whereas others, such as hunting or fishing, are less dependent on the type of setting. Table 3.15-5 identifies the distribution of recreation place acres by ROS class. Recreation places can be categorized into three general groupings based on their principle uses and attractions. These three general groupings, marine, freshwater, and land-based, are discussed in the *Recreation and Tourism* section of the 1997 Forest Plan Revision Final Environmental Impact Statement (EIS) (USDA Forest Service 1997a, pp. 3-107, 3-108). The distribution of recreation places among these general groupings is presented in Table 3.15-6.

For the purposes of this analysis, recreation places are classified in two basic ways. First, recognizing that access plays a key role in recreation in Southeast Alaska, “home ranges” were defined for each community. Inventoried recreation places were classified into two categories: those located within a radius of approximately 20 miles from communities (“home range”) and those outside (“rest of forest”). Almost half (48 percent) of the recreation place acres are within a community home range. Second, recreation places are identified as either important or ordinary/common based on five categories: facilities, marine, hunting, fishing, and tourism. The Forest Service developed this rating system in response to public comments received on the 1990 Draft EIS. Recreation places may be important for one, several, or none of the identified categories. Important recreation places by category are summarized in Table 3.15-7 and discussed further in the *Recreation and Tourism* section of the current Forest Plan Revision Final EIS (USDA Forest Service 1997a, pp. 3-109, 3-111).

Table 3.15-5
Distribution of Recreation Place Acres by Recreation Opportunity Spectrum Class

ROS Class	Acres (1,000s)
Primitive	1,306
Semi-Primitive Non-Motorized	916
Semi-Primitive Motorized	870
Roaded Natural	103
Roaded Modified	432
Rural and Urban	3

Note: These totals include all identified recreation places within the Tongass National Forest boundary, including those on state and private lands.

Table 3.15-6
Distribution of Recreation Places by General Use

	Number of Places	Percent of Total	Acres (1,000s)[1]	Percent of Total
Marine	617	43	1,234	34
Freshwater	302	21	908	25
Land-based	531	37	1,488	41
Total	**1,436**	**100**	**3,630**	**100**

[1] Updated acreages were calculated using the ratios from USDA Forest Service 1997a (pp. 3-107, 3-108) and the total acres identified in Table 3.15-5. Totals may not sum exactly due to rounding.

Table 3.15-7
Important Recreation Places by Category[1]

	Number of Places	Percent of Total[2]	Acres (1,000s)	Percent of Total[2]
Facilities[3]	402	28	1,053	29
Marine[4]	617	43	1,089	30
Hunting[5]	373	26	1,452	40
Fishing[6]	187	13	472	13
Tourism	876	61	1,924	53
Total Acres/Places	**1,436**	**NA**	**3,630**	**NA**

[1] Recreation places are rated as either important or common/ordinary.
[2] Percent columns sum to more than 100 because a recreation place can be rated important in more than one category.
[3] All recreation places with facilities were rated as being important. In addition, other recreation places with some type of facility, such as a viewing platform, and facilities authorized by a special use permit for recreation purposes, were identified as important.
[4] The marine category identified here is different to the marine type identified in Table 3.15-6. The marine category in this table only includes those recreation places that are truly unique or typify the Southeast Alaska marine experience.
[5] Important hunting areas were distinguished from ordinary hunting areas based on a number of factors, including heavy recurring use, hunter success, ease of access, opportunities for several species, and prized species, such as mountain goats and moose.
[6] Important fishing recreation places were identified using ADF&G ratings for recreational fishing.
Note: This estimate of total recreation place acres is slightly higher than the estimate used in the current Forest Plan Revision Final EIS (USDA Forest Service 1997a). The database used to develop these estimates has been updated and these estimates were developed using a more precise methodology than the grid-sampling approach that was employed in the 1997 Forest Plan Revision Final EIS analysis.
Source: USDA Forest Service 1997a (pp. 3-109, 3-111).

Existing Use Levels and Trends

The following section is divided into four parts that discuss forest use in general, resident recreation, tourism, and commercial outfitter/guide use on the Tongass National Forest.

Forest Use

Although there are some locations on the Tongass where fees are collected and locations where people can be easily counted, much of the information regarding general public use has been historically based on long-term observations, anecdotal information, and professional estimates, adjusted by quantitative indicators where available. In general, many residents and nonresidents seek the same type of recreation experiences and many engage in similar activities. Alaska has a reputation for vastness, rugged beauty, and solitude, and both residents and nonresidents usually expect to find these qualities in recreation settings. Expectations often vary by group and individual, however, with some people having higher expectations of wilderness and solitude than others.

The Alaska Region of the Forest Service (Region 10) began participating in the Forest Service's National Visitor Use Monitoring (NVUM) program in 2000. The final results of this program, which involved surveys conducted over 3 years, were published in August 2004 (Kocis et al. 2004). According to the NVUM analysis, there was an estimated total of 1.83 million National Forest visits and 2.13 million site visits to the Tongass in 2003 (Kocis et al. 2004). NVUM has standardized definitions of visitor use measurement to ensure that all National Forest visitor measurements are comparable. A National Forest visit, as defined by the NVUM, is the entry of one person onto the Forest to participate in recreation activities for an unspecified period of time and may include multiple site visits. A site visit, as defined by the NVUM study, is the entry of one person onto a National Forest site or area to participate in recreation activities for an unspecified period of time.

The results of the NVUM surveys on the Tongass indicate that the top five activities of survey respondents were viewing natural features (64.4 percent), hiking/walking

(59.6 percent), relaxing (32.5 percent), viewing wildlife (16.4 percent), and nature center activities (15.1 percent) (Table 3.15-8). Survey respondents were also asked to identify the primary activity that they were engaged in at the time of the survey. The top activities were hiking/walking (30.5 percent), viewing natural features (26.7 percent), fishing (8.3 percent), relaxing (8 percent), and gathering forest products (4.2 percent) (Table 3.15-8). Three of these activities (viewing natural features, hiking/walking, and relaxing) are also in the top five activities ranked by participation.

Table 3.15-8
Activity Participation and Primary Activities Identified in the 2004 Tongass NVUM Survey

Activity	Percent Participation	Primary Activity (Percent)[3]
Viewing Natural Features	64.4	26.7
Hiking/Walking	59.5	30.5
Relaxing	32.5	8.0
Viewing Wildlife	16.4	2.9
Nature Center Activities	15.1	3.1
Fishing	13.5	8.3
Nature Study	9.9	2.3
Picnicking	8.9	3.2
Gathering Forest Products	8.9	4.2
Driving for Pleasure	8.1	1.8
Motorized Water Activities	7.9	0.4
Visiting Historic Sites	6.2	0.3
Resort Use	4.1	1.9
Hunting	3.6	3.2
Other Non-motorized	3.2	0.6
Non-motorized Water	2.9	0.6
Other Motorized Activity	2.6	0.2
Bicycling	2.3	1.2
Backpacking	2.2	0.0
Developed Camping	1.7	0.6
OHV Use	1.3	0.0
Cross-country Skiing	1.0	1.0
Primitive Camping	0.6	0.1
Downhill Skiing	0.5	0.4
Horesback Riding	0.3	0.0
Snowmobiling	0.2	0.2

Source: Kocis et al. 2004 (Table 13)

Resident Recreation

Many residents of Southeast Alaska place a high value on the quality and availability of outdoor recreation opportunities in the region. This is evidenced by the fact that the proportion of Alaskan residents who participate in outdoor activities is generally much higher than elsewhere in the United States (Bowker 2001). Many local residents engage in dispersed recreation activities on National Forest System (NFS) land and adjacent saltwater. Accurate data on this type of use are difficult to obtain and estimates tend to either underestimate the nature and extent of much of this use or overcompensate in inconsistent ways (USDA Forest Service 1997a, p. 3-120). The net result is that while there is a general consensus that outdoor recreation opportunities and activities provided by the Tongass are highly important to residents, there is limited data that accurately quantifies resident recreation use.

Resident recreation demand is influenced by a number of factors, including regional population levels, per capita participation rates, and recreation travel behavior. Over time, the supply of certain recreation opportunities in Southeast Alaska has increased. Road systems have expanded into previously inaccessible areas and visitor services and tourism marketing have also increased. In some cases, supply-induced increases in participation have occurred. This appears to be the case on Prince of Wales, Wrangell, and Mitkof Islands where road systems developed for timber harvesting created an opportunity for road-related access to previously inaccessible recreation settings and an opportunity for recreation activities involving wheeled vehicles.

Supply-induced participation changes have also been accompanied by additional demand for specific recreation places or facilities for a related activity. Increased opportunities for roaded access and activities are typically accompanied by a need for parking, dispersed campsites, picnic sites, trails to scenic attractions, and additional short access routes to cabin sites and previously inaccessible beaches. Increased tourism has resulted in increased demand for interpretive services as well as walking and hiking opportunities near the major communities.

The use of off-highway vehicles (OHVs) is another growing activity on the Tongass. Use is limited by topography, dense vegetation, and wet soils. These types of vehicles are most frequently used on road systems connected to communities, with riders seeking out primitive roads or spurs. Limited accessibility often results in OHV use on muskegs, beaches, tidal areas, and river channels during low flows.

A new travel management policy established for the Forest Service in 2005 requires each National Forest to identify and designate those roads, trails, and areas that are open to motor vehicle use. This policy is presently being implemented on the Tongass with each District Ranger required to seek public input and coordinate with federal, state, county, and other local governmental entities, as well as tribal governments, before any decision is made to consider use on a particular road, trail, or area. This decisionmaking process also involves completing National Environmental Policy Act (NEPA) analyses, as appropriate. Unplanned, user-created routes will be considered at the local level during the designation process (USDA Forest Service 2005e).

Tourism

Nonresident pleasure visitors or tourists can be divided into independent and package visitors. Independent visitors, who constitute a small but growing group, are characterized as those who get off the ferries and planes and engage in a variety of activities. They spend more time in the communities and on the Forest, and may secure the services of outfitters and guides, restaurants, motels, and transportation services such as floatplanes, boats, and gas stations. Independent travelers tend to plan their own itineraries, but often secure the services of mini-packages, such as day excursions or fishing charters. Approximately 89 percent of non-cruise ship visitors to Southeast Alaska in 2006 purchased some type of multi-day package (McDowell et al. 2007). These types of visitors compete more directly with residents for recreation opportunities on the Forest. Lodges have grown in popularity in recent years, with fishing lodges in particular playing an important role in the tourism industry in some local areas. A recent study, for example, identified nine recreational fishing lodges in the vicinity of Elfin Cove, a small town located west of Hoonah (Dugan et al. 2006). Fishing lodges accounted for 63 percent of the non-cruise, multi-day packages identified in 2006, with Wilderness lodges accounting for a further 13 percent of the total. Adventure tours (7 percent), rail packages (3 percent), motorcoach tours (3 percent), and “other” (12 percent) accounted for the remaining share of multi-day packages (McDowell et al. 2007).

Package visitors are typically the cruise ship clients, though some arrive by ferry and airplane. This is a very large group that uses the Tongass National Forest primarily as a scenic resource. These visitors spend less time in the area and generally follow preplanned and regimented itineraries. Shore excursions have, however, become an important part of the cruise ship experience, with much of this activity centered around communities. Half-day and day excursions into the Forest are also increasing in popularity.

The marketing of recreation opportunities by commercial suppliers has important similarities to resident recreation concerns. For example, many businesses that provide boat or aircraft access for wildlife viewing and other activities have a low tolerance for the presence of other groups in the same area. The presence of more than two or three other parties in a bay or area may cause such operators to seek substitute locations. The ability to market Alaska tourism, in part due to the high cost of visiting Alaska, is dependent on meeting customer expectations of seeing and experiencing vast, untamed land and its wildlife. Resident recreationists who traditionally use an area may, however, be discouraged by commercial businesses operating in the same area.

Reasons for Visiting Southeast Alaska

Two of the top three attractions in the state in 1993 were directly associated with the Tongass: the Inside Passage ranked first and Mendenhall Glacier ranked third. Southeast communities accounted for four of the six most frequently visited communities and places in the state: Juneau ranked second, Ketchikan third, Skagway fourth, and Glacier Bay sixth (USDA Forest Service 1997a).[1]

The most recent comprehensive survey of the motivations of visitors to Southeast Alaska was conducted in 1988. Outstanding scenery was identified as the most cited reason for visiting the region (Table 3.15-9). Opportunities for seeing whales, bald eagles, bears, and other wildlife add to the experience. Wildlife was the second most cited reason for visiting the area. Scenery and wildlife were the most frequently cited attractions by both independents and visitors as a whole (Table 3.15-9).

Table 3.15-9
Reasons for Visiting Southeast Alaska

Reason	Independents	All Visitors
Scenery	66%	66%
Wildlife	31%	35%
Recommendations	25%	25%
Visit friends/relatives	23%	7%
Fishing/hunting	19%	8%
Wildernesses	16%	13%
Specific attractions	13%	10%
Part of cruise	9%	60%
Advertising	7%	10%
Price	2%	8%

Source: USDA Forest Service 1997a (Table 3-37). (Original Source: Data Decisions Group 1989. *Southeast Alaska Pleasure Visitor Research Program*, Summer 1988, p. 20.)

As noted, the 1988 survey is the most recent comprehensive survey of this type. The State of Alaska has not commissioned any similar comprehensive surveys of the motivations of Southeast Alaska visitors since that time. The information summarized in Table 3.15-9 provides an interesting snapshot of visitor motivations in 1988, but the number of visitors to the region has more than doubled since 1993, with the number of cruise ship visitors increasing more than threefold over this period. While the exact percentages may be different, it seems reasonable to assume that the Tongass-specific reasons identified in 1988—scenery, wildlife, fishing/hunting, and wilderness—continue to be valid today.

[1] These data, presented in Table 3-35 of the current Forest Plan EIS, are originally from the 1993 Alaska Visitor Statistics Program (AVSP). These data have not been collected in subsequent AVSPs.

Although there has not been a similar comprehensive survey specifically designed to address the motivations of visitors to Southeast Alaska, the results of three more recent surveys provide some insight. These surveys are the 2001 statewide Alaska Visitor Statistics Program (AVSP)[2], a 2005 survey of non-cruise visitors to central Southeast Alaska, and a 2005 survey of cruise visitors to Juneau (Northern Economics 2002, McDowell Group 2006a, McDowell Group 2005).

The 2001 statewide AVSP found that sightseeing was far and away the most common non-business activity for summer visitors to Alaska in 2001, cited by 53 percent of visitors as the primary non-business activity they hoped to enjoy in Alaska on their trip (Table 3.15-10). The second most frequently cited activity—fishing—was identified by only 9 percent of those surveyed. These relatively low figures for everything but sightseeing are partially a product of the survey design with survey respondents asked to identify the primary activity rather than multiple activities, but also reflect the importance of sightseeing and the range of other available activities.

Table 3.15-10
Most Common Non-Business Activities for Visitors to Alaska, 2001

Activity[1]	Percent of Surveyed Visitors
Sightseeing	53
Fishing	9
Touring Glaciers	3
Hiking	3
Wildlife Viewing	3

[1] These are the five most common responses to the question: "What is the primary non-business activity you hope to enjoy in Alaska on this trip?" The results were not disaggregated by region.
Source: Northern Economics 2002.

The McDowell Group (2006a) found that fishing, cited by 49 percent of surveyed visitors, was the primary reason to visit most frequently cited by non-cruise visitors to central Southeast Alaska in 2005. Visit friends/family and outdoors/scenic beauty were identified by 32 and 22 percent of surveyed visitors, respectively (Table 3.15-11). Fishing was identified by 46 percent of surveyed visitors as the activity they enjoyed most on their trip, with outdoors/scenic beauty and visit family/friends cited by 43 percent and 20 percent of those surveyed, respectively (Table 3.15-11). These data are for visitors to central Southeast Alaska, but are likely to be broadly representative of all non-cruise visitors to rural areas in Southeast Alaska.

The McDowell Group also surveyed cruise ship visitors to Juneau in 2005 and provided summary data from similar surveys conducted in 2003 and 2001. A survey of cruise ship passengers docking at Juneau may be considered broadly representative of all cruise ship visitors to Southeast Alaska because most cruise ships visiting Southeast Alaska stop there. These data again support the importance of scenery and sightseeing to the overall visitor experience, with 44 percent of cruise ship passengers surveyed in Juneau in 2005 identifying scenery/sightseeing as one of their most enjoyed activities (Table 3.15-12). Glaciers and whale watching were identified by 27 percent and 16 percent of surveyed visitors in 2005, respectively. The top three cited activities in 2005—scenery/sightseeing, glaciers, and whale watching—were also the most frequently cited activities in 2001 and 2003.

[2] The AVSP is a significant visitor industry research project conducted periodically by the State of Alaska. The most recent study was conducted in 2006 (McDowell et al. 2007).

Table 3.15-11
Reasons for Visiting and Most Enjoyed Activities for Rural (Non-Cruise) Visitors to Central Southeast Alaska, 2005

Activity	Percent of Surveyed Visitors[1] Reason for Visit[2]	Percent of Surveyed Visitors[1] Most Enjoyed[3]
Fishing	49	46
Visit Friends/Family	32	20
Outdoors/Scenic Beauty	22	43
Wildlife	13	21
Inside Passage	11	NA
People	NA	12

[1] Central Southeast was defined for the purposes of the McDowell Group study as Petersburg, Wrangell, Kake, Alaska and Prince of Wales Island. Note: Multiple responses were allowed.
[2] Activities identified in response to the survey question: "Why did you choose to visit the Central Southeast Alaska area?"
[3] Activities identified in response to the survey question: "What did you enjoy most about visiting the Central Southeast Alaska area?"
Note: NA = not included in the top five cited activities for this category
Source: McDowell Group 2006a

Table 3.15-12
Most Enjoyed Activities for Cruise Visitors to Juneau, 2001, 2003, and 2005

Activity	Percent of Surveyed Visitors 2005[1]	2003	2001
Scenery/Sightseeing	44	34	20
Glaciers	27	20	18
Whale Watching	16	8	9
Shopping	15	5	7
Weather	9	3	2

[1] The percentages for 2005 sum to more than 100 because multiple responses were allowed in the survey for that year.
Source: McDowell Group 2005

Taken together, these studies indicate that the scenery and sightseeing are consistently among the top reasons, and in most cases the top reason, attracting visitors to Alaska, Central Southeast, and Juneau. They are also most frequently cited as "most enjoyed" by surveyed visitors. This is largely consistent among different types of visitors (i.e., cruise and non-cruise) and consistent with the results of the 1988 survey (see Table 3.15-9). The other activities identified as reasons for visiting in 1988 also show up in the more recent surveys to varying degrees. These results also suggest that while the scenery is important for all visitors, the relative importance of other activities varies by the type of visitor (cruise versus non-cruise) and the survey location.

The estimated number of summer visitors to Southeast Alaska more than doubled between 1993 and 2007, increasing from 502,800 in 1993 to 1.160.000 in 2007.

Trends in Visitation
The number of visitors to Southeast Alaska has increased considerably over the past decade. Statewide, the total number of summer visitors increased from 861,100 in 1993 to 1,631,500 in 2006, which equates to an average annual growth rate of 5 percent and a total net increase of 89 percent. The number of summer visitors to Southeast Alaska increased by 131 percent over the same time period, increasing from 502,800 in 1993 to 1,160,000 in 2006 (McDowell Group et al. 2007). Statewide, increases in cruise ship passengers accounted for 66 percent of the

growth in visitors between 1993 and 2006. Arrivals by air increased by 44 percent over the same period, while the number of visitors arriving by ferry, highway, and other modes of entry decreased (Northern Economics 2002, McDowell et al. 2007).

Data for 2006 indicate that 63 percent of visitors to Southeast Alaska entered Alaska via cruise ship, 32 percent entered by air, with 3 percent and 1 percent entering via highway and ferry, respectively (McDowell et al. 2007).

The number of cruise ship passengers visiting Juneau more than trebled between 1993 and 2005, increasing from approximately 306,600 in 1993 to 948,200 in 2005.

The number of cruise ship passengers visiting Juneau more than doubled between 1993 and 2000, increasing from approximately 306,600 in 1993 to 632,000 in 2000 (Table 3.15-13). This number has continued to grow over the past 5 years, with a total of 953,000 cruise ship visitors to Juneau in 2006, a 51 percent increase from 2000 and a more than threefold increase from 1993. The number of passengers docking at Juneau is considered representative of the total number of cruise ship passengers because most cruise ships visiting Southeast Alaska stop there.

Other ports in Southeast Alaska, including Ketchikan, Skagway, and Haines, also experienced net increases in passenger volumes during the 1990s. Sitka and Wrangell were exceptions to this general trend with absolute decreases in passenger volumes during the latter half of the 1990s. Recorded passenger volumes at Sitka decreased from a high of 252,256 in 1996 to a low of 160,652 in 2000, but have since increased, peaking with 256,782 passengers in 2003. A total of 229,793 cruise ship passengers visited Sitka in 2005 (USDA Forest Service 2001c, Sitka Convention and Visitors Bureau 2006). The subsequent decrease in passenger volumes at Sitka was likely associated with the start-up of the Icy Strait Point development in Hoonah (see below).

The rapid growth and sheer magnitude of the cruise ship industry has important implications for recreation planning on the Tongass. Shore excursions have become an integral part of the cruise ship experience, providing increased revenues for ship operators and opportunities for local entrepreneurs. Much of this activity has been concentrated at ports of call that accommodate large or mid-sized cruise ships. Recent survey data (2005) indicate, for example, that approximately 83 percent of cruise visitors to Juneau participated in at least one tour while they were in Juneau. Glacier tours were the most popular type of tour in 2005, with 42 percent of cruise visitors taking this type of tour. Wildlife/marine life viewing, the Mt. Roberts Tramway, and flightseeing via helicopter were also popular (McDowell Group 2005).

Alongside the international cruise lines, several small and mid-size cruise operators are active in the region, often taking their customers to places such as Metlakatla and Petersburg in addition to the larger communities. Icy Strait Point, an old cannery located approximately 1.5 miles from Hoonah, is Alaska's first cruise destination built specifically for tourists. Owned by the Hoonah Totem Corporation and operated by Pt. Sophia Development Corporation, this facility opened in 2004. A total of 67,620 cruise passengers visited Hoonah in 2004, 77,498 visited in 2005, and 135,519 cruise visitors were projected for 2006 (Cruise Line Agencies of Alaska 2006). Another destination of this type is planned by the Goldbelt Corporation for Hobart Bay, north of Petersburg.

While the number of cruise ship passengers visiting Juneau has more than doubled over the past decade, the total number of Southeast Alaska State ferry passengers has shown an overall pattern of decline, with about 36 percent fewer passengers served in 2005 than in 1990, 233,618 versus 363,122 (Table 3.15-13).

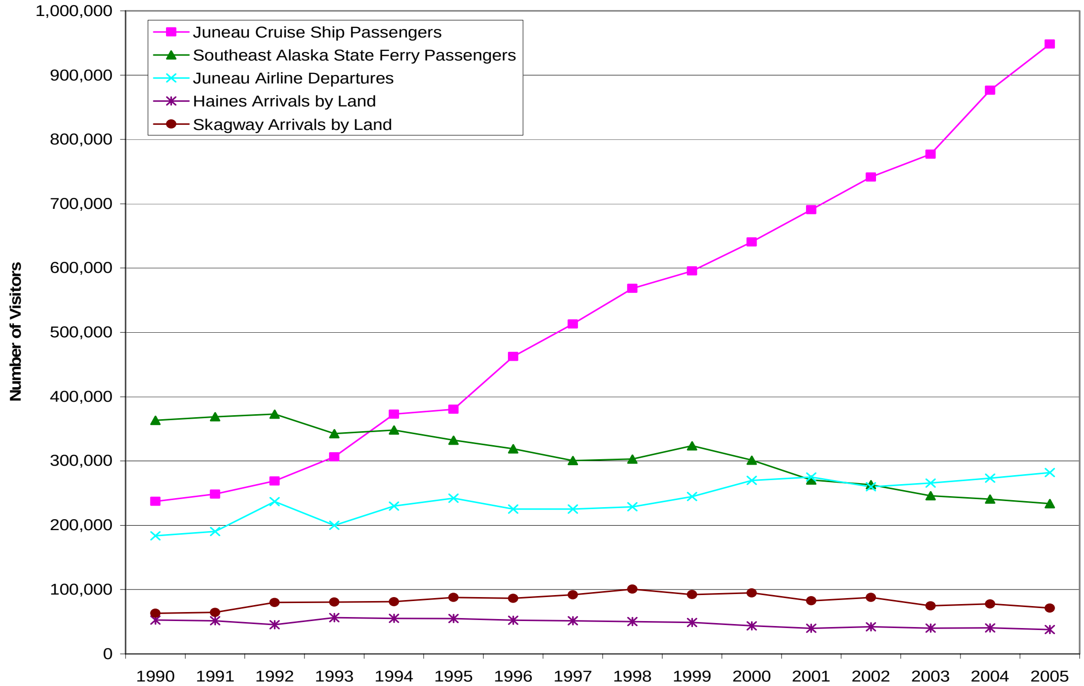
Table 3.15-13
Southeast Alaska Visitation, 1990 to 2005

Year	Juneau Cruise Ship Passengers[1,2]	Southeast Alaska State Ferry Passengers[2,3]	Juneau Airline Departures[2]	Haines Arrivals by Land[4]	Skagway Arrivals by Land
1990	237,070	363,122	183,677	52,719	63,237
1991	248,428	368,780	190,244	51,605	64,610
1992	269,000	372,680	236,824	45,355	79,946
1993[5]	306,600	342,613	200,066	56,406	80,709
1994	372,923	347,998	229,820	55,356	81,172
1995	380,529	332,312	242,084	55,148	87,977
1996	462,542	318,864	225,397	52,326	86,536
1997	513,181	300,653	225,397	51,495	91,849
1998	568,348	303,076	228,842	50,234	100,784
1999	595,595	323,540	244,645	48,997	92,291
2000[6]	640,477	301,176	269,880	43,621	94,925
2001	690,648	270,443	275,074	39,865	82,629
2002	741,512	263,040	259,759	42,290	87,851
2003	776,991	245,818	265,815	40,238	74,750
2004	876,203	240,666	273,152	40,438	77,837
2005	948,226	233,618	281,870	37,756	71,387

[1] These figures for passengers at Juneau are representative of cruise ship visitation trends because the majority of cruise ships visiting Southeast Alaska stop at Juneau.
[2] These data are presented for 1980 through 1994 in the 1997 Forest Plan Revision Final EIS (USDA Forest Service 1997a, Table 3-38).
[3] These totals do not include Inter-Island Ferry Association passengers.
[4] Arrivals by land are per passenger.
[5] The ferry Taku was out of service during May and June, which reduced total passengers.
[6] The ferry Columbia was out of service for most of the summer season, which reduced total passengers.
[7] The town of Hyder also receives a considerable number of arrivals by land. Based on estimates provided by the Hyder Community Association, approximately 28,000 visitors were recorded at the Fish Creek viewing platform in 1999. This number grew to 31,000 in 2001. A total of 35,676 visits were estimated at the viewing platform in 2005 (USDA Forest Service 2006f).
Sources: Alaska Department of Transportation 2006, Alaska Travel Industry 2006, Haines Convention and Visitors Bureau 2006, Skagway Convention and Visitors Bureau 2006, USDA Forest Service 1997a (Table 3-38) (Original Sources: Alaska Marine Highway Traffic Reports, Juneau Convention and Visitors Bureau, and Juneau Airport Manager's Office); USDA Forest Service 2001c.

Juneau airline departures increased between 1990 and 2005, but at a much slower rate than cruise ship passengers. Skagway and Haines arrivals by land stayed relatively constant over this period, showing an overall downward trend since the late 1990s (see Table 3.15-13 and Figure 3.15-1). Hyder also receives arrivals by land but data are not available for the early part of the decade. Essentially, all cruise ship use is by nonresident tourists. Ferry and airline passenger volumes and arrivals by land, on the other hand, also include Alaska residents and nonresidents visiting for reasons other than recreation and tourism, such as business or visiting relatives or friends. Larger communities also provide medical and other services that are not available in smaller communities.

Figure 3.15-1
Southeast Alaska Visitation, 1990 to 2005



Notes:
1. Longitudinal data are not available for arrivals in Hyder (see the note to Table 3.15-13).
2. State ferry data do not include Inter-Island Ferry Authority (IFA) passengers.
Source: See Table 3.15-13.

Data on the division between visitor and resident arrivals are not available for Southeast Alaska, but are available for the state as a whole. In summer 2004, residents accounted for an estimated 26 percent of total arrivals, down from 28 percent in 2001 (Northern Economics 2004, 2002). The percent of total arrivals accounted for by residents varied by type of transport, ranging from 0 percent for cruise ship arrivals to 44 percent of arrivals by highway and personal vehicle. Residents accounted for 41 percent and 38 percent of domestic air and international air arrivals, respectively, and 29 percent of arrivals by ferry (Table 3.15-14). These data are for the state as a whole, but are likely broadly representative of Southeast Alaska and illustrate the importance of the state ferry and domestic airlines to local residents.

Table 3.15-14
Alaska Arrivals by Transport Type and Visitor/Resident, Summer 2004

	Total Arrivals	Percent Visitor	Percent Resident
Domestic Air	1,030,200	59	41
International Air	44,800	62	38
Highway			
Personal vehicle	123,900	56	44
Motorcoach	13,400	85	15
Ferry	22,800	71	29
Cruise Ship	712,400	100	0
Total	**1,947,500**	**74**	**26**

Source: Northern Economics 2004.

The ferry data provided in Tables 3.15-13 and 3.15-14 and Figure 3.15-1 are for the AMHS only. These data do not include passengers transported by the Inter-Island Ferry Authority (IFA), which is a public corporation providing transportation to island communities in southern Southeast Alaska. Roundtrip service is currently (as of summer 2006) provided between Hollis and Ketchikan and seasonally from Coffman Cove to Wrangell and Petersburg.

Service has been provided between Hollis and Ketchikan since 2002. This service transported 25,197 passengers in 2002, its first year of operation. A total of 28,658 passengers were served by this ferry in 2005. The service between Coffman Cove and Wrangell and Petersburg was established in 2005 and served 2,955 passengers between May and August of that year (IFA 2006a). IFA ferries connect with vessels of the AMHS at Ketchikan, Wrangell, and Petersburg (IFA 2006b). The continued availability of these ferry services could affect resident recreation patterns in the future, as well as the recreation patterns of independent visitors to the region.

Visitation trends for two popular excursions, Juneau Icefield and Mendenhall Glacier, are presented in Table 3.15-15. The number of visitors to these areas has increased considerably since 1990. There were almost three times as many Juneau Icefield helicopter landing tour passengers in 2005 than in 1990, 93,902 versus 34,765. The number of visitors to the Mendenhall Glacier nearly doubled over this period, increasing from 188,000 in 1990 to 367,333 in 2005 (Table 3.15-15).

Table 3.15-15
Juneau Icefield and Mendenhall Glacier Visitation, 1990 to 2005

Year	Juneau Icefield Tour Passengers[1]	Mendenhall Glacier Visitors[1]
1990	34,765	188,000
1991	41,887	145,482
1992	45,638	160,000
1993	53,600	210,000
1994	62,449	265,000
1995	55,818	212,411
1996	65,709	276,000
1997	75,491	237,233
1998	84,632	238,366
1999	85,174	273,488
2000	85,531	NA
2001	89,961	236,340
2002	85,680	250,363
2003	85,407	284,867
2004	94,928	319,630
2005	93,902	367,333

[1] These data are presented for 1980 through 1989 in the 1997 Forest Plan Revision Final EIS (USDA Forest Service 1997a; Table 3-38).

Sources: 1990 to 1994: USDA Forest Service 1997a (Table 3-38) (Original Source: Juneau Ranger District Records); 1994 to 2000: USDA Forest Service 2001c; 2001 to 2005: USDA Forest Service 2006g; 2006h.

Commercial Outfitter/Guide Use

Outfitter/guides on the Tongass range from small family, run operations to larger corporations. Most firms serve less than 100 clients per year, with a smaller number of firms serving much larger numbers and one firm serving more than 100,000 clients in 1999.

The Forest Service authorizes commercial activities to make it easier for the public to visit National Forests. Due to its remote and rugged nature, recreation use on much of the Tongass National Forest requires good outdoor skills and/or specialized equipment. Commercial outfitters and guides provide access and equipment to assist people who might not otherwise be able to pursue certain recreation activities on the Forest. Outfitter/guides on the Tongass range from small family-run operations to larger corporations and non-profit organizations.

A survey of commercial recreation businesses in Southeast Alaska conducted in 2000 indicated that the majority of surveyed businesses were small, with 86 percent earning gross revenues of less than $100,000. Six firms reported revenues over $1 million, including one firm with revenues exceeding $10 million. A similar distribution is evident in terms of clients served, with the majority of firms serving less than 100 clients, a smaller number of firms serving considerably larger numbers, and one firm serving more than 100,000 clients in 1999 (Alaska Division of Community and Business Development [DCBD], 2001).

Both residents and nonresidents use the services of outfitter/guides, but nonresidents tend to use outfitter/guides more often because they do not have the local knowledge or necessary equipment. Local residents tend to use their own boats and equipment to reach the Forest. Personal boats are often smaller than charter boats used by nonresidents, resulting in visiting groups of residents generally being smaller than nonresident groups.

Outfitter/guides require special use permits to operate on the Tongass and are required to report annual use as part of their permit. In 2005, there were almost 270 special use authorizations issued for outfitter/guide services on the Tongass National Forest.

The survey of commercial recreation businesses in Southeast Alaska conducted in 2000 found that 73 percent of the businesses surveyed had experienced an increase in the number of clients they serve since 1995 (Alaska DCBD 2001). Nineteen percent reported no change over this period, with the remaining 8 percent reporting a decrease in number of clients served. Sixty-eight percent of responding firms indicated that they had been in business less than 10 years. Cruise ship passengers accounted for 41 percent of total clients for all of the surveyed businesses, ranging from 22 percent of clients for businesses with fewer than 200 clients a year to 91 percent of clients for businesses with more than 10,000 clients a year.

Recreation activities in Southeast Alaska and on the Tongass National Forest cover a broad spectrum of uses, ranging from fishing and hunting to helicopter flights and photography. The principle activities engaged in by the businesses surveyed in 2000 are identified in Table 3.15-16. Saltwater fishing was the most popular activity, followed by nature viewing/sightseeing, then wildlife viewing. The survey found that motorized watercraft was the most popular transportation mode used by commercial recreation businesses in Southeast Alaska.

Most outfitter/guides using the Forest shorelines access them via boat from saltwater. Some clients are dropped off on beaches, while others are also guided on land. The majority of charter boats in Southeast Alaska operate exclusively on saltwater for fishing or sightseeing without ever using the Forest (USDA Forest Service 2004g). These businesses are included in the data presented in Table 3.15-16.

While people often participate in several different activities in one or more settings on any given trip, different activities result in different numbers of people in a group and different amounts of time spent on the Forest. At one end of the spectrum, guided bear hunting consists of many small groups of one or two people. Hunters

Table 3.15-16
Principle Activities Engaged in by Southeast Alaska Commercial Recreation Businesses in 1999

Activity	Percent	Activity	Percent
Saltwater Fishing	63	Hiking, Mountain Climbing	14
Nature Viewing/Sightseeing	49	Cultural/Historical Sites	10
Wildlife Viewing	44	Camping	6
Photography	35	Backpacking	3
Motorized Boating	25	Northern Lights Viewing	3
Freshwater Fishing	21	Downhill Skiing, Snowboarding	1
Bird Viewing	21	Cross-Country Skiing, Snowshoeing	1
Non-Motorized Boating	15	Bicycling, Mountain Biking	1
Hunting	14		

Source: Alaska DCBD 2001

are dispersed across a large area and are on the Forest for long periods of time, typically 5 to 10 days, during spring and fall. At the other end of the use spectrum are mid-sized nature-viewing tour boats with relatively large group sizes (from 12 to 70 people). These groups are typically concentrated in a few areas of the Forest. Their use is short-term and concentrated in the summer season.

The Shoreline Outfitter/Guide FEIS, prepared for four northern Ranger Districts on the Tongass (USDA Forest Service 2004g), notes that recreation group size is highly variable along shorelines in that study's project area. Groups generally consist of less than 12 people, although larger groups, often associated with commercially guided groups from tour boats, may also be present. The largest shoreline group reported in the north part of the Forest in 1999 was a tour boat with 70 people.

This type of use accounts for a large number of visitors, but tends to be concentrated in relatively few areas of the Forest. Businesses providing services to these types of larger groups are heavily influenced by physical conditions that allow for large boat access and their schedules.

Helicopter landing tours are another form of outfitter/guide use that has been increasing in popularity in recent years. The number of clients and groups participating in helicopter tours are identified by area in Table 3.15-17.

Of 948,226 cruise ship passengers visiting Juneau in 2000, 93,902, or 10 percent, participated in helicopter landing tours on the Juneau Icefield (Tables 3.15-13 and 3.15-15). These tours to the Juneau Icefield involve high volumes of people concentrated at specific locations for short periods of time, typically 2 to 4 hours. Helicopter traffic, in groups of one to three helicopters, is almost continuous to and from icefield locations during the summer. Clients are typically outfitted and guided to walk, photograph, hike, or trek on, and explore the glacial environment.

Dogsled mushing tours on the Juneau Icefield are also increasing in popularity, with approximately 21,600 helicopter tour passengers engaging in this activity in 2005 (USDA Forest Service 2006i). This is more than twice the number of passengers (approximately 9,550) who participated in this type of tour in 2001. The number of helicopter passengers visiting the Juneau Icefield increased by 4 percent over this period, from approximately 90,000 to 93,900 (see Table 3.15-15). The large increase in the number of people taking dogsled mushing tours reflects the number of permitted helicopter tour operators offering this type of tour, with operators likely offering this type of tour in response to expressed and perceived demand. There were four permitted helicopter tour operators from 2001 through 2005. In 2001 and 2002, only one helicopter tour operator under permit offered dog mushing tours. In 2003 and 2004, there were two helicopter tour operators under permit who offered

Table 3.15-17
Helicopter Tour Locations by Client and Group, 2005

Area	Number of Groups[1]	Number of Clients
Juneau Icefield 1 – Gilkey Backcountry	600	2,702
Juneau Icefield 3 – Herbert	1,992	8,965
Juneau Icefield 4 – Mendenhall	11,736	52,813
Juneau Icefield 5 – Lemon	16	70
Juneau Icefield 6 – Death Valley	6	27
Juneau Icefield 7 – Norris	535	2406
Juneau Icefield 8 – Taku	1,982	8,920
P24 Baird Patterson Glaciers	94	424
Skagway Icefield – Denver	2,360	10,621
Skagway Icefield – East Fork	58	262
Skagway Icefield – LeGrande	10	47
Skagway Icefield – Meade	811	3,648
Skagway Icefield – Shubee	32	142

[1] These numbers are an estimate of the number of helicopters based on an average helicopter group size of four to five passengers per trip.
Source: USDA Forest Service 2006h

dogsled mushing tours. In 2005, three of the operators under permit offered dogsled mushing tours (USDA Forest Service 2006g).

Helicopter landing tours also occur in a number of locations elsewhere on the Forest, including the Revilla and Spires (Patterson Glacier) roadless areas. The numbers of visitors are, however, much lower than those visiting the Juneau Icefield. In 2000, a total of 1,205 helicopter landing tour service days were reported for the Revilla Roadless Area, east of Ketchikan. A total of 727 helicopter landing service tour days were reported for the Spires Roadless Area, northeast of Petersburg. After 2000, this service was no longer available (USDA Forest Service 2006h). The number of helicopter passengers visiting Patterson Glacier, northeast of Petersburg, decreased by 42 percent, from 727 passengers in 2000 to 424 passengers in 2005 (USDA Forest Service 2006h).

Summary data for outfitter/guide use for 2004 and 2005 are presented in Table 3.15-18. This table identifies the number of reported outfitter/guide clients and groups by Ranger District. A total of 618,000 clients and 12,250 groups were reported in 2005, which represented a 22 percent increase in clients from 2004 and a 5 percent increase in the number of groups. The Juneau Ranger District accounted for 88 percent of the total clients in 2005, with 68 percent of these clients (366,191) visiting the Mendenhall Glacier Visitor's Center.

This diversity in the range of activities and types of recreation experience offered by outfitter/guide businesses can lead to conflicts between businesses when incompatible activities occur in close proximity. Comments received during the Shoreline Outfitter/Guide EIS process highlighted conflicts between helicopter and wheeled airplane access on one hand and some boat or foot travel access on the other. Several comments noted that the activities of smaller operations often tend to

Table 3.15-18
Outfitter/Guide Use by Ranger District, 2004 and 2005

	2004		2005		2004-2005 Change	
Ranger District	**Clients**	**Groups**	**Clients**	**Groups**	**Clients**	**Groups**
Admiralty National Monument	3,553	760	3,318	702	-235	-58
Craig	1,662	246	2,063	403	401	157
Hoonah	4,890	664	4,668	647	-222	-17
Juneau[1]	439,413	NA	541,941	NA	102,528	NA
Ketchikan - Misty	22,630	2,710	22,036	2,618	-594	-92
Petersburg	7,059	1,113	11,420	1,444	4,361	331
Sitka	11,212	1,610	12,281	1,776	1,069	166
Thorne Bay	1,392	484	802	318	-590	-166
Wrangell	9,333	1,201	14,472	1,531	5,139	330
Yakutat	4,246	1,889	4,572	2,005	326	116
Total	**505,390**	**NA**	**617,573**	**NA**	**112,183**	**NA**

Note:
NA = Not available
[1] Data on the number of groups on the Juneau Ranger District do not include an accurate accounting of the number of groups visiting Mendenhall Glacier and are, therefore, not reported here.
Source: USDA Forest Service 2006i

be similar and compatible resulting in minimal conflicts, while larger operations often tend to detract from the setting and expectations of smaller groups. Some smaller operators believe that they are being displaced from their traditional use areas by larger commercial operations. On the other hand, some tour boat operators providing services to large groups felt they have been progressively excluded from areas on the Tongass National Forest over the past two decades (USDA Forest Service 2004g).

The number of big game guides has increased substantially over the past decade, which has raised concerns that current levels of guided hunting may not be sustainable due to increasing user conflicts and game population concerns. Some comments received on the Draft 2002 Forest Plan SEIS noted that growth in the guiding industry has led to these activities expanding into portions of Southeast Alaska that were not historically subject to this type of pressure. These types of concerns about user conflict are evaluated by the Forest Service when addressing the outfitter/guide experience provided on NFS lands. The Forest Service works with the State of Alaska and the Federal Subsistence Board to address game population concerns. The State of Alaska manages recreational hunting throughout the state, while the Federal Subsistence Board manages all federal lands in the state with respect to wildlife species taken for subsistence.

While many Southeast Alaska residents support the growing tourism industry, some residents are questioning the benefits and believe that unregulated growth of this industry would be detrimental and result in high social costs to communities. Concerns have been expressed that the existing and increasing level of commercial use is causing crowding or displacement of local residents and independent travelers who recreate on the Forest (USDA Forest Service 2004g). However, while some members of the public support limits on commercial use, others are concerned about the economic impacts of restrictions and limitations on commercial use.

Environmental Consequences

Direct and Indirect Effects

This section describes the potential direct, indirect, and cumulative effects of the proposed alternatives on recreation and tourism. The section is divided into three parts. The first two parts address effects on the supply of recreation opportunities and effects on recreation use and demand, respectively. The supply section discusses the effects of the alternatives on the existing supply of recreation opportunities in terms of the Forest Service's ROS settings and inventoried recreation places on the Tongass. The use and demand section discusses the potential effects on resident recreation and tourism. The final section summarizes the potential effects by alternative.

Effects on Supply

The following section discusses the potential effects of the proposed alternatives on ROS settings and recreation places.

Recreation Opportunity Spectrum

As discussed in the preceding affected environment section, the ROS system is designed to help identify and quantify different types of recreation setting on the Tongass National Forest and portrays the appropriate combination of activities, settings, and experience expectations along a continuum that ranges from highly modified to primitive environments (Table 3.15-2). The Forest-wide mix of ROS settings would vary by alternative. Estimated acres by ROS setting and alternative are presented in Table 3.15-19. The changes shown in this table are long-term changes that are expected to occur 150 years in the future and would take place gradually over several decades. ROS settings are projected to change in those areas allocated to intensive and moderate development LUDs. As a result, changes in settings are related to projected levels of future development. The ROS projections provide a general overview of how the recreation settings of the Forest would change over time with each alternative.

Viewed in terms of total Forest-wide acres, Alternatives 1 and 2 would provide the greatest amount of primitive and semi-primitive opportunities, with little change occurring from the existing condition. Alternative 7 would result in the greatest shift from the existing condition to roaded opportunities, followed by Alternatives 4, 5, 6, and 3, in that order. These shifts would occur as a result of timber harvest activities.

The percentage of acres classified as RM would increase over the 150-year period under all of the alternatives, including Alternatives 1 and 2. The largest gains would occur under Alternatives 4 and 7, with the percent of Forest-wide acres classified as RM increasing from approximately 10 percent to approximately 23 percent and 24 percent, respectively (Table 3.15-19). Under the most intensive timber harvest alternative (Alternative 7), approximately 66 percent of the Forest would remain at the undeveloped end of the recreation opportunity spectrum (Primitive and SPNM) after 150 years, a decrease of 14 percent from the current distribution.

It may be noted that these projections assume for the purposes of analysis that the supply of SPM settings would not increase over time. This is not necessarily the case. The ROS system helps identify, quantify, and describe recreation settings and essentially represents an inventory of existing recreation areas. Shoreline areas or other areas accessible by floatplane or helicopter that are presently allocated to Primitive or SPNM settings could be reallocated to the SPM setting in the future if patterns of use or other factors change. This type of change would result in an increase in the supply of SPM settings.

Table 3.15-19
Forest-wide ROS Acres after 150 Years of Implementation, by Alternative

	Primitive	SPNM	SPM	RN	RM	R+U	Total
Current	10,358,097	3,046,557	1,486,674	160,594	1,713,018	5,715	**16,770,654**
	62%	18%	9%	1%	10%	0%	**100%**
1	10,246,686	2,957,732	1,424,696	393,438	1,744,877	5,749	**16,773,179**
	61%	18%	8%	2%	10%	0%	**100%**
2	10,202,344	2,644,438	1,345,098	408,886	2,166,667	5,749	**16,773,181**
	61%	16%	8%	2%	13%	0%	**100%**
3	9,880,140	2,471,124	1,293,060	431,942	2,691,163	5,749	**16,773,179**
	59%	15%	8%	3%	16%	0%	**100%**
4	9,179,816	2,150,522	1,167,523	494,990	3,774,577	5,749	**16,773,177**
	55%	13%	7%	3%	23%	0%	**100%**
5	9,501,363	2,374,608	1,267,907	449,592	3,173,962	5,749	**16,773,181**
	57%	14%	8%	3%	19%	0%	**100%**
6	9,553,690	2,401,633	1,266,316	448,995	3,096,797	5,749	**16,773,180**
	57%	14%	8%	3%	18%	0%	**100%**
7	9,133,989	2,074,083	1,138,811	509,657	3,910,889	5,749	**16,773,178**
	54%	12%	7%	3%	23%	0%	**100%**

Notes:
SPNM=Semi-Primitive Non-Motorized, SPM=Semi-Primitive Motorized, RN=Roaded Natural, RM=Roaded Modified, R+U=Rural and Urban
1. The total acres shown in this table are slightly lower than the Forest-wide total because the ROS inventory does not include the entire Forest.
2. ROS settings are projected to change in those areas allocated to the Semi-Remote Recreation, Scenic Viewshed, Modified Landscape, and Timber Production LUDs. These projected changes are based on the following assumptions:
- Semi-Remote Recreation: 5 percent of Primitive, SPNM, and SPM would be converted to RN over the 150-year evaluation period.
- Scenic Viewshed: 25 percent of Primitive, SPNM, and SPM would be converted to RM; 25 percent of Primitive would change to SPNM; and 50 percent of Primitive and 75 percent of SPNM and SPM would stay the same over the 150-year evaluation period.
- Modified Landscape: 50 percent of Primitive, SPNM, and SPM would be converted to RM; 50 percent of Primitive would change to SPNM; and 50 percent SPNM and SPM would remain the same
- Timber Production: 80 percent of Primitive, SPNM, and SPM would be converted to RM; 10 percent of Primitive, SPNM, and SPM would change to RN; 10 percent of Primitive would become SPNM; and 10 percent of SPNM and SPM would remain the same.

Recreation Places

This analysis assesses the potential effects of the proposed alternatives on recreation places based on projected changes in the LUDs within which these places are located. In general, recreation places located in intensive and moderate development LUD groups would trend toward RM and RN setting opportunities in the future if they are not currently in these settings. Recreation places in the Natural Setting and Wilderness groups would likely retain their existing settings. It is important to remember that these effects are the result of long-term changes that are expected to occur gradually during the next 150 years.

Home Range Recreation Places

Home range recreation places are those inventoried recreation places within an approximate 20-mile radius from one or more communities. The long-term effects of the proposed alternatives on home range recreation places are summarized in Table 3.15-20. These effects are presented in terms of the distribution of recreation place acres by LUD group. Home range recreation places in development LUDs (moderate or intensive) would range from 10 percent of total home range acres under Alternative 1 to 44 percent and 40 percent under Alternatives 7 and 4, respectively. The percent of home range recreation place acres allocated to Wilderness LUDs would be 22 percent under all of the alternatives (Table 3.15-20).

Table 3.15-20
Home Range Recreation Places by LUD and Alternative (percent of acres)

Alternative	Wilderness	Natural Setting	Moderate Development	Intensive Development
1	22	67	5	6
2	22	58	9	10
3	22	53	12	13
4	22	37	19	21
5	22	48	14	15
6	22	49	13	15
7	22	33	21	23

Important Recreation Places

Recreation places are identified as either important or ordinary/common based on five categories: facilities, marine, hunting, fishing, and tourism. Individual recreation places may be important for one, several, or none of these categories. The following sections discuss the long-term effects of the proposed alternatives on important recreation places by category.

Facilities. The long-term effects of the proposed alternatives on important recreation places with facilities are summarized in Table 3.15-21. These effects are presented in terms of the distribution of recreation place acres by LUD group, which indicates the relative degree of potential impact that each alternative would have on existing recreation places with important facilities. The potential effects of timber harvest would likely vary by the type of facility. The importance of a remote public recreation cabin may, for example, be greatly enhanced by the solitude and natural scenery the area provides. This type of setting may be of only secondary importance for a similar cabin where the attraction might be the outstanding steelhead fishing in the spring.

Approximately 29 percent of inventoried recreation places acres are currently important for recreation facilities. The overall percentage of these acres that would be allocated to development LUDs (moderate or intensive) ranges from 5 percent (Alternative 1) to 21 percent (Alternative 7). The percent of recreation place acres important for facilities allocated to Wilderness LUDs would be 41 percent under all of the alternatives (Table 3.15-21).

Table 3.15-21
Recreation Places Important for Facilities by LUD and Alternative (percent of acres)

Alternative	Wilderness	Natural Setting	Moderate Development	Intensive Development
1	41	55	3	2
2	41	49	6	4
3	41	47	8	4
4	41	40	13	6
5	41	46	9	5
6	41	46	9	4
7	41	38	15	6

Marine. The long-term effects of the proposed alternatives on recreation places that are important for marine recreation are summarized in Table 3.15-22. These effects are presented in terms of the distribution of recreation place acres by LUD group. The perception of naturalness and scenery are very important values among Forest visitors engaged in the unique marine recreation opportunities offered by the

Tongass. Approximately 30 percent of inventoried recreation places acres are currently important for marine recreation activities. Many of these recreation places are within the beach fringe and are allocated to the SPM ROS.

The overall percentage of recreation place acres that are important for marine recreation and would be allocated to development LUDs (moderate or intensive) ranges from 4 percent under Alternative 1 to 33 percent under Alternative 7. The percent of recreation place acres important for marine recreation allocated to Wilderness LUDs would be 36 percent under all of the alternatives (Table 3.15-22).

Table 3.15-22
Recreation Places Important for Marine Recreation by LUD and Alternative (percent of acres)

Alternative	Wilderness	Natural Setting	Moderate Development	Intensive Development
1	36	60	3	1
2	36	54	6	5
3	36	48	7	9
4	36	33	15	15
5	36	43	9	12
6	36	43	9	12
7	36	31	17	16

Hunting. The long-term effects of the proposed alternatives on recreation places that are important for hunting are summarized in Table 3.15-23. These effects are presented in terms of the distribution of recreation place acres by LUD group. Hunters who favor hunting in an undisturbed, natural setting would likely prefer those alternatives that have the most acres in the Natural Setting and Wilderness LUD groups. Hunters who prefer using roads and road access would generally benefit from those alternatives with more acres in the intensive and moderate development LUD groups. Approximately 40 percent of inventoried recreation places acres are currently important for hunting.

The overall percentage of recreation place acres that are important for hunting and are allocated to development LUDs (moderate or intensive) would range from 5 percent under Alternative 1 to 41 percent under Alternative 7. The percent of recreation place acres important for hunting allocated to Wilderness LUDs would be 26 percent under all of the alternatives.

Fishing. The long-term effects of the proposed alternatives on recreation places that are important fishing places are summarized in Table 3.15-24. These effects are presented in terms of the distribution of recreation place acres by LUD group. There would be some variation in the Forest-wide standards and guidelines applied across the different alternatives, but all alternatives would maintain fish habitat. The

Table 3.15-23
Recreation Places Important for Hunting by LUD and Alternative (percent of acres)

Alternative	Wilderness	Natural Setting	Moderate Development	Intensive Development
1	26	69	2	3
2	26	64	4	7
3	26	57	6	11
4	26	35	12	27
5	26	45	10	20
6	26	49	9	16
7	26	33	13	27

quantity of fish available would likely remain constant across alternatives and immediate stream-side areas would remain natural along fish-bearing streams. It may, however, be noted that the Forest-wide beach and estuary fringe buffers would be reduced under Alternative 7.

Access to streams and areas immediately adjacent to streams may be subject to modifications at various levels. This may affect the quality of the fishing experience for some. Approximately 13 percent of inventoried recreation places acres are currently important for fishing.

Alternatives with more acres in the intensive and moderate development LUD groups would generally provide increased road access to fishing areas. However, the setting adjacent to the stream side corridors would appear more modified over time. The Natural Setting and Wilderness LUD groups maintain the settings in a more natural condition, with access generally more challenging. Access may affect the quality of the fishing experience regardless of the degree of setting changes leading up to the stream.

The percentage of recreation place acres that are important for fishing and would be allocated to development LUDs (moderate or intensive) ranges from 3 percent under Alternative 1 to 41 percent under Alternative 7. The percent of recreation place acres important for fishing allocated to Wilderness LUDs would be 31 percent under all of the alternatives (Table 3.15-24).

Table 3.15-24
Recreation Places Important for Fishing by LUD and Alternative (percent of acres)

Alternative	Wilderness	Natural Setting	Moderate Development	Intensive Development
1	31	66	2	1
2	31	58	5	6
3	31	48	7	14
4	31	30	13	25
5	31	43	8	18
6	31	44	8	17
7	31	28	15	26

Effects on Use and Demand

The following section is divided into two parts that discuss the potential effects of the alternatives in terms of resident recreation use and tourism, respectively.

Resident Recreation

Forest-wide LUD allocations are presented by alternative in Table 3.15-25. This table also highlights the net change in development LUDs from Alternative 5 (No Action). Net changes in development LUDs would range from a 16 percent decrease under Alternative 1 to a 9 percent increase under Alternative 7. Projected changes in ROS settings are shown for 150 years into the future in Table 3.15-19. The effects of the LUD allocations on important recreation places are discussed in the preceding section.

Table 3.15-25
Forest-Wide LUD Allocations and Net Change in Development LUDs by Alternative (percent)

	Alternative						
Land Use Designation	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Wilderness and Natural Monument	35	35	35	35	35	35	35
Mostly Natural Setting	60	53	48	37	43	44	35
Moderate Development	2	3	5	9	7	6	10
Intensive Development	3	8	12	19	15	14	20
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Net Change in Development LUD from Alternative 5 (No Action) (percent)[1]	-16	-10	-5	7	0	-1	9

[1] This is the net change in Development LUDs as a share of total LUDs.

As noted in the Affected Environment part of this section, resident recreation demand, like other forms of recreation demand, is influenced by a number of factors, including regional population levels, per capita participation rates, and recreation travel behavior. The alternatives evaluated here are unlikely to affect broader trends in recreation behavior, but it is possible that they could result in different supply-induced changes in participation. These potential changes, along with the potential effects of the alternatives on recreation places, would likely affect resident recreationists.

Supply-induced changes in participation on the Tongass have, to date, been mainly related to changes in road systems and road access. This type of change in participation appears to have occurred on Prince of Wales, Wrangell, and Mitkof Islands, for example. In these locations, road systems developed for timber harvesting created an opportunity for road-related access to previously inaccessible recreation settings and, therefore, an opportunity for recreation activities involving wheeled vehicles. In addition, new roads that provide easier access to a wider area may create new semi-primitive opportunities that increases the capacity of a recreation place or creates a new recreation place.

While there would be some new road access under all alternatives in the long run, nearly all new roads constructed under the alternatives would be closed following harvest. These roads would, therefore, not be available for use by highway vehicles or high-clearance vehicles. They would, however, be available for access by other methods and would, as a result, have the potential to affect existing recreation patterns.

Viewed at a programmatic level, changes in participation related to road systems and access are more likely to occur under alternatives that involve higher levels of projected road construction. Based on the miles of new road construction projected under each alternative, Alternative 1 would have the lowest impact on existing recreation access patterns with less than half the road miles projected under Alternative 5 (No Action) (755 miles versus 3,881 miles). Also, new road construction under Alternative 1 would be almost entirely limited to areas outside existing Inventoried Roadless Areas (IRAs), and would, therefore, tend to increase road density in already roaded areas rather than provide new access to presently undeveloped areas.

Alternatives 2 and 3 would also have relatively low impacts on existing recreation access patterns with 1,798 and 1,072 fewer projected new road miles, respectively, than under Alternative 5. These alternatives would also limit the construction of new roads in IRAs and, therefore, limit potential changes in access, but to a lesser extent than under Alternative 1. Alternative 6 (Proposed Action) would have an effect similar to Alternative 5, while Alternatives 4 and 7 would involve 854 and 1,893 more new road miles, respectively, than Alternative 5, and have the potential to provide new access to presently undeveloped areas.

As the preceding discussion suggests, the general trend across all alternatives is toward an increase in motorized opportunities and a corresponding decrease in primitive recreation opportunities. Viewed at this level, Alternative 1 would have the lowest impact on primitive areas and associated opportunities because timber management would be limited to areas outside the existing IRAs on the Tongass. Alternatives 2 and 3 would have the next lowest potential impacts in that order, with timber management under Alternative 2 limited to areas outside the existing IRAs except in locations where existing roads could logically be extended. Alternative 3 would keep the 23 areas proposed for wilderness in House Resolution (HR) 987 and the 18 special interest areas in the 1999 Record of Decision (ROD) in a natural condition. Alternatives 5 and 6 would be more likely to involve timber harvest in IRAs, and this likelihood would be increased further under Alternatives 4 and 7. Alternatives 4 and 7 have an increased emphasis on timber production with respective long-term annual Allowable Sales Quantities (ASQs) of 342 million board feet (MMBF) and 421 MMBF compared to 267 MMBF under Alternative 5 and 49 MMBF under Alternative 1.

Given the programmatic nature of this planning document, it is not possible to predict site-specific changes that would occur under any of the alternatives. Potential impacts to recreation places and recreation activities in other areas would be evaluated on a project-by-project basis and in accordance with the applicable Forest Plan standards and guidelines under all alternatives. The Forest-wide standards and guidelines and LUD prescriptions of the current Forest Plan would continue to be implemented as part of Alternative 5, where they apply. An updated and edited version of the current Forest Plan (Volume II), which includes edits to the existing Recreation and Tourism Standards and Guidelines, would apply under all of the action alternatives, with some exceptions for Alternatives 4 and 7.

These edits include changes to OHV management and wilderness group sizes and use. Under the updated Forest Plan, OHV planning would be in accordance with 36 CFR 212, 251, and 261—Travel Management; Designated Routes and Areas for Motor Vehicle Use. Under the existing Forest Plan, open roads on the Forest are designated open to OHVs unless site-specific closures are made. Although not specified in the current Forest Plan, the new travel management rule is presently being implemented on the Tongass. Travel management would, as a result, be the same under all alternatives.

Recreation activities in Wilderness would be managed to meet appropriate levels of social encounters. This would include limiting group sizes to no more than 12 persons for commercial and general public use of a wilderness, limiting the length of stay at one location to 14 days, and limiting commercial recreation use to two groups of 12 people from a single vessel (or other form of transportation), with the groups required to disperse out of sight and sound from each other. Exceptions may be approved by the District Ranger or Monument Ranger in response to unusual circumstances. The updated Forest Plan authorizes one exception—the Stikine River valley—where larger group size would be allowed for general public use. Outfitted groups would still be required to comply with the 12 person limit.

The Forest will change over time under all of the alternatives, including Alternative 5, and recreation demand and use patterns are also likely to change. Recreationists may respond to changes to specific areas and locations in three general ways. Many will likely adapt to new situations, and changes in settings will have little or no impact to these current Forest users. For others, change may not be acceptable, and these users will be displaced to other areas where the setting and use patterns are more in line with their expectations and needs. A third group of current recreationists may find that they cannot adapt to the new situation nor find suitable substitute areas, and as a result, substitute other leisure activities in place of recreating on the Forest.

Tourism

The tourism industry and number of visitors to Southeast Alaska has increased dramatically since the early 1990s, with much of this growth linked to increased cruise ship travel to the region. Cruise ships bring the most visitors to Southeast Alaska, accounting for approximately 63 percent of visitors in 2001 (McDowell et al. 2007). Future development of the tourism industry in Southeast Alaska and elsewhere in the United States is dependent on a wide range of factors, including the value of the dollar in foreign countries, the price of oil, world events and international unrest, and political and social change. In addition, regions like Southeast Alaska directly compete with other locations and activities for tourist dollars. As a result, changes in other tourist markets, both positive and negative, have the potential to affect the tourism industry in Southeast Alaska. These factors are, for the most part, unrelated to management of the Tongass National Forest.

Other potential factors affecting tourism development in the region include the reactions of local communities and residents to increased tourism development. Cruise ship visitation is concentrated in a few locations in the region with the large ships usually calling at five key ports: Juneau, Ketchikan, Skagway, Sitka, and Haines. This concentration results in an uneven distribution of tourism-related benefits throughout the region, as well as a concentration of tourism-related concerns in particular communities (Schroeder et al. 2005). There is some evidence that there may be limits to the amount of unconstrained tourism development that Southeast Alaska communities are willing to tolerate. Local initiatives aimed at managing tourism include an advisory measure to limit the number of cruise ship dockings in Haines, which was approved by voters in 2000, as well as initiatives in Juneau and Haines proposed in response to helicopter and floatplane traffic over residential areas. Another example of local reaction was provided by Sitka voters who rejected a measure in 2000 to expand the public dock in Sitka to accommodate cruise ships (Schroeder et al. 2005). In addition, Alaska voters recently approved the Alaska Cruise Ship Ballot Initiative that established a statewide tax of $50 per passenger on cruise ship passengers visiting Alaska.

While it is reasonable to assume that the vast majority of tourism activity in the region is related to the natural environment, many visitors experience the Tongass passively—from the deck of a cruise ship, for example—without directly using the Forest for recreation purposes. The alternatives would have very little effect on this type of visitor because the scenic quality of heavily traveled cruise ship corridors and tourism industry use areas would be largely protected under all of the alternatives. The Scenery Standards and Guidelines provide special emphasis for scenic quality in LUDs allowing timber harvest in visual priority travel routes and use areas. This is discussed further in the *Scenery* section of this chapter.

However, cruise ships have heavily marketed Forest-related activities in recent years, and many passengers take at least one trip to the Forest during their visit, with icefield helicopter tours and visits to the Mendenhall Glacier by cruise ship passengers increasing substantially (Table 3.15-15). As discussed in the affected environment portion of this section, the tourism industry and outfitter/guides in Southeast Alaska offer a wide spectrum of recreation activities, ranging from guided bear hunting through helicopter tours and guided wildlife-viewing boat tours. Viewed in terms of Forest management, the requirements of these activities are often at odds with one another. Some activities require developed facilities, utilities, and easy access, while others require vast and remote areas in a natural setting, with outfitter/guides providing only the basic essentials for their clients.

The following discussion addresses the potential effects of the alternatives on recreation places important for tourism and future recreation and tourism developments.

Recreation Places Important for Tourism

The effects of the proposed alternatives on recreation places that are important for tourism are summarized in Table 3.15-26. These effects are presented in terms of the distribution of recreation place acres by LUD group. Approximately 53 percent of inventoried recreation places acres are currently considered important for tourism. All of the proposed alternatives provide a mix of opportunities, with some alternatives emphasizing natural settings and others allowing more timber harvest and road building. These changes may be viewed as opportunities or detriments to various sectors of the tourism industry and their clients. Based on numerous surveys and marketing campaigns for visitors, it is widely accepted that natural beauty and scenery are some of the principal factors attracting visitors to the region. However, the State of Alaska and part of the tourism industry expressed a desire during the planning process for the current Forest Plan for increased access and opportunities for development, as they believed that some existing areas are at or near capacity (USDA Forest Service 1997a, p. 3-136).

There are indications that demand exceeds supply in some recreation places, especially those used more extensively by tourist operators and outfitter/guides. Activities that are presently near or at capacity include bear-viewing areas and helicopter use in the immediate vicinity of urban areas. Other areas may be able to accommodate current levels of tourism and potential increases in the future without negatively affecting the tourist experience or causing detrimental environmental effects. The number of visitors cruising the Inside Passage or viewing Mendenhall Glacier may, for example, be sustainable at current and future levels of use (Schroeder et al. 2005).

Table 3.15-26
Recreation Places Important for Tourism by LUD and Alternative (percent of acres)

Alternative	Wilderness	Natural Setting	Moderate Development	Intensive Development
1	46	51	2	1
2	46	47	4	3
3	46	43	5	6
4	46	34	10	10
5	46	40	7	7
6	46	40	6	7
7	46	33	11	10

The overall percentage of recreation place acres that are important for tourism and would be allocated to development LUDs (moderate or intensive) ranges from 2 percent under Alternative 1 to 21 percent under Alternative 7. The percent of recreation place acres important for tourism allocated to Wilderness LUDs would be 46 percent under all of the alternatives (Table 3.15-26).

Given the programmatic nature of this planning document, it is not possible to predict site-specific changes that would occur under any of the alternatives. Management practices for specific areas, such as limiting the number of visitors by permit, would continue to be evaluated on a project-by-project basis and in accordance with the applicable Forest Plan standards and guidelines under all alternatives. The Forest-wide standards and guidelines and LUD prescriptions of the current Forest Plan would continue to be implemented as part of Alternative 5, where they apply. An updated and edited version of the current Forest Plan, which includes edits to the existing Recreation and Tourism Standards and Guidelines, would apply under all of the action alternatives, with some exceptions under Alternatives 4 and 7. These edits are discussed further in the preceding section that address effects to resident recreation.

Assuming that the volume of tourists remains at its current level or continues to increase as it has done over the last decade, the overall recreation trend would likely be toward more group experiences on the Tongass and less opportunities for solitude and isolation in natural areas close to cruise ship stops (Schroeder et al. 2005).

Developments

Increased tourism has led to the development of new tourism facilities in Southeast Alaska, including the Icy Point Strait development near Hoonah. The rapid growth and large volume of cruise ship passengers and the growth in shore excursions suggest that there will be demand for new developed facilities on the Tongass in the future. This section identifies the share of the Forest that would be available for recreation and tourism developments under each alternative.

The recreation and tourism Forest-wide standards and guidelines in the current Forest Plan address commercial development of facilities and opportunities by LUD. Developments are classified as either major or minor. These standards and guidelines remain substantially unchanged in the Proposed Forest Plan accompanying this EIS. Abbreviated definitions of these terms are provided below.

> **Major Development.** Major recreation and tourism developments provided by the private sector involve a long-term commitment of the land base, with a moderate to high level of site modification. They involve large buildings or complexes of buildings and facilities, and often provide several services in a concentrated area. Comfort and convenience are provided for guests, and facilities can generally accommodate more than 12 people. Subsequent site reclamation involves extensive removal of facilities; improvements, revegetation, recontouring, etc.; and a period of at least 5 years to attain a natural appearance.
>
> Examples of this type of development include destination resorts and lodges, food and beverage services, downhill ski areas, marinas and gas stations, and full-service campgrounds.
>
> **Minor Development.** Minor recreation and tourism developments provided by the private sector involve only minor site modifications. They involve small rustic facilities and/or improvements, generally with a single purpose or service, and may involve several sites or an extensive area. Basic essentials are typically provided and can generally accommodate 12 or fewer people per site. Site reclamation involves simple removal of facilities and little or no revegetation; a natural appearance can be attained in a few years.
>
> Examples of this type of development include cabins, huts, small docks, cross-country ski trails with simple facilities, temporary or portable camps, and simple rustic campgrounds.

The major and minor recreation development standards and guidelines by LUD are summarized in Table 3.15-27. The percent of Tongass acres available for major or minor tourism development is presented by alternative in Table 3.15-28.

Both major and minor developments are prohibited in Wilderness, National Monument Wilderness, and Research Natural Areas, which together account for approximately 35 percent of the Forest under all alternatives. Major developments are also prohibited in Wild River LUDs, which account for about 1 percent of the Forest. Major developments are discouraged in the Municipal Watershed, Remote

Recreation, and Experimental Forest LUDs and LUD II areas (Table 3.15-27). These LUDs account for 17 to 19 percent of all of the alternatives (Table 3.15-28). Minor developments are discouraged in the Municipal Watershed and Experimental Forest LUDs, which, combined, account for less than 1 percent of the Forest (Table 3.15-28).

The share of the Forest that would be compatible with major or minor recreation developments ranges from 20 percent under Alternatives 4, 5, and 7 to 31 percent under Alternative 1. The Semi-Remote Recreation LUD accounts for most of the compatible lands and ranges from 15 percent of the Forest under Alternatives 4 and 7 to 32 percent under Alternative 1 (Table 3.15-28). Developments in other parts of the Forest would be evaluated on a case-by-case basis. The share of the Forest where major developments would be evaluated on a case-by-case basis ranges from 13 percent under Alternative 1 to 27 percent under Alternatives 4 through 7.

Table 3.15-27
Major and Minor Recreation Developments by LUD

	Major	Minor
Not Allowed	Wilderness Wilderness National Monument Research Natural Area Wild River	Wilderness Wilderness National Monument Research Natural Area
Discouraged	Nonwilderness National Monument Remote Recreation Municipal Watershed LUD II Experimental Forest	Municipal Watershed Experimental Forest
Case-by-Case	Special Interest Area Old-growth Habitat Scenic River Modified Landscape Timber production Minerals Transportation and Utility Systems	Nonwilderness National Monument Remote Recreation Special Interest Area Old-growth Habitat Wild River Modified Landscape Timber production Minerals Transportation and Utility System LUD II
Compatible	Semi-Remote Recreation Recreational River Scenic Viewshed	Semi-Remote Recreation Recreational River Scenic Viewshed Scenic River

Notes:
Not Allowed: Recreation special-use developments are not allowed by law or regulation or are not consistent with agency policy and regulations.
Discouraged: Recreation special-use developments are generally not consistent with the objectives of the LUD. Development proposals require scrutiny of magnitude and scope for LUD conformance.
Case-by-Case: Recreation special-use developments may be compatible with the LUD objectives depending upon the scope, purpose, and magnitude of the proposal. Proposals will be evaluated on a case-by-case basis.
Compatible: Recreation special-use developments are generally compatible with this LUD, and applicants are encouraged to examine these areas first where there is a public need and no private lands are available or suitable for development.
Source: USDA Forest Service 1997a (Table 3-51).

Table 3.15-28
Percent of Tongass Acres Available for Tourism Developments

	Alternative						
	1	2	3	4	5	6	7
Major Developments							
Not Allowed	36	36	36	36	36	36	36
Discouraged	19	19	18	17	17	17	17
Case-by-case	13	19	23	27	27	27	27
Compatible	32	27	23	19	20	21	20
Minor Developments							
Not Allowed	35	35	35	35	35	35	35
Discouraged	0	0	0	0	0	0	0
Case-by-case	32	37	41	44	44	43	44
Compatible	32	27	23	20	20	21	20

Note: See the notes to Table 3.15-27 for an explanation of Not Allowed, Discouraged, Case-by-Case, and Compatible.

Development of tourism opportunities is a cooperative effort. Investments in the development of tourism facilities, such as destination resorts, are typically the responsibility of the private sector. Federal, state, and local agencies may also play a role in facilitating the development of these types of opportunities. The LUDs and standards and guidelines that would apply under each alternative provide a framework within which these types of developments may take place. They also provide direction for the Forest Service to respond to and address the needs of the recreation and tourism industry.

Juneau Icefield Land Use Designation

The LUD classification for the area north of Juneau that encompasses the Juneau Icefield would be changed from Remote Recreation to Semi-Remote Recreation under all of the action alternatives. The areas would remain classified as Remote Recreation under Alternative 5, No-Action Alternative. This change has been proposed because the snow accumulation zone on the icefield has retreated to higher elevations as a result of climate change, which has resulted in a number of minor development sites (e.g., dog sled camps) becoming unsuitable for use as the thinning snow layers expose crevasses during the middle of the operating season. The proposed change in LUD boundaries would allow the Forest Service to consider moving minor developments into areas with snow, where these types of development would not be allowed under the existing LUD. This proposed change would not affect the Forest Service's ability to allow an expansion of helicopter landing sites in the area, because glacier landing tours are allowed under both the existing (Remote Recreation) and proposed (Semi-Remote Recreation) LUDs for this area.

Effects by Alternative

The following section discusses the potential impacts by alternative.

Alternative 1. This alternative would keep all remaining IRAs in a natural condition. This alternative would preserve the largest amount of Primitive and Semi-Primitive recreation opportunities both Forest-wide and within community home ranges. Alternative 1 would also maintain existing recreation places located within IRAs in their current natural condition. Potential changes in access resulting from new road construction would be almost entirely limited to areas outside the existing IRAs. This alternative would most closely maintain current outdoor recreation setting conditions Forest-wide and support the maintenance of existing use patterns and opportunities.

There would be a relatively small shift toward the Roaded end of the ROS under this alternative, with approximately 78 percent of the Forest expected to be either Primitive or SPNM after more than 100 years, compared to approximately 80 percent at present. There would be an increase in the share of important recreation places in Natural Setting LUDs relative to Alternative 5.

Alternative 2. This alternative would keep most IRAs in a natural condition and emphasize a wide range of recreation and tourism opportunities in a natural setting. This alternative would preserve the second largest amount of Primitive and Semi-Primitive recreation opportunities after Alternative 1 both Forest-wide and within community home ranges. Potential changes in access resulting from new road construction would take place on lands outside of IRAs except for some areas where roads could be logically extended. This alternative would largely maintain current outdoor recreation setting conditions Forest-wide and support the maintenance of existing use patterns and opportunities.

The shift toward the Roaded end of the ROS would be larger under this alternative than under Alternative 1, but still relatively small, with approximately 77 percent of the Forest expected to be either Primitive or SPNM after 150 years, compared to approximately 80 percent at present. There would be an increase in the share of important recreation places in Natural Setting LUDs relative to Alternative 5.

Alternative 3. This alternative provides a mix of National Forest uses and activities similar to Alternative 2, with additional emphasis on timber management. This alternative would keep the 23 areas proposed for Wilderness in HR 987 and the 18 Areas of Special Interest in the 1999 ROD in a natural condition.

There would be smaller amounts of Primitive and Semi-Primitive recreation opportunities preserved under this alternative than under Alternatives 1 and 2, but still a relatively large amount, both Forest-wide and within community home ranges. Potential changes in access resulting from new road construction would take place in lands outside of the 23 areas proposed for Wilderness in HR 987 and the 18 Areas of Special Interest in the 1999 ROD.

Approximately 73 percent of the Forest would be either Primitive or SPNM after 150 years, compared to approximately 80 percent at present. There would be an increase in the share of important recreation places in the Natural Settings relative to Alternative 5 for all categories except facilities, where the share of important recreation places in Natural Setting LUDs would remain essentially the same as under Alternative 5.

Alternatives 4 and 7. Alternative 4 would provide for a mix of National Forest uses, with an emphasis on timber production. Timber management would occur in some IRAs not managed for timber production in the current Forest Plan. This would also be the case under Alternative 7, which would place additional emphasis on timber. Timber would be managed on a considerably expanded land base compared with the current Forest Plan (Alternative 5) and on a larger land base than under Alternative 4.

These alternatives would place a relative emphasis on the roaded end of the ROS spectrum, with 23 percent of the Forest expected to be RM after 150 years, compared to approximately 10 percent at present. This would be matched with a corresponding decrease in Primitive and SPNM settings, which combined would comprise about 67 percent of the Forest after 150 years under both alternatives compared to 80 percent at present.

These alternatives would involve the largest amount of new road construction, with approximately 4,735 miles and 5,774 miles projected under Alternatives 4 and 7, respectively, compared to about 3,881 miles under Alternative 5. While there would be a relative increase in new roads, with access provided to presently undeveloped areas, nearly all new roads would be closed following harvest and would, as a result, not be available for use by highway or high-clearance vehicles. The closed roads would, however, be available for access by other methods and would, as a result, have the potential to affect existing recreation patterns.

The share of home range recreation places within Wilderness and Natural Setting LUD groups would decrease from 79 percent under the current Forest Plan (Alternative 5) to 59 percent and 55 percent under Alternatives 4 and 7, respectively. There would be a decrease in the share of important recreation places in Natural Setting LUDs relative to Alternative 5.

Alternatives 5 and 6. Alternative 5 (No Action) is the current Forest Plan (1997 ROD, as amended) and provides for a moderately high level of timber production along with strong resource protection measures. Alternative 6 (Proposed Action) is similar to Alternative 5, but includes adjustments to the plan based on information generated during the recent 5-Year Plan Review and other minor clarifications and updates.

These alternatives would provide a mixture of Primitive and Roaded recreation opportunities relative to the other alternatives, which range from maintaining almost all IRAs in a natural condition (Alternative 1) to intensive timber management (Alternatives 4 and 7). Approximately 71 percent of the Forest would be either Primitive or SPNM under Alternatives 5 and 6 after 150 years, compared to approximately 80 percent at present. Approximately 19 percent of the Forest would be RM compared to 10 percent at present and 11 percent under Alternative 1 after 150 years.

There would be more new roads constructed under these alternatives than under Alternatives 1 through 3 and fewer than under Alternatives 4 and 7. The share of home range recreation places within Wilderness and Natural Setting LUD groups would be lower under these alternatives than under Alternatives 1 through 3 and higher than under Alternatives 4 and 7. This would also be the case with the share of important recreation place acres within Wilderness and Natural Setting LUDs.

Cumulative Effects

This section considers the incremental effects of the alternatives when added to other past, present, and reasonably foreseeable actions. The effects of past and present actions on recreation are included in the Affected Environment portion of this section, which discusses current recreation facilities and activities on the Tongass. Past actions include past timber harvest and road building that has facilitated roaded recreation and changed ROS settings, as well as the development of recreation facilities, such as cabins, campgrounds, interpretive sites, and visitor centers. Present actions include the impacts of current management policies on existing recreation patterns, particularly those that are authorized by special use permits.

One of the major trends in recreation in Southeast Alaska has been the continued growth in the number of cruise ship passengers visiting the region. The effects of the alternatives are considered in conjunction with this trend because it underpins current and future recreation demand on the Tongass. Current recreation patterns on the Tongass also reflect past timber harvest and road building activities on adjacent private and Native corporation lands, as well as wildland recreation opportunities on federal- and state-managed lands elsewhere in the region.

Reasonably foreseeable actions on NFS lands include the projected levels of future timber harvest and road building that are used in the preceding analysis to assess the potential impacts of the alternatives on the supply of recreation opportunities and recreation use and demand.

Other reasonably foreseeable actions include transportation and utility developments proposed by the State of Alaska. These proposals are summarized in the *Transportation and Utilities* section of this document. A total of 1,523 miles of roads are projected to be constructed on non-NFS lands in Southeast Alaska after full implementation of the plan (100+ years) under each of the alternatives (see Table 3.12-3). Most of the projected non-NFS roads are forest roads that would be developed for timber harvest, but the total miles also include roads likely to be built to serve communities, such as the Juneau access road on the east side of Lynn Canal. This road, and other road corridors covered by Public Law 109-59, would, if approved under NEPA and funded, connect additional areas in Southeast Alaska to the continental highway system and improve transportation between communities. They would also improve access for recreation use and would in some cases likely facilitate new types of use.

It is not possible at this time to predict exactly which roads would be developed or their likely impact on future recreation patterns. None of the alternatives is expected to affect this type of future road development, which would be expected to go or not go forward regardless of the selected alternative. The overall cumulative effect of new regional road corridors viewed in conjunction with the proposed Forest Plan alternatives would be a trend toward the roaded end of the ROS spectrum that would be relatively high under Alternative 7 and relatively low under Alternative 1. Planned timber harvest activities on adjacent private and Native corporation lands would also result in a cumulative trend toward more land in roaded ROS settings. This would also be most pronounced under Alternative 7 and least pronounced under Alternative 1.

Other reasonably foreseeable future actions include an expected growth in recreation and tourism businesses based on continued growth in the cruise ship industry, as well as the development of additional fishing and other lodges. This type of development would facilitate additional recreation and tourism in the region and on the Forest. Human settlement expansion is expected to occur around the region's larger cities, such as Juneau and Sitka, with residential expansion also expected as a result of state land auctions. These developments would likely result in increased demand for a range of recreation activities, with some developments favoring developed recreation opportunities, and others more dependent on undeveloped lands.

Mining activities are expected to expand at existing sites, including Greens Creek on Admiralty Island and Berner's Bay north of Juneau, with an increase in mining exploration and new development also anticipated. Regional energy and transmission projects are also expected to occur, including the Swan-Tyee transmission line and the Juneau-Hoonah transmission line. Mining and regional energy projects are for the most part expected to have a negative effect on recreation activities, because most recreational activities are incompatible with these types of land use. Improvements in reliable electrical service could, however, benefit some recreation businesses and, by extension, recreationists.

Risk and Uncertainty

As stated in a number of locations in this section, recreation and tourism in Southeast Alaska and on the Tongass is influenced by a number of factors that are largely independent of forest management decisions. Factors affecting the current level of visitation to the region, for example, likely include the impact of events at the World Trade Center on September 11, 2001, and the relatively weak U.S. dollar, both of which favor domestic over international travel and may have prompted some to take a trip to Southeast Alaska, rather than a trip abroad. Future recreation and tourism demand is difficult to predict with any precision and no attempt is made to quantify future demand in this section. The number of cruise ship visitors to the region is generally expected to remain at current levels or continue to increase, but there is uncertainty that this will be the case for the foreseeable future.

Likely impacts to the supply of recreation opportunities on the Forest are easier to project, as they are directly affected by management decisions, at least to the extent that different LUD classifications influence potential ROS classes and, therefore, different types of recreation. Much of the analysis in this section is based on this relationship, which allows a comparison between alternatives over time.

Changes in Southeast Alaska's climate (discussed in the *Climate and Air* section) could affect recreation and tourism in the region in the future. Many tourists visiting the region travel long distances from across the United States, as well as from other countries. Many tourists arriving by cruise ships travel a considerable distance by air before even boarding the cruise ship in Seattle, Vancouver, or elsewhere. Others travel directly to Southeast Alaska via air. Future regulatory or market-based pressures to reduce transportation-related greenhouse gases could affect the level of visitation to the region.

Recreation activities could also be directly affected by global warming, with, for example, fewer winter recreation opportunities available and for shorter periods of time. Climate change could also affect recreational fishing through changes in biodiversity and water levels, as well as changes in the length of season and user experience (Kelly et al. 2007).

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Scenery

Affected Environment

The Tongass National Forest offers a variety of scenery to its visitors, from spectacular mountain ranges and the glaciers of the mainland to low-lying marine landscapes composed of intricate waterways, bays, and island groups. The Forest is viewed from a variety of vantage points, including the communities of Southeast Alaska, the Alaska Marine Highway ferry route, cruise ship routes, existing road systems, popular small boat routes and anchorages, developed recreation sites and facilities, and hiking trails. Tourist-related flight seeing via small aircraft is increasing in popularity and provides aerial views of the forest landscape.

The Forest Service developed a Visual Management System (VMS) in 1974 to integrate aesthetic considerations into large-scale resource management decisions. VMS included objective criteria, such as viewing distance and the degree of visual change to the landscape for estimating the effects of management activities. However, VMS used somewhat subjective definitions of what constituted an aesthetic landscape and relied on professional judgment to quantify effects. The Scenic Management System (SMS) was released in 1996 to integrate the increased understanding of ecosystem processes and cultural landscapes in identifying the effects of various management practices on scenic resources. The SMS was used in this analysis to inventory existing scenic resources, provide measurable scenic quality management objectives for each portion of the landscape, and estimate the landscape's sensitivity based on the visibility from priority travelways and use areas.

In order to apply SMS to the Forest, a viewshed analysis of the entire Tongass National Forest was completed using GIS. The analysis was completed separately for each Ranger District. Step one involved identifying the Visual Priority Routes (VPRs) and use areas. These are the major points from which people view the forest. They include the Alaska Marine Highway; cruise ship and small boat routes; major roads, trails, and anchorages; and important recreation areas on the land. The viewshed analysis identified points at regular intervals along the VPRs and use areas. Each viewpoint along a route was assigned a viewing height from which a person would observe the forest. For example, the average height of a person was selected for the viewing height along a hiking trail, and the height of the cruise ship's deck was used for the cruise ship route. Each cell in the digital elevation model was evaluated for visibility from each of the points along each VPR and use area. Visibility was assessed separately for each marine viewpoint and land viewpoint.

The second phase of the analysis identified distance zones, breaking the visible areas into foreground, middleground, and background from each viewpoint, based on distance. Foreground is the visible area within 0.5 mile of a VPR; background is the visible area greater than 5 miles and less than 15 miles from a VPR; and middleground is the visible area between foreground and background of a VPR. Areas more than 15 miles from any viewpoint and those not seen from any of the VPRs or Use Areas were considered seldom seen. Distance zones were also assessed separately for land and water viewpoints. The final layers for each Ranger District were generated by combining the results from the marine analysis and the land analysis. Any point that was visible from either a land or marine viewpoint was considered visible in the final layer. Any area that was foreground from either a land or marine viewpoint was considered foreground, and any land that was background from either a land or marine viewpoint became background. All other visible land became middleground. The distance zones were subsequently overlaid with the LUDs to generate the Scenic Integrity Objectives (SIOs) (refer to the Forest-wide standards and guidelines in the Tongass Land and Resource Management Plan for details on how SIOs were determined for each LUD).

Existing Scenic Integrity

The existing scenic resources of the Tongass encompass everything from vast tracts unmodified by human activity to extensive areas of heavily modified landscapes. Existing Scenic Integrity (ESI) ratings are used by the Forest Service to analyze the degree of intactness of the landscape character. These ratings are used to categorize the degree of alteration visible in the landscape on a continuum from a natural setting to a heavily altered landscape. The ratings apply to the broad landscape affected, not just the acres altered. As described below, ESI ratings range over six levels of integrity, from Very High to Unacceptably Low.

- Very High—Landscapes where the valued landscape character is intact with only minute deviations, if any. The existing landscape character and sense of place is expressed at the highest possible level.
- High—Landscapes where the valued landscape character appears intact. Deviations may be present, but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident.
- Moderate—Landscapes where the valued landscape character appears slightly altered. Noticeable deviations must remain visually subordinate to the landscape character being viewed.
- Low—Landscapes where the valued landscape character appears moderately altered. Deviations begin to dominate the valued landscape character being viewed, but they borrow valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes or architectural styles outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed, but compatible or complimentary to the character within.
- Very Low—Landscapes where the valued landscape character appears heavily altered. Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes, or architectural styles within or outside the landscape being viewed.
- Unacceptably Low—Landscapes where the valued landscape character being viewed appears extremely altered. Deviations are extremely dominant and borrow little if any form, line, color, texture, pattern or scale from the landscape character.

Table 3.16-1 displays the acres of each ESI for the Tongass. In this and succeeding tables, a breakdown between “seen” and “seldom seen” areas is presented. Seen areas are those areas that can be viewed in the foreground, middleground, or background from inventoried VPR and Use Areas with a concern level of 1 or 2, the travelways and use areas with the highest number of users. Seldom seen areas are all the rest of the Forest. The ESI for wilderness is also included in this table. Approximately 88 percent of the Tongass is rated as a Very High ESI, which is a visually unaltered condition. About 10 percent of the land is rated in as Low, Very Low, or Unacceptably Low, which indicates noticeable development activity. The remainder of the Forest is rated as High or Moderate. Some of the wilderness acres have a High or lower rating. This is mostly due to the landscape effect of developments adjacent to wilderness and past development activities within wildernesses.

Table 3.16-1
The Existing Scenic Integrity of the Tongass National Forest (percent)

ESI Rating	Very High/High	Moderate	Low	Very Low	Unacceptably Low
Seen	23.6	1.2	1.6	3.4	0.1
Seldom seen	30.5	0.2	1.4	3.4	0.1
Wilderness	30.2	0.1	0.1	-	-
Subtotals	**88.3**	**1.5**	**3.1**	**6.8**	**0.2**

Note: Numbers are GIS estimates and are not exact. Columns and rows may not sum exactly due to rounding. Less than 2 percent of the Forest is unclassified.

Under the 1997 Forest Plan, all land has a designated Land Use Designation (LUD), which guides the types and intensity of development actions. The LUDs designate the SIOs for each area, which define the degree to which the natural landscape can be altered, and provide guidelines for timber harvest, road building, and other activities to ensure they are conducted in a way that allows the scenic objectives to be achieved. A LUD may have different SIOs depending on the distance zone (foreground, middleground, background) in which the development activity is to take place. SIOs are classified using the same terms outlined above for ESI: Very High, High, Moderate, Low, and Very Low. The Unacceptably Low rating is only used to inventory existing conditions and cannot be used as a management objective.

1. The current adopted SIOs for all land within the Tongass are displayed in Table 3.16-2. This table separates the acres of each SIO into five categories: foreground, middleground, background, seldom seen, and other (municipal watersheds and non-wilderness national monuments where the SIO is determined on a project-by-project basis). The Very High SIO is typically assigned to wilderness; however, it is not used for Tongass wilderness because of the potential alterations allowed under the Alaska National Interest Lands Conservation Act (ANILCA). In reality, the vast majority of wilderness acreage will be managed through the specific wilderness plans with a Very High SIO. Thus, over 60 percent of the Tongass is to be managed at the High or Very High Scenic Integrity level.

2. Demand for scenic quality can best be represented by the increase in tourist-related travel to the Tongass, as well as a heightened awareness and sensitivity of Alaskan residents to scenic resource values. Southeast Alaska's Inside Passage is advertised and promoted by the Division of Tourism, cruise ship operators, and the Southeast Alaska Tourism Council. Their marketing strategy focuses on the scenery of the Tongass National Forest as a major attraction. The visitors to Southeast Alaska would, therefore, arrive with expectations and an image of the environment and scenery awaiting them. If current trends continue, demand for viewing scenic landscapes will increase. Studies published by the Alaska Department of Community and Economic Development show a 62 percent increase in visitor

Table 3.16-2
Adopted Scenic Integrity Objectives for the Tongass (percent)

	Visual Quality Objective				
	High	**Moderate**	**Low**	**Very Low**	**Other[1]**
Foreground	8.0	3.7	1.6	-	0.2
Middleground	24.2	9.3	2.2	8.0	0.3
Background	1.6	0.6	-	0.4	-
Seldom seen	25.9	6.3	-	5.7	0.7
Unmapped	1.1	0.3	-	-	-
Total	**59.7**	**19.9**	**3.8**	**14.1**	**1.2**

[1] Includes land in the Municipal Watershed and Nonwilderness National Monument LUDs. SIOs in these LUDs are to be determined on a project-by-project basis. Generally, the High SIO will be met.
Source: USDA Forest Service, GIS. Numbers are not exact and may not sum correctly due to rounding.

arrivals to Alaska since 1993. Lands adjacent to the Alaska Marine Highway, cruise ship routes, flight-seeing routes, high-use recreation areas, and other marine and land-based travel routes will be seen by more people, more frequently, and for greater duration.

Environmental Consequences

The Tongass has adopted specific management objectives for scenic resources (SIOs) for each LUD in the Forest. The adopted SIOs indicate the desired or acceptable level of human-induced alteration to the valued landscape character. Each alternative described in this FEIS would, if implemented, maintain, alter, or enhance the visual character of the landscape to varying degrees, depending on the mix of LUDs in that alternative. By varying the amount of land in each LUD, the alternatives would result in different amounts of land managed under each SIO. The adopted SIO is, therefore, the unit used to measure potential change in visual resources for each alternative.

Adopted SIOs can be thought of as an indicator of long-term cumulative effects, especially on development LUDs. SIOs are adopted to provide a threshold for the amount of modification to the landscape during land altering activities; therefore, land may have an adopted SIO of Low, but currently meet the High SIO.

The potential effects to the scenic resource are described in the following three ways:

1. A Forest-wide display of acres of each SIO adopted as a result of each alternative.
2. A display of the number of acres within the three development LUDs that would be suitable for timber harvest under each alternative. The acres suitable for harvest are listed by their location within the foreground, middleground, background, or seldom seen area.
3. A display of the effects of each alternative on a selected group of viewsheds throughout the Tongass.

Direct, Indirect, and Cumulative Forest-wide Effects

Table 3.16-3 displays the acres in each SIO that would result from the seven alternatives. Table 3.16-3 also shows the acres under each alternative and SIO that would be located within seen and seldom seen areas. Seen areas are those areas

Table 3.16-3
Scenery Integrity Objectives (percent)

	Scenery Integrity Objectives					
	High	**Moderate**	**Low**	**Very Low**	**Other[1]**	**Total**
Alternative 1						
Seen Areas	34%	22%	1%	2%	1%	**60**
Seldom Seen Areas	27%	10%	0%	1%	1%	**39**
Unmapped Areas[2]	1%	0%	0%	0%	0%	**1**
Total	**62%**	**32%**	**1%**	**3%**	**2%**	**100**
Alternative 2						
Seen Areas	35%	18%	2%	5%	1%	**60**
Seldom Seen Areas	27%	9%	0%	3%	1%	**39**
Unmapped Areas[2]	1%	0%	0%	0%	0%	**1**
Total	**62%**	**27%**	**2%**	**7%**	**1%**	**100**
Alternative 3						
Seen Areas	35%	15%	3%	7%	1%	**60**
Seldom Seen Areas	26%	8%	0%	4%	1%	**39**
Unmapped Areas[2]	1%	0%	0%	0%	0%	**1**
Total	**61%**	**23%**	**3%**	**11%**	**2%**	**100**
Alternative 4						
Seen Areas	31%	13%	5%	11%	1%	**60**
Seldom Seen Areas	24%	6%	0%	7%	1%	**39**
Unmapped Areas[2]	1%	0%	0%	0%	0%	**1**
Total	**56%**	**19%**	**5%**	**18%**	**2%**	**100**
Alternative 5						
Seen Areas	34%	13%	4%	8%	1%	**60**
Seldom Seen Areas	26%	6%	0%	6%	1%	**39**
Unmapped Areas[2]	1%	0%	0%	0%	0%	**1**
Total	**61%**	**19%**	**4%**	**14%**	**2%**	**100**
Alternative 6						
Seen Areas	34%	13%	4%	8%	1%	**60**
Seldom Seen Areas	25%	7%	0%	5%	1%	**39**
Unmapped Areas[2]	1%	0%	0%	0%	0%	**1**
Total	**60%**	**20%**	**4%**	**13%**	**2%**	**100**
Alternative 7						
Seen Areas	29%	13%	5%	12%	1%	**60**
Seldom Seen Areas	24%	6%	0%	8%	1%	**39**
Unmapped Areas[2]	1%	0%	0%	0%	0%	**1**
Total	**54%**	**19%**	**5%**	**20%**	**2%**	**100**

[1] Consists of land in the municipal Watershed and Nonwilderness National Monument LUDs. SIOs in these LUDs are to be determined on a project-by-project basis. Generally, the High SIO will be met.
[2] Consists of unmapped portions of the Forest.
Note: Numbers are based on GIS estimates and are not exact due to rounding.

that can be viewed in the foreground, middleground, or background from inventoried travelways and use areas. Wilderness areas are included in these acreages. The acres displayed for Alternative 5 (No Action) represent the current mix of adopted SIOs.

The number of acres designated as High SIO would be similar under all alternatives except Alternatives 4 and 7, which have fewer acres in the High SIO category (56 and 54 acres, respectively, compared to 61 percent under Alternative 5). However, the area with an SIO of Low or Very Low would vary considerably between alternatives, especially within the seen areas. The acres of Low or Very Low SIO in the seen area under Alternative 1 would be approximately 3 percent of the Tongass, compared to 12 percent under Alternative 5. Conversely, the seen area with an SIO of Low or Very Low under Alternatives 4 and 7 would be approximately 16 and 17 percent, respectively. Alternatives 2 and 3 would be between Alternatives 1 and 5 in terms of the amount of seen area with an SIO of Low or Very Low. Alternative 6 would result in a mix of SIOs that would be similar to Alternative 5.

Another way to assess the relative effects of the alternatives on scenic integrity is to compare the area under each alternative that would be suitable for timber harvest.

The percent of land that is suitable for timber harvest within the three development LUDs (Scenic Viewshed, Modified Landscape, and Timber Production) under each alternative is shown in Table 3.16-4. The table indicates the amount of land suitable for timber harvest within the foreground, middleground, and background as seen from high priority travel routes and use areas. The percent of suitable land within seldom seen areas is also shown.

Under all the alternatives, approximately two-thirds of the suitable lands for timber harvest are within the Timber Production LUD. The number of suitable acres allocated to this LUD varies from approximately 312,000 acres under Alternative 1 to approximately 1,174,000 under Alternative 7. This compares to approximately 781,000 under Alternative 5 (No Action). Although all harvest units would meet the SIO for the individual distance zone and LUD, the degree of change to the visual resources are likely to be the greatest in the Timber Production LUD. Approximately one-half of the suitable acres allocated to Timber Production would be in seen areas.

Alternative 1. Under Alternative 1, approximately 62 percent of the Forest would have an adopted SIO of High and would be managed for a Natural Setting (Table 3.16-3). This is similar to Alternative 5 (No Action), which would have 61 percent with an SIO of High. Areas with a High SIO are managed so that the valued landscape character appears intact. As is the case with all the alternatives, over one-half of the land with the High SIO would be within Wilderness or National Monument LUDs. Approximately 32 percent of the Forest under Alternative 1 would have a Moderate SIO. Landscapes with this SIO are managed to achieve a mostly natural condition. This alternative has the highest acreage designated as High and Moderate SIO. Most of the remaining Forest lands (6 percent) would have an adopted SIO of Low or Very Low (compared to approximately 18 percent under Alternative 5). Areas with these SIOs are managed so that the valued landscape character would appear moderately or heavily altered.

This alternative has the least amount of land suitable for timber harvest compared to the other alternatives. Alternative 1 would have less than one-half the suitable acres as Alternative 5 (No Action). Approximately 7 percent of the suitable acres would be designated Scenic Viewshed, 22 percent Modified Landscape, and 71 percent Timber Production LUD (the LUD projected to have the greatest degree of change) (Table 3.16-4). Alternative 1 would result in the least amount of new road construction (approximately 1,766 miles) over the next 10 decades.

Table 3.16-4
Distance Zone breakdown of the Estimated Suitable Forest Land for Each Alternative by Development LUD

	Alternatives						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Scenic Viewshed							
Foreground	2%	4%	4%	5%	4%	3%	5%
Middleground	5%	7%	8%	11%	10%	9%	11%
Background	0%	0%	0%	0%	0%	0%	0%
Seldom Seen Area	0%	0%	0%	1%	1%	1%	1%
Unmapped	0%	0%	0%	0%	0%	0%	0%
Subtotal	**7%**	**12%**	**13%**	**17%**	**14%**	**14%**	**18%**
Modified Landscape							
Foreground	9%	7%	6%	4%	5%	5%	5%
Middleground	11%	10%	11%	10%	11%	11%	11%
Background	0%	0%	0%	0%	0%	0%	0%
Seldom Seen Area	2%	2%	2%	2%	2%	2%	2%
Unmapped	0%	0%	0%	0%	0%	0%	0%
Subtotal	**22%**	**18%**	**18%**	**16%**	**18%**	**18%**	**18%**
Timber Production							
Foreground	15%	12%	11%	9%	9%	9%	9%
Middleground	41%	42%	40%	40%	40%	40%	39%
Background	1%	2%	2%	1%	2%	2%	1%
Seldom Seen Area	14%	15%	16%	16%	17%	17%	15%
Unmapped	0%	0%	0%	0%	0%	0%	0%
Subtotal	**71%**	**70%**	**69%**	**68%**	**68%**	**68%**	**65%**
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Estimated Suitable (thousands of acres)	**312**	**545**	**661**	**999**	**781**	**774**	**1,174**

Note: Numbers are based on GIS estimates and are not exact. Columns do not sum correctly due to rounding.

Alternative 2. The overall distribution of adopted SIOs would be similar to those under Alternative 1 (Table 3.16-3), except that there would be fewer acres in the Moderate SIO (27 percent compared to 32 percent under Alternative 1 and 19 percent under Alternative 5) and more in the Low and Very Low SIOs (9 percent compared to 4 percent for Alternative 1). This alternative has approximately one-third more suitable land than Alternative 1. Alternative 2 has slightly more acres of suitable lands for timber harvest in the Scenic Viewshed LUD than Alternative 1, and more of these lands are in the foreground, which is the area likely to have the least change in the visual condition (Table 3.16-4). Alternative 2 would result in approximately 2,600 miles of new road construction over the next 10 decades.

Alternative 3. Alternative 3 would have more acres in the development LUDs than Alternatives 1 and 2, but there would be only a slight decrease in the amount of land in the High SIO (61 percent versus 62 percent under Alternatives 1 and 2). This is due primarily to allocating more land to the Scenic Viewshed LUD, in which the foreground lands are managed as High SIO (Table 3.16-3). There would be less land in the Moderate SIO than Alternatives 1 and 2, but more than under

Alternatives 4, 5, 6, or 7. More land would have Low and Very Low SIOs compared to Alternatives 1 and 2 (slightly over 14 percent compared to 4 and 9 percent, respectively). Alternative 3 would have more suitable land for timber harvest than Alternatives 1 or 2 (Table 3.16-4). Alternative 3 would result in approximately 3,464 miles of new roads over the next 10 decades.

Alternative 4. Alternative 4 would have more acres in development LUDs than Alternative 5 and less land in the High SIO (nearly 56 percent compared to 62 percent under Alternative 1 and 61 percent under Alternative 5). Alternative 4 would have more land in Low and Very Low SIOs (23 percent compared to 4 percent under Alternative 1 and 18 percent under Alternative 5). Alternative 4 would have more suitable land for timber harvest than Alternative 5 and more acres in the Timber Production LUD. Alternative 4 would result in approximately 5,487 miles of new road construction over the next 10 decades.

Alternative 5. Alternative 5, the No-Action Alternative, would have approximately 61 percent of the land in the High SIO, which is similar to Alternatives 1, 2, 3, and 6 (Table 3.16.3). This alternative would have a relatively low percentage of land suitable for harvest in the foreground (18 percent), compared to 25 percent under Alternative 1. A relatively high percent of the suitable lands (20 percent) would be within the seldom seen areas. Alternative 5 would result in approximately 4,351 miles of new roads over the next 10 decades.

Alternative 6. Alternative 6, the Proposed Action, is very similar to Alternative 5 in terms of its effect on the visual resource. The mix of SIOs would be nearly the same under Alternative 6 as it would be under Alternative 5. Alternative 6, along with Alternative 5, would have a relatively high percentage of land in the seldom seen areas. Alternative 6 would result in approximately 4,285 miles of new roads over the next 10 decades, which is slightly less than under Alternative 5.

Alternative 7. Alternative 7 would have the most acres in development LUDs of all the alternatives and the least land in the High SIO (nearly 54 percent compared to 62 percent under Alternative 1 and 61 percent under Alternative 5). Alternative 7 would have the most land in Low and Very Low SIOs (nearly 25 percent compared to 4 percent under Alternatives 1 and 18 percent under Alternative 5). Alternative 7 would have more suitable land for timber harvest than Alternative 5 (over 3 times as much as Alternative 1 and approximately 50 percent more than Alternative 5) and more acres in the Timber Production LUD. Alternative 7 would result in the highest amount of new road construction (approximately 6,264 miles) over the next 10 decades.

Effects on Selected Viewsheds

To help focus the visual effects on more familiar areas, the alternatives were also analyzed by selected viewsheds in the Tongass. These viewsheds were selected for their popularity and intensity of public use and travel. Table 3.16-5 compares the amount of land in each SIO under the six alternatives for each of the viewsheds from these selected routes. Discussion of the effects on scenic resources for each viewshed follows the table.

Two points to consider when reviewing the alternative effects are:

1. Where an area is allocated to the Semi-remote Recreation LUD, the formally adopted SIO is Moderate; however, the resulting SIO is essentially High because this LUD precludes commercial timber harvest. The Moderate SIO is primarily intended to provide a standard for recreation and tourism types of development and facilities associated with these developments, from small

Table 3.16-5
Estimated Percentage of Selected Viewsheds Classified by Adopted SIOs under Each Alternative [1,2,3]

Scenic Integrity Objective	Alternative 1	2	3	4	5	6	7
Behm Canal (West)							
High	16%	19%	19%	6%	19%	21%	6%
Moderate	48%	21%	21%	19%	20%	19%	19%
Low	24%	36%	36%	46%	36%	36%	46%
Very Low	12%	24%	24%	29%	25%	24%	29%
Caroll Inlet							
High	14%	14%	14%	0%	12%	14%	0%
Moderate	50%	19%	19%	19%	20%	19%	19%
Low	15%	22%	22%	26%	22%	22%	26%
Very Low	21%	46%	46%	55%	46%	46%	55%
Chatham Strait							
High	58%	59%	58%	47%	56%	59%	39%
Moderate	31%	17%	8%	10%	9%	8%	11%
Low	4%	5%	5%	7%	6%	5%	9%
Very Low	7%	20%	29%	36%	30%	29%	41%
Cholmondeley Sound							
High	39%	39%	39%	4%	35%	39%	4%
Moderate	59%	6%	5%	7%	5%	5%	7%
Low	1%	19%	19%	26%	20%	19%	26%
Very Low	1%	36%	37%	63%	40%	37%	64%
Clarence Strait							
High	44%	45%	46%	34%	45%	46%	22%
Moderate	40%	27%	20%	20%	21%	20%	25%
Low	6%	9%	13%	14%	13%	13%	20%
Very Low	9%	19%	21%	32%	21%	21%	33%
Duncan Canal							
High	21%	21%	21%	9%	18%	21%	1%
Moderate	64%	52%	52%	18%	18%	18%	20%
Low	5%	6%	6%	16%	12%	12%	19%
Very Low	11%	22%	22%	58%	52%	49%	59%
Eastern Passage							
High	15%	18%	19%	11%	19%	19%	9%
Moderate	78%	66%	51%	59%	51%	51%	61%
Low	5%	6%	13%	12%	13%	13%	12%
Very Low	2%	10%	17%	18%	17%	17%	18%
Ernest Sound							
High	29%	29%	29%	23%	30%	29%	2%
Moderate	71%	71%	38%	12%	11%	11%	13%
Low	0%	0%	15%	18%	20%	18%	23%
Very Low	0%	0%	18%	47%	39%	42%	63%
Frederick Sound							
High	21%	23%	25%	14%	23%	25%	6%
Moderate	67%	52%	34%	23%	25%	28%	23%
Low	2%	5%	8%	12%	10%	10%	12%
Very Low	10%	21%	33%	52%	42%	37%	59%

Table 3.16-5 (continued)
Estimated Percentage of Selected Viewsheds Classified by Adopted VQOs under Each Alternative [1, 2, 3]

Scenic Integrity Objective	Alternative 1	2	3	4	5	6	7
Hyder/Salmon River Highway							
High	0%	10%	10%	18%	11%	11%	18%
Moderate	100%	85%	85%	57%	83%	83%	57%
Low	0%	0%	0%	0%	0%	0%	0%
Very Low	0%	5%	5%	25%	6%	6%	25%
Icy Strait							
High	47%	49%	49%	27%	48%	49%	26%
Moderate	46%	22%	22%	26%	22%	22%	26%
Low	5%	7%	7%	8%	7%	7%	8%
Very Low	2%	22%	22%	39%	23%	22%	40%
Lynn Canal							
High	32%	33%	33%	32%	34%	34%	32%
Moderate	67%	65%	58%	57%	57%	57%	57%
Low	0%	0%	7%	9%	7%	7%	8%
Very Low	0%	1%	2%	3%	2%	2%	3%
Mendenhall Glacier							
High	34%	34%	34%	34%	55%	34%	34%
Moderate	66%	66%	66%	66%	45%	66%	66%
Low	0%	0%	0%	0%	0%	0%	0%
Very Low	0%	0%	0%	0%	0%	0%	0%
Peril Strait							
High	41%	42%	42%	16%	35%	37%	12%
Moderate	59%	34%	30%	11%	19%	18%	15%
Low	0%	3%	3%	8%	4%	3%	8%
Very Low	0%	22%	25%	64%	43%	41%	65%
Salmon Bay Lake							
High	38%	39%	38%	41%	39%	39%	4%
Moderate	41%	37%	37%	19%	20%	20%	39%
Low	15%	15%	15%	28%	29%	29%	32%
Very Low	6%	10%	10%	12%	12%	12%	25%
Stephens Passage							
High	38%	38%	38%	31%	38%	40%	31%
Moderate	62%	62%	59%	44%	38%	40%	44%
Low	0%	0%	0%	2%	1%	1%	2%
Very Low	0%	0%	3%	23%	23%	20%	23%
Stikine Strait							
High	28%	35%	38%	13%	36%	38%	13%
Moderate	58%	32%	29%	45%	30%	29%	45%
Low	3%	7%	7%	9%	7%	7%	9%
Very Low	11%	26%	27%	33%	27%	27%	33%
Sumner Strait							
High	31%	31%	31%	23%	30%	31%	21%
Moderate	52%	47%	30%	10%	20%	20%	10%
Low	5%	6%	8%	14%	11%	11%	14%
Very Low	12%	16%	31%	54%	40%	39%	55%

Table 3.3.6-5 (continued)
Estimated Percentage of Selected Viewsheds Classified by Adopted VQOs under Each Alternative [1, 2, 3]

Scenic Integrity Objective	Alternative 1	2	3	4	5	6	7
Sweetwater Lake/Honker Divide							
High	69%	69%	69%	50%	63%	63%	21%
Moderate	16%	16%	14%	18%	16%	16%	30%
Low	9%	9%	11%	18%	14%	14%	31%
Very Low	5%	5%	6%	14%	7%	7%	18%
Tenakee Inlet to Tenakee Springs							
High	82%	82%	76%	21%	33%	40%	18%
Moderate	13%	5%	1%	2%	1%	18%	3%
Low	0%	1%	2%	7%	4%	3%	8%
Very Low	4%	11%	22%	69%	62%	39%	72%
West Coast Waterway/Prince of Wales							
High	38%	38%	38%	27%	32%	35%	17%
Moderate	39%	24%	20%	11%	19%	19%	11%
Low	6%	9%	9%	15%	13%	11%	16%
Very Low	17%	29%	33%	48%	36%	35%	56%
Wrangell Narrows							
High	31%	33%	37%	30%	38%	36%	20%
Moderate	60%	48%	41%	45%	40%	41%	53%
Low	9%	16%	18%	21%	18%	18%	22%
Very Low	1%	3%	4%	4%	4%	4%	5%
Zimova Strait							
High	39%	40%	42%	22%	42%	42%	20%
Moderate	42%	29%	19%	33%	19%	19%	36%
Low	10%	10%	15%	21%	15%	15%	21%
Very Low	9%	21%	24%	23%	23%	24%	24%

[1] VQO terms are defined in the *Affected Environment* portion of this section.
[2] The percentages in the table are based on the approximate acres seen from a Visual Priority Travel Route and Use Area. The numbers are not exact and columns may not add correctly due to rounding.
[3] Other includes private lands, municipal watersheds, and National Monuments.

cabins to resorts. In most cases, the effects would be confined to small sites that would be inconspicuous over a landscape. Therefore, much of the area identified as Moderate would be managed as High.

2. The Tongass adopts the High SIO for wildernesses rather than Very High because of the direction in ANILCA; however, the Very High SIO is likely to be achieved in most areas within wilderness.

Behm Canal (West)

Alternatives 4 and 7 would each adopt an SIO of High for approximately 6 percent of the viewshed and an SIO of Low or Very Low for 75 percent of the viewshed (Table 3.16-5). This compares to Alternative 1 which would manage 16 percent with an SIO of High and 36 percent of the viewshed with an SIO of Low or Very Low. Therefore, Alternatives 4 and 7 would have the greatest effect on scenery in the Behm Canal Viewshed, while Alternative 1 would have the least. Effects on scenery under Alternatives 2, 3, 5, and 6 would be intermediate, with 19 to 21 percent managed with an SIO of High and 60 to 61 percent Low or Very Low. In some areas, particularly on the Revella Island side of the Canal, existing harvest has reached or exceeded the level allowed by the adopted SIOs. Additional harvest may need to be reduced or deferred in these areas in the coming decade.

Carroll Inlet

Alternatives 4 and 7 would manage approximately 81 percent of the viewshed with an SIO of Low or Very Low and almost none of it with a High (Table 3.16-5). This compares to Alternative 1 which would manage 14 percent in High and 36 percent in Low or Very Low. Alternatives 2, 3, 5, and 6 have similar distribution of LUDs and thus would result in similar SIO designations, with approximately 12 to 14 percent of the land with an SIO of High and 68 percent with an SIO of Low or Very Low. Therefore, Alternatives 4 and 7 would likely result in the highest level of change in visual condition of the alternatives and Alternative 1 would have the least. Effects on scenery under Alternatives 2, 3, 5, and 6 would be intermediate.

Chatham Strait

Under all of the alternatives except Alternatives 4 and 7, 56 to 59 percent of the Chatham Strait Viewshed would be managed as High SIO (Table 3.16-5). Under Alternatives 4, approximately 47 percent of the viewshed would have an SIO of High and under Alternative 7, 39 percent. Under Alternative 1, 11 percent of the viewshed would be managed with an SIO of Low or Very Low. This compares with 25 percent under Alternative 2, between 35 and 43 percent for Alternatives 3, 4, 5, and 6, and 50 percent for Alternative 7. Therefore, Alternative 7, followed by Alternative 4, would result in the greatest level of change. In some areas, particularly between Peril Strait and Tenakee Inlet, where existing harvest has reached or exceeded the level allowed by the adopted SIOs. Additional harvest may need to be reduced or deferred in these areas in the coming decade.

Cholmondeley Sound

Approximately 90 percent of the viewshed would have an SIO of Low or Very Low under Alternatives 4 and 7, compared to 2 percent under Alternative 1 (Table 3.16-5). Alternatives 2, 3, 5, and 6 would result in 55 to 60 percent in Low or Very Low SIOs. Between 35 and 39 percent of the viewshed would have a High SIO under all alternatives except Alternatives 4 and 7, which would manage 4 percent under a High SIO. Alternatives 4 and 7 would have a much greater effect on scenery than the other alternatives. Alternative 1 would have a much lower level of effects than Alternatives 4 and 7. Effects on scenery under Alternatives 2, 3, 5, and 6 would be intermediate. Under all of the alternatives, most of the outer part of the bay would be in an extensively altered condition due to harvest on private lands.

Clarence Strait

Clarence Strait is a large viewshed, extending along both sides of the strait from its northern end south to Gravinia Island. The viewshed includes portions of the South Etolin Wilderness Area, which would have an SIO of High under all alternatives. While the wilderness has a designated SIO of High, a Very High SIO would likely be achieved. All alternatives except Alternatives 4 and 7 would adopt an SIO of High for 44 to 46 percent of the viewshed (Table 3.16-5). Alternative 4 would adopt an SIO of High for 34 percent of the viewshed, while Alternative 7 would adopt an SIO of High for 22 percent. Alternatives 3, 5, and 6 would result in approximately 34 percent Low or Very Low SIO, compared to 15 percent under Alternative 1 and 28 percent under Alternative 2. Approximately 46 percent of the viewshed would be Low or Very Low under Alternative 4 and 53 percent would be Low or Very Low under Alternative 7. Therefore, Alternative 7 would result in the highest level of change to the viewshed, while Alternative 1 would result in the least. Effects on scenery under Alternatives 2, 3, 5, and 6 would be midway between the two, with slightly lower effects under Alternative 2 than under Alternatives 3, 5, and 6. Effects Under Alternative 4 would be similar, but somewhat lower, than under Alternative 7.

Duncan Canal

All of the alternatives except Alternatives 4 and 7 would adopt an SIO of High for approximately between 18 and 21 percent of the viewshed (Table 3.16-5), due primarily to the Old-Growth LUD located along both sides of the southern end of Duncan Canal. Alternatives 4 and 7 would have 9 and 1 percent High, respectively. Alternatives 5 and 6 would designate 61 to 64 percent as Low or Very Low SIO. Alternatives 2 and 3 would adopt an SIO of Low or Very Low for 28 percent of the viewshed. Alternatives 4 and 7 would have 74 and 78 percent Low or Very Low, respectively, and thus would have the greatest effect on scenery in the viewshed. Alternative 1 would have the least, closely followed by Alternatives 2 and 3. Alternatives 5 and 6 would result in a greater level of change than Alternatives 1, 2 or 3, but a lower level than Alternatives 4 or 7.

Eastern Passage

All alternatives except Alternatives 4 and 7 would adopt an SIO of High for 15 to 19 percent of the viewshed, versus 11 percent under Alternative 4 and 9 percent under Alternative 7 (Table 3.16-5). Alternatives 1 and 2 would adopt an SIO of Low or Very Low for 7 and 16 percent of the viewshed, respectively, compared to 30 percent under Alternatives 3, 4, 5, 6, and 7 (Table 3.16-5). Therefore, Alternatives 1 and 2 would likely result in less change to the visual condition of the viewshed compared to the other alternatives. Alternatives 4 and 7 would likely have a somewhat greater effect on scenery than Alternatives 3, 5, and 6.

Ernest Sound

Under all of the alternatives except Alternatives 4 and 7, 29 or 30 percent of the viewshed would be managed as High SIO (Table 3.16-5), due to the Old-Growth LUD located on the northwestern shore of Cleveland Peninsula. Approximately 23 and 2 percent would have a High SIO under Alternatives 4 and 7, respectively. There would be no Low or Very Low SIOs under Alternatives 1 and 2, compared to 33 percent under Alternative 3, and 59 or 60 percent under Alternatives 5 and 6. Alternatives 4 and 7 would designate 65 and 86 percent as Low or Very Low, respectively. Therefore, Alternatives 1 and 2 would likely result in less change to the visual condition of the viewshed compared to the other alternatives. Alternative 7 would likely have the greatest effect on scenery, and Alternative 4 would likely have the second largest effect after Alternative 7.

Frederick Sound

All of the alternatives except Alternatives 4 and 7 would adopt an SIO of High for approximately 21 to 25 percent of the Frederick Sound Viewshed (Table 3.16-5). Most of the High SIO occurs within a large area of Old-Growth LUD on the northeast shore of Kupreanof Island, as well as several smaller Old-Growth LUDs along the eastern shore of Kupreanof and Mitkof islands. Under Alternatives 4 and 7, approximately 14 and 6 percent would have an SIO of High, respectively. Alternative 4 would adopt an SIO of Low or Very Low for 64 percent of the viewshed, compared to 52 to 47 percent for Alternatives 5 and 6, respectively, 41 percent for Alternative 3, 26 percent for Alternative 2, and 71 percent for Alternative 7. Alternative 1 would adopt an SIO of Low or Very Low for 12 percent of the viewshed, approximately one-sixth the Low and Very Low under Alternative 7 (Table 3.16-5). Alternative 1 would have the least effect on scenery in the viewshed, and Alternatives 4 and, especially, 7 would have the greatest effect on scenery in the viewshed. The other alternatives would be intermediate.

Hyder/Salmon River

All alternatives would all have a moderate effect on scenery in the Hyder/Salmon River viewshed (Table 3.16-5). Alternatives 4 and 7 would likely have a somewhat greater effect on scenery in the viewshed than the other alternatives because they would adopt a Low or Very Low SIO for 25 percent of the viewshed, compared to 0 to 6 percent under Alternatives 1, 2, 3, 5, and 6.

Icy Strait

All of the alternatives except for Alternatives 4 and 7 would adopt an SIO of High for between 47 and 49 percent of the viewshed (Table 3.16-5), due partly to the Wilderness LUDs on Pleasant and Lemesurier Islands and the LUD II and Old-Growth LUD at Point Adolphus. Wilderness areas would have an SIO of High under all alternatives, but would likely achieve an SIO of Very High. The amount of the viewshed with an SIO of High would drop to 27 to 26 percent under Alternatives 4 and 7, respectively. Alternatives 2, 3, 5, and 6 would all adopt an SIO of Low or Very Low for 29 to 30 percent of the viewshed, compared to 7 percent for Alternative 1 and 47 to 48 percent for Alternatives 4 and 7. Alternatives 4 and 7 would have the greatest effect on scenery in the viewshed, while Alternative 1 would have the least. There would be little difference between the other alternatives, which would have effects midway between Alternative 1 and Alternatives 4 and 7. Under all of the alternatives, much of the south shore of the strait would be in an altered condition due to harvest on private lands.

Lynn Canal

Scenic effects within the Lynn Canal Viewshed would be very similar under all of the alternatives (Table 3.16-5). All alternatives would adopt an SIO of High for approximately one-third of the viewshed, due primarily to the large Remote Recreation LUD on the east side of Lynn Canal. All of the alternatives would have relatively low percentages of land with an SIO of Low or Very Low, with less than 2 percent for Alternatives 1 and 2 and 9 percent for Alternatives 3, 5, and 6. Alternatives 4 and 7 would have 11 to 12 percent of land with a Low or Very Low SIO (Table 3.16-5). Therefore, while all alternatives would have a moderate effect on scenery in the viewshed, Alternatives 1 and 2 would result in a somewhat lesser change to the scenery that the other alternatives.

Mendenhall Glacier

The effects of all of the alternatives on the Mendenhall Glacier Viewshed are similar for all alternatives except Alternative 5 (Table 3.16-5). Over half the viewshed would have an SIO of High, while the remainder would be Moderate under Alternative 5 (No Action). In contrast, all of the action alternatives would adopt an SIO of High for 34 percent of the viewshed and a Moderate for 66 percent (Table 3.16-5). All the alternatives have a large Remote Recreation LUD located north of Taku Inlet, with most of the remaining viewshed designated as Semi-Remote Recreation. Under Alternative 5, the Remote Recreation LUD is larger, extending further to the west, resulting in 55 percent of the viewshed managed as High SIO, compared to 34 percent for the other alternatives. As noted above, Semi-Remote Recreation LUDs generally achieve an SIO of High, making Alternative 5 almost identical to the other alternatives in terms of effects on scenery.

Peril Strait/Neva-Olga Strait/Sitka

Approximately 35 and 42 percent of the viewshed would be have an SIO of High under all alternatives except Alternatives 4 and 7, which would adopt an SIO of High for 16 and 12 percent of the viewshed, respectively (Table 3.16-5). Approximately three-fourths of the viewshed would have an SIO of Low or Very Low under Alternatives 4 and 7, compared to 0 percent for Alternative 1, 25 percent for Alternative 2, 28 percent for Alternative 3, 47 percent for Alternative 5, and 44 percent under Alternative 6. Therefore, the effects on scenery would be lowest under Alternative 1, followed by Alternatives 2 and 3, and then Alternatives 5 and 6. The level of change would be greatest under Alternatives 4 and 7. Existing harvest in a few areas (particularly the Sitkoh Bay/False Island areas) may have reached or exceeded the level allowed by the adopted SIOs. Site-specific analysis may indicate that even-aged harvest may need to be reduced or deferred in these areas for the next decade.

Salmon Bay Lake
Between 38 and 41 percent of the viewshed would have an SIO of High under all alternatives except Alternative 7, which would adopt an SIO of High for 4 percent of the viewshed (Table 3.16-5). Alternatives 1, 2, and 3 would adopt an SIO of Low or Very Low for 21 to 25 percent of the viewshed, Alternatives 4, 5, and 6 would adopt an SIO of Low or Very Low for 40 to 41 percent of the viewshed, and Alternative 7 would adopt an SIO of Low or Very Low for 57 percent, and would have the greatest effect on scenery in the viewshed.

Stephens Passage
All of the alternatives except Alternatives 4 and 7 would adopt an SIO of High for 38 to 40 percent of the viewshed (Table 3.16-5), due in part to the Wilderness/National Monument LUDs, which include portions of the Admiralty Island National Monument and the Tracy Arm Ford's Terror Wilderness Area. These areas would have an SIO of High under all alternatives but would likely achieve an SIO of Very High. Alternatives 4 and 7 would adopt an SIO of High for 31 percent of the viewshed. Alternatives 1 to 3 would adopt an SIO of Low or Very Low for between 0 and 3 percent of the viewshed, while Alternatives 4, 5, 6, and 7 would have between 21 and 25 percent. Alternatives 4 and 7, followed closely by Alternatives 5 and 6, would have the greatest effect on scenery, while Alternatives 1 to 3 would have the least.

Stikine Strait
All alternatives except Alternatives 4 and 7 would adopt an SIO of High for between 28 and 38 of the viewshed (Table 3.16-5). Alternatives 4 and 7 would adopt an SIO of High for 13 percent. Alternative 1 would adopt an SIO of Low or Very Low for 14 percent of the viewshed, while Alternatives 3, 5, and 6 would have 33 percent and Alternatives 4 and 7 would have 42 percent. Therefore, Alternative 1 would have the least effect on scenery, and Alternatives 4 and 7 would have the most; Alternatives 3, 5, and 6 would have an intermediate level of effects on scenery.

Sumner Strait
The Sumner Strait Viewshed includes portions of the Kuiu Wilderness and the Mt. Calder/Mt. Holbrook and Salmon Bay LUD II areas. These areas would have an SIO of High under all alternatives but would likely achieve an SIO of Very High. All alternatives except Alternatives 4 and 7 adopt an SIO of High for between 30 and 31 percent of the Viewshed (Table 3.16-5). Alternatives 4 and 7 would adopt an SIO of High for 23 and 21 percent, respectively. Alternatives 4 and 7 would adopt an SIO of Low or Very Low for between 68 and 69 percent of the viewshed, compared to 50 to 51 percent for Alternatives 5 and 6, 39 percent for Alternative 3, and 17 to 22 percent for Alternatives 1 and 2 (Table 3.16-5). Therefore, Alternatives 4 and 7 would have the greatest effect on scenery and Alternative 1 would have the least, closely followed by Alternative 2, and then by Alternatives 3, 5, and 6, in that order.

Sweetwater Lake/Honker Divide
All alternatives except Alternative 4 and 7 would adopt an SIO of High for between 63 and 69 percent of the viewshed (Table 3.16-5). Alternatives 1, 2, and 3 would adopt an SIO of Low or Very Low for between 14 and 17 percent of the viewshed, while Alternatives 5 and 6 would adopt an SIO of Low or Very Low for 21 percent of the viewshed. Alternative 4 would adopt an SIO of High for 50 percent and an SIO of Low or Very Low for 32 percent. Alternative 7 would adopt an SIO of High for 21 percent of the viewshed and a Low or Very low for 49 percent. Therefore,

Alternative 7 would have the greateest effect on scenery in the viewshed, while Alternatives 1, 2, and 3 would have the least, followed closely by Alternatives 5 and 6. Effects under Alternative 4 would be between those under Alternatives 5 and 7.

Tenakee Inlet to Tenakee Springs

This viewshed contains the Trap Bay and Kadashan LUD II areas, which have an SIO of High under all alternatives (Table 3.16-5). The viewshed also contains land designated as Research Natural Area and Wild River LUDs, which also have a High SIO under all alternatives. Alternatives 1, 2, and 3 would adopt an SIO of High for between 76 and 82 percent of the viewshed and an SIO of Low or Very Low for between 4 and 24 percent of the viewshed, while Alternatives 5 and 6 would adopt an SIO of High for 33 to 40 percent and an SIO of Low or Very Low for 66 and 42 percent, respectively. Alternative 4 would adopt an SIO of High for 21 percent and an SIO of Low or Very Low for 76 percent. Alternative 7 would have the least area with an SIO of High (18 percent) and 80 percent with an SIO of Low or Very Low. Therefore, Alternative 7 would have greatest effect on scenery in the viewshed, while Alternative 1 would have the least, followed closely by Alternative 2 and then by Alternative 3.

West Coast Waterway/Prince of Wales

This viewshed contains the Mt. Calder/Mt. Holbrook LUD II area, which would have an SIO of High under all alternatives. All alternatives except Alternatives 4 and 7 would adopt an SIO of High for between 32 and 38 percent of the viewshed, while Alternatives 4 and 7 would adopt an SIO of High for 27 and 17 percent, respectively (Table 3.16-5). Alternatives 2, 3, 5, and 6 would adopt an SIO of Low or Very Low for between 38 and 49 percent of the viewshed. Alternative 1 would have 23 percent of the viewshed in the Low and Very Low SIOs. Alternative 4 would adopt an SIO of Low or Very Low for 63 percent of the viewshed and Alternative 7 for 72 percent. Therefore, Alternative 7 would have a greatest effect on scenery in the viewshed, while Alternative 1 would have the least. Alternatives 2, 3, 5, and 6 would be midway between Alternatives 1 and 7 in terms of the degree of change to scenery in the viewshed, while Alternative 4 would be close to Alternative 7.

Wrangell Narrows

All alternatives except Alternative 7 would adopt an SIO of High for between 30 and 38 percent of the viewshed (Table 3.16-5). Alternative 7 would adopt an SIO of High for 20 percent of the viewshed. Alternative 1 would adopt an SIO of Low or very Low for 10 percent of the viewshed, compared to between 19 and 27 percent for the other alternatives. Alternative 7 would have a somewhat greater effect than the other alternatives. A small portion of the viewshed would be in the Petersburg Municipal Watershed LUD where SIOs would be determined on a case-by-case basis for any projects proposed in the watershed.

Zimova Strait

All alternatives except Alternatives 4 and 7 would adopt an SIO of High for 39 to 42 percent of the viewshed (Table 3.16-5). Alternatives 4 and 7 would adopt an SIO of High for 22 and 20 percent of the viewshed, respectively. Alternative 1 would have the least land with an SIO of Low or Very Low (19 percent). Alternatives 2, 3, 5, and 6 would designate 31 to 39 percent as Low or Very Low, compared to 44 to 45 percent for Alternatives 4 and 7. Alternative 1 would have the least effect, followed by Alternatives 2, 3, 5, and 6, which are very similar. Alternatives 4 and 7 would have the greatest effect.

Subsistence

Affected Environment

Subsistence hunting, fishing, trapping, and gathering activities are a major focus of life for many Southeast Alaska residents. Some individuals participate in subsistence activities to supplement personal income and provide needed food. Nearly all rural Alaska communities depend on subsistence resources to meet some portion of their nutritional needs (Wolfe 2000). Others pursue subsistence activities to perpetuate cultural customs and traditions. Still others participate in subsistence activities for reasons unconnected with income or tradition. For all these individuals, subsistence is a lifestyle reflecting deeply held attitudes, values, and beliefs.

Within the context of Southeast Alaska's seasonal and cyclical resource-based employment, subsistence harvest of fish and wildlife resources takes on special importance. The use of these resources may play a major role in supplementing cash incomes during periods when the opportunity to participate in the wage economy is either marginal or nonexistent. Because of high prices of commercial products provided through the retail sector of the cash economy, especially in remote communities, the economic role of locally available fish and game takes on added importance.

Native and non-Native communities both have high subsistence participation rates and rely heavily on wild foods, with approximately 86 percent of rural Alaska households using wild game and 95 percent using fish (Wolfe 2000). The opportunity to participate in subsistence activities reinforces a variety of cultural and related values in both Native and non-Native communities. For example, the distribution of harvested fish and wildlife contributes to the cohesion of kinship groups and community stability through the sharing of resources. Subsistence resources provide the foundation for Native culture, forming the basis for different clans and potlatch ceremonies, as well as reinforcing basic values of respect for the earth and its resources. Participating in subsistence activities contributes to the self-reliance, independence, and ability to provide for oneself; values that social surveys indicate are important reasons why many non-Native people emigrate to or remain in Southeast Alaska (USDA Forest Service 1997a).

The Legal Context for Subsistence Use

While there are a variety of cultural, popular, and sociological definitions and interpretations of subsistence, Congress addressed this subject in Title VIII of the 1980 Alaska National Interest Lands Conservation Act (ANILCA). Section 803 of ANILCA defines subsistence use as:

> "the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal, or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade."

ANILCA provides for "the continuation of the opportunity for subsistence uses by rural residents of Alaska, including both Natives and non-Natives, on the public lands." It also states, in part, that "customary and traditional" subsistence uses of renewable resources "shall be the priority consumptive uses of all such resources on the public lands of Alaska."

The provisions in ANILCA established a harvest priority for rural residents in an attempt to protect subsistence resource harvest. Under ANILCA, in times of resource scarcity or when demand exceeds biologically sound harvest levels, subsistence harvests have priority over other consumptive use of resources. In practice, this meant that commercial, sport, or other harvests were to be curtailed by state or federal fish and wildlife management authorities before subsistence harvests were limited. The Alaska legislature subsequently passed a regulation to comply with ANILCA, but in 1989, the Alaska Supreme Court ruled in McDowell v. State of Alaska that a harvest priority for rural residents conflicted with the state constitution, which guarantees all Alaskans equal access to the state's natural resources. This ruling took the state out of compliance with ANILCA and the federal government has managed subsistence resources on federal lands in Alaska since 1990. As a result, subsistence harvests of fish and wildlife on the Tongass National Forest are presently managed by the Forest Service (Schroeder and Mazza 2005).

ANILCA requires the analysis of the potential effects on subsistence uses of all actions on federal lands in Alaska. This analysis most commonly focuses on those food-related resources most likely to be affected by habitat degradation associated with land management activities. Three factors related to subsistence uses are specifically identified by ANILCA: 1) resource distribution and abundance, 2) access to resources, and 3) competition for the use of resources. These factors are discussed in general terms in the following paragraphs.

Abundance and Distribution

Southeast Alaska subsistence resources include terrestrial wildlife (including deer, moose, mountain goat, black and brown bear, furbearers, and small game), waterfowl (including ducks, geese, and seabirds), marine mammals (harbor seal), salmon, other finfish, marine invertebrates, plants, and firewood. The abundance and distribution of these resources on the Tongass is described in the 1997 Land Management Plan Revision Final EIS, as well as in other sections of this EIS.

Access

Road building, a byproduct of timber harvesting and, to a much lesser extent, mining, is an important agent of change in Southeast Alaska. These road networks provide greater access to areas previously unconnected and can affect subsistence both positively and negatively by providing access, dispersing hunting and fishing pressure, and creating the potential for increased competition. On Prince of Wales

Island, for example, areas that have become road-connected are now more easily reached through the ferry system, thus providing greater access from Ketchikan, one of the largest cities in the region. While road systems tend to bring more people into an area, they also give subsistence hunters access to previously remote regions and provide a greater opportunity for subsistence harvest.

Southeast Alaska is comprised of isolated islands unconnected by road systems; however, with the transportation means available (floatplanes, ferry systems, automobiles, boats), Southeast Alaska residents are very mobile in their subsistence resource use activities. Wrangell, the fifth largest community in Southeast Alaska, has documented their subsistence gathering from the southern tip of Prince of Wales Island to Yakutat, covering most of the islands in between (Kruse and Muth 1990).

Competition

The Tongass National Forest, with nearly 17 million acres of largely undeveloped land, includes extensive subsistence resources. These resources are not, however, distributed or used evenly across the Forest. Where the resources are confined to island groups or river systems and access is costly or nonexistent, use of the resources is low. Where the resource is abundant, and a community is present but access by other communities is costly, the resource tends to be used primarily by the community that resides in the area. Where resources are abundant and access is available to local and other communities of Southeast Alaska, competition for resources may exist.

Increased competition may result when less expensive access to the area or within the area is provided. Such is the case when road systems are established to local communities. When areas historically not used for subsistence purposes are made available because of easier, more cost-effective access, the new area then tends to be used. When communities with road access to abundant resources are connected to the ferry systems or to commercial air services, competition for the resources may be generated from outside communities with lower abundance of the same resource.

Examples of the effect of ease of access are readily available in Southeast Alaska. Chichagof Island, Prince of Wales Island, and the Yakutat Forelands at one time were isolated portions of the Tongass with limited use from communities in the vicinity. Today, road construction, primarily a result of timber harvest activities, has created relatively large areas that are easily accessed from local communities. Access provided by the ferry systems and small commuter planes to Chichagof and Prince of Wales Islands allows relatively easy access from off-island communities. Access to the Yakutat Forelands has been made easier because of commercial jet service and ferry service to the community of Yakutat.

The Southeast Alaska Federal Subsistence Regional Advisory Council noted an increased use of subsistence resources in the 1990s, and recommended decreases in harvest of deer, moose, and other wildlife species for non-rural residents. Competition for these resources typically increases with growth in the regional population and changes in access, such as the addition of new ferry services.

Subsistence Users

Under ANILCA only rural Alaska residents qualify for subsistence hunting and fishing on federal lands. Alaska residents living in urban areas can harvest under sport, personal use, or commercial regulations, but not under subsistence regulations. Following the Alaska Supreme Court's 1989 ruling in McDowell v. State of Alaska, all Alaska residents qualify as subsistence users on state lands with federal lands continuing to be managed under ANILCA.

In 2005, Southeast Alaska had an estimated population of 70,800, with the majority (about 91 percent) living in 32 established communities (Alaska Department of Labor [DOL] 2006). About 63 percent of the area's population lived in the city and borough of Juneau or Ketchikan Gateway Borough, the only two communities considered as urban areas for subsistence purposes. An additional 24 percent of the area's population resided in the communities of Sitka, Petersburg, Wrangell, Haines, and Craig. The remaining 13 percent of the population lived in communities ranging in size from Meyers Chuck with 15 people to Metlakatla with 1,342 people (Alaska DOL 2006).

In addition to permanent communities, there are a small number of logging camps across the Tongass National Forest that, in the past, were large enough and existed long enough to have had an effect on local uses of fish and wildlife. Currently, the remaining camps have few residents and do not have much effect on competition for resources.

A relatively small number of Southeast Alaska residents live at remote isolated locations. These include people living at homesites throughout Southeast Alaska, at summer fishing sites along the outer coast, tree thinners camped near areas where they have Forest Service contracts, trappers, and people living on floathouses and fishing boats. This diverse group is typically transient, generally has very low cash income, and is closely tied to non-commercial harvest of fish, game, and other renewable natural resources.

As in other parts of Alaska, Southeast Alaska's population grew with the expansion of government services following the oil boom. A number of new communities evolved around State land selections or timber harvesting activities in the 1980s and 1990s. Edna Bay, Coffman Cove, North Whale Pass, Thorne Bay, and other small Prince of Wales Island communities are examples. The population in Southeast Alaska increased in the 1990s, but has decreased since 2000, with approximately 2,300 fewer people living in the region in 2005 than in 2000 (Alaska DOL 2006).

Alaska Natives made up 17 percent of the region's population in 2000 and comprised about 23 percent of the total population of Southeast Alaska's 30 rural communities in 2000 (Figure 3.17-1). These rural communities include places that are predominately Native, such as Angoon, Hydaburg, and Metlakatla, other logging and fishing communities that may be predominately non-Native, and places with more mixed ethnicity. The Bureau of Indian Affairs identifies 17 localized Indian tribes in the region, including the Metlakatla of the Annette Island Reserve. At the time of contact, tribes occupied seasonal camps and temporary villages throughout traditional territories. In the late 1800s, the individual tribes of the region coalesced at what had been their winter villages. The area's extant tribes live within their earlier territories and use a similar set of subsistence resources and in this way maintain long standing ties to place. For Native people, this tie to place and the harvest and use of traditional foods are key elements in fostering Native cultural identity (Alaska Native Heritage Center 2000).

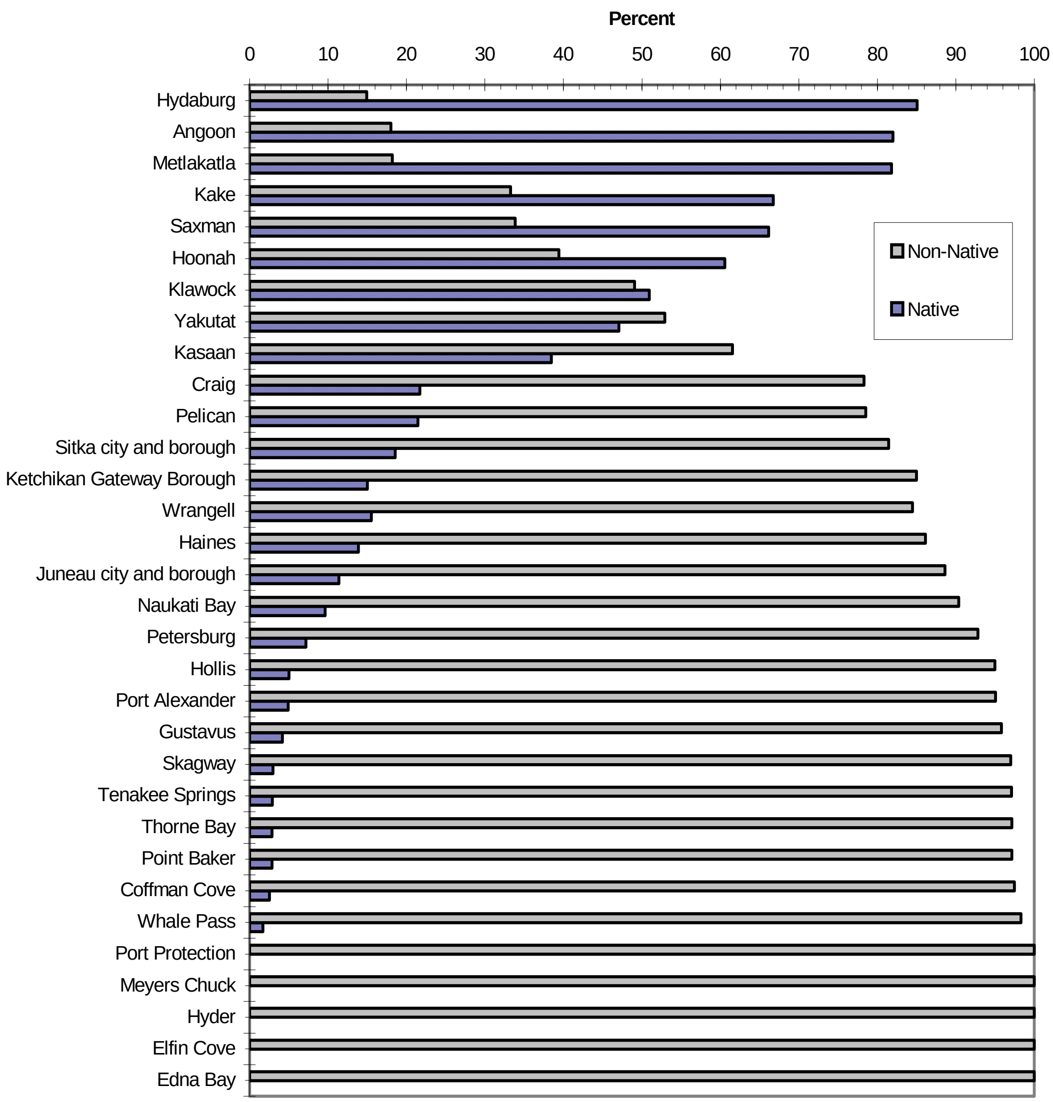
Economy

Subsistence use of fish and wildlife continues to be an important component of the economies of Southeast Alaska communities. In Native communities, harvest and use of wild resources supported the subsistence-based economy that predated the introduction of cash income. In the modern era, beginning in the late-1700s, the economies of Native communities have undergone a progressive transformation, incorporating cash income into the subsistence-based system. Southeast Alaska communities that were settled primarily by non-Native immigrants have also depended on a mix of subsistence use of wild resources and cash income.

Cash income in most Southeast Alaska rural communities is limited and intermittent, and frequently supports the purchase of fuel and equipment that are part of subsistence harvest technology. Subsistence harvests have been found to fill essential food needs in most rural communities in the region. These harvests are also customarily shared among community residents and between members of different communities. Some subsistence products are traded and bartered within the region. Subsistence harvests are not geared toward market sale or commercial profit. A mixed subsistence-market economy in which subsistence harvests and cash income are complementary characterizes the economies of most of the region's rural communities (Wolfe 2004).

Subsistence research conducted in Southeast Alaska over the past two decades has included detailed community studies, use area mapping, household surveys, and studies of specific subsistence harvests. During the 1980s, the Forest Service supported research that examined the impacts of timber harvests in the Tongass National Forest on subsistence resources in the area. The Tongass Resource Use Cooperative Survey (TRUCS) was completed in 1988 and followed by the Tongass Subsistence Studies. Data from TRUCS are summarized in the 1997 Tongass Land Management Plan Revision Final EIS.

Figure 3.17-1
Native/Non-Native Components of Southeast Communities, 2000



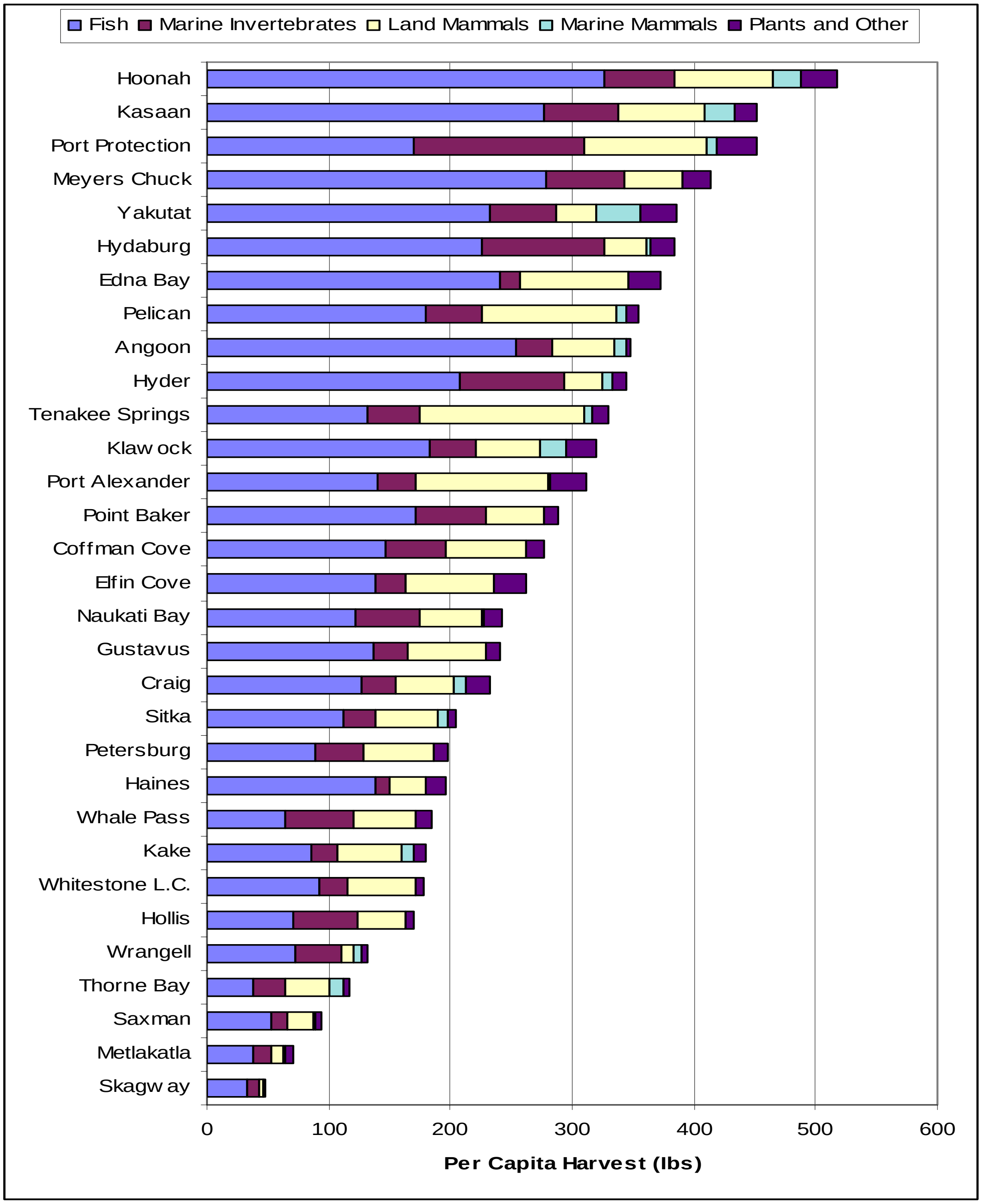
Source: U.S. Census Bureau 2001.

From 1987 to 2001, interviews were conducted with 1,064 households in 24 Southeast Alaska communities as part of the Forest Plan subsistence administrative studies. This fieldwork was conducted cooperatively with the Forest Service, Alaska Department of Fish and Game (ADF&G), and the area's tribes and communities all participating. Summary data from this and past community harvest assessments were compiled from the ADF&G Subsistence Community Profile Database (www.state.ak.us) and harvest levels are presented by community and species in Figure 3.17-2. The data presented in Figure 3.17-2 are the most recent available in the ADF&G database. The year these data were collected does, however, vary by community and the data summarized in Figure 3.17-2 should be considered a general overview of harvest patterns rather than an exact representation of current harvest activities.

The preliminary findings of this research are summarized in a recent unpublished paper by Schroeder and Mazza (2005) who identify a number of key subsistence characteristics that are evident in these data and generally consistent with the following past findings:

- Wild foods account for a large share of the diet for residents of the studied communities, ranging from 48 pounds per capita for Skagway in 1986 to over 500 pounds per capita for Hoonah in 1996 (see Figure 3.17-2). The average American diet includes about 225 pounds of meat, fish, and poultry on a per capita basis. In most of the study communities, wild foods came close to, or exceeded, this national average. Although residents of subsistence communities purchase food, most could meet their entire protein need from wild sources.
- Marine resources, including fish, mammals, and plants, comprise the majority of subsistence harvests in all communities when measured by food weight. Marine resources account for more than half of total per capita harvest in all Southeast Alaska communities, ranging from 55 percent in Tenakee Springs to 89 percent in Wrangell (Figure 3.17-2). As a result, management activities that restrict access for subsistence harvest of land mammals have had a relatively small effect on overall subsistence harvest by weight.
- Recent subsistence harvest levels in the main Native communities and the larger non-Native communities appear very similar to harvest levels estimated in the late 1980s or before. Harvest levels identified in the recent assessments conducted in Angoon, Hoonah, Hydaburg, Kake, Petersburg, Wrangell, and Yakutat, for example, are very similar to those identified in earlier studies. In a few communities, such as Coffman Cove, Kasaan, Klawock, and Port Protection, there are large differences in harvest levels over time. However, these differences seem to be more influenced by special events or small community sizes than by patterned changes in subsistence harvests.
- Subsistence harvest levels vary considerably from community to community. Recent research and other data suggest that intercommunity variability may not be fully explained by ethnicity, income, community size, or access to resources. Other factors, such as community demographic composition, cultural traditions and orientations, and community history, may have a larger influence on harvest levels than more easily analyzed standard socioeconomic variables.
- Subsistence harvesters use a wide variety of species, but use tends to be concentrated on a relatively small number of species. In Yakutat, for example, individual subsistence harvesters use as many as 65 of the 150 different species that are harvested in the community, but 84 percent of overall community harvest (in food weight) involves just 10 species. That said, the contribution of a particular species to the total subsistence harvest generally appears to vary from year to year, although the overall total harvest in food weight may remain nearly constant.

Figure 3.17-2
Per Capita Subsistence Harvest by Community and Resource Type



Note:
The year these data were collected varies by community, as follows:
1987: Elfin Cove, Gustavus, Hyder, Metlakatla, Meyers Chuck, Pelican, Petersburg, Port Alexander, Saxman, Skagway, Tenakee Springs, and Wrangell
1996: Angoon, Haines, Hoonah, Kake, Point Baker, Port Protection, Sitka, and Whitestone Logging Camp
1997: Craig, Hydaburg, and Klawock
1998: Coffman Cove, Edna Bay, Hollis, Kasaan, Naukati Bay, Thorne Bay, and Whale Pass
2000: Yakutat
Source: ADF&G 2006

- A small number of high harvesting households account for a disproportionate share of the total community harvest and tend to harvest more fish and wildlife than their family members can consume. The surplus is distributed to other subsistence users through a kinship network and through barter and trade. These networks are also used to distribute specialty subsistence products such as herring roe and hooligan oil, which are produced in large quantities in only a few communities. In Yakutat, for example, just 25 percent of subsistence households account for about 75 percent of total community subsistence harvest (in terms of food weight), with the lowest harvesting 50 percent of households taking just 8 percent of the total community harvest.

Subsistence Use Areas

Historically, subsistence use occurred where access to the resources cost less in energy than the resources gathered. Many of the gathering activities occurred in easily accessible areas. These activities occurred close to settlements where they could be accessed by foot or boat. Over time, as new technology developed, ease of access meant a movement outward into new resource use areas. The motorboat and development of road systems associated with timber harvest activities in Southeast Alaska have had perhaps the greatest influence on subsistence gathering activity. Today, all communities use motorized boats and many are tied to nearby lands by road systems. As new roads are developed, access is improved to a number of areas and subsistence use has moved to these areas.

The distribution of subsistence harvest activity is described in further detail in the 1997 Tongass Land Management Plan Revision Final EIS, with traditional household deer hunting areas mapped in Appendix H. These areas were identified based on the 1987 TRUCS (Kruse and Muth 1990). The traditional household deer hunting areas mapped in Appendix H show that the road systems are extensively used. This is particularly true on Prince of Wales Island. These maps also show that subsistence use is concentrated in close proximity to individual communities and along the beaches.

Each of the communities in Southeast Alaska has a distinct home range with concentrated use occurring within this range. A wide range of use typically occurs on a less concentrated scale outside the normal home range. More than half (54 percent) of all households surveyed in rural Southeast Alaska in 1987 traveled a minimum of 11 miles by boat to reach the one reliable deer hunting area that they chose to describe in TRUCS (Kruse and Muth 1990). An additional 18 percent of all households also used boats to reach their reliable deer hunting area, but traveled shorter distances (10 miles or less). Only 15 percent of all households used cars or trucks to travel to the most reliable areas. Thirteen percent used some other form of transportation, such as airplanes, walking, all-terrain vehicles, and the Alaska Marine Highway System (Kruse and Muth 1990).

While the majority of use occurs within about a 15-mile radius of rural communities, nearly all of the forested lands of the Tongass are used to some degree for subsistence deer hunting (USDA Forest Service 1997a). Appendix H in the 1997 Tongass Land Management Plan Revision Final EIS also displays, by community, the individual Wildlife Analysis Areas where approximately 75 percent of the average annual deer harvest occurred.

Kruse and Muth (1990) found that nearly one-half of the households harvesting deer mentioned the existence of clearcuts of various ages occurring in presently reliable areas (44 percent), most-often-used areas (48 percent), and areas no longer used (55 percent). They also reported that old-growth forests were mentioned as most reliable by 90 percent of households harvesting deer, were most-often-used areas by 91 percent of households, and were areas no longer used by 90 percent of those households harvesting deer.

Many of the fish and wildlife resource values of Southeast Alaska watersheds, based on the Value Comparison Unit (VCU) classification of the Tongass, are summarized in the 1998 Tongass Fish and Wildlife Resource Assessment (ADF&G 1998). This report shows the relative value of areas for black bear, brown bear, deer, sport fishing, salmon production, and subsistence use. This resource assessment also included a ranking of the VCUs that have the highest community use values.

Environmental Consequences

The analysis of the likely effects of the EIS alternatives on subsistence resources and uses is in two parts. Effects on subsistence resources and uses important to each rural community are discussed individually by community in the *Subregional Overview and Communities* section. Here, the Forest-wide evaluation is presented, based on general considerations in the three categories of effects previously identified: abundance and distribution, access, and competition. This general analysis relies on the community discussions and also on the Forest-wide effects analyses from the related resource sections (primarily *Fish* and *Wildlife*) where abundance and distribution are of concern.

Section 810 of ANILCA requires the Forest Service, in determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of NFS lands in Alaska, to evaluate the potential effects on subsistence uses and needs, followed by specific notice and determination procedures should there be a significant possibility of a significant restriction of subsistence uses. The Alaska Land Use Council's definition of "significantly restrict subsistence use" is one guideline used in the evaluation:

> "A proposed action shall be considered to significantly restrict subsistence uses, if after any modification warranted by consideration of alternatives, conditions, or stipulations, it can be expected to result in a substantial reduction in the opportunity to continue subsistence uses of renewable resources."

It should be noted that the term "significant" as used in this context does not have the same definition as used in the implementing regulations for NEPA. See 40 CFR Section 1508.27 for definitions of "significant" in a NEPA context.

Considerations of abundance and distribution, access, and competition (by non-rural residents) are mentioned.

The U.S. District Court Decision of Record in *Kunaknana v. Watt* provided additional clarification. In part it states:

> "restrictions for subsistence uses would be significant if there were large reductions in abundance or major redistribution of these resources, substantial interference with harvestable access to active subsistence-use sites, or major increases in non-rural resident hunting."

Direct and Indirect Effects

Abundance and Distribution

Based on the 1987 survey information compiled as part of TRUCS, 61 percent of subsistence resources (by weight) are fish or marine invertebrates, 21 percent are deer, 4 percent are other land mammals, and another 3 percent are marine mammals. More recent community data compiled by ADF&G (2006) indicate that fish and marine invertebrates still comprise the majority of subsistence harvest per capita (in pounds), ranging from 53 percent in Tenakee Springs to 88 percent in Skagway (see Figure 3.17-2).

The subsistence analysis conducted for the 1997 Forest Plan Revision Final EIS found that the primary subsistence resource likely to be significantly affected by the alternatives was Sitka black-tailed deer. Some effects to fish habitat may also result from land management activities, but the magnitude of the effects could not be calculated. Risk to fish habitat is generally expected to increase with increased timber harvest, increased roading, and narrower riparian areas along streams. A panel evaluation of alternatives was conducted for the 1997 Final EIS. Alternative 11, which essentially represents the adopted Forest Plan (Alternative 5 [No Action] in this EIS), was judged to have relatively low risk relative to the other alternatives.

As a result of their association with old-growth forest habitat, which is the main terrestrial habitat type affected by the alternatives, deer are considered the “indicator” for potential subsistence resource consequences concerning the abundance and distribution of the resources. The community-based subsistence analysis (see the *Subregional Overview and Communities* section) focuses largely on deer, which is, in most cases, by far the largest terrestrial component of subsistence food resources.

In the subsistence analysis in the 1991 Forest Plan Revision Supplemental Draft EIS (SDEIS), it was determined that at that time all of the Forest Plan alternatives, if implemented, could result in a significant restriction on the abundance and/or distribution of subsistence uses of Sitka black-tailed deer, brown bear, and marten sometime during the next 50 years. This conclusion was based on an analysis of the current status of huntable wildlife resources, and identified portions of the Tongass where such restrictions may already be occurring (i.e., were the result of existing conditions) (USDA Forest Service 1991, pp. 3-762 and 3-763). The unpublished 1992 Draft Final EIS reached the same conclusion for deer and brown bear. Such restrictions were most likely for communities with subsistence use areas in the northern portion of the Tongass (Chichagof and Baranof Islands, primarily). The Revised SDEIS came to the same conclusion in its analysis for deer.

In the 1997 Forest Plan Revision Final EIS, hunting demand and huntable populations of wildlife were only re-examined for Sitka black-tailed deer. Using a revised habitat capability model, the new deer analysis reached similar conclusions to that of the Revised SDEIS, based on specific areas where recent deer harvests are high relative to deer habitat capability. (This analysis was summarized at the end of the affected environment portion of the *Wildlife* section of the 1997 Forest Plan Revision Final EIS; see also Iverson 1996.) This analysis identified seven areas (near Juneau, Hoonah, Sitka, and Craig/Klawock) where current deer harvests exceeded 20 percent of the estimated habitat capability. This analysis also found another 23 areas exceeding 10 percent of capability (four on Admiralty, five on Chichagof, four on Baranof, eight on Prince of Wales, and two near Ketchikan). Areas exceeding 20 percent are those where deer harvest may be restricted, either directly through restrictions in seasons and bag limits, or indirectly through reduced hunter efficiency and increased difficulty in obtaining deer relative to historical rates. Hunters in areas between 10 to 20 percent may experience reduced hunter efficiency and moderate difficulty in obtaining deer. This analysis may underestimate negative effects when deer populations are below carrying capacity. Adverse effects to deer hunters may be further amplified with either reductions in deer habitat capability or increases in deer demand/harvest or both.

The 1997 deer analysis was much in line with the earlier (1991, 1992, and 1996) analyses, which also used the 10 and 20 percent harvest cutoffs and the same land units. It indicated that deer habitat capabilities in several portions of the Tongass may not be adequate to sustain the current levels of deer harvests, and that implementation of any Forest Plan alternative could, therefore, be accompanied by a significant possibility of a significant restriction on the abundance and/or distribution of subsistence uses of deer. (Sport hunting restrictions would, however, occur first, followed by selective subsistence reductions, based on ANILCA Section 804.) This possibility, at least in the short term, is largely due to the continuation of reduced habitat capabilities resulting from past habitat alterations, which is why it applied to all alternatives.

Under the alternatives analyzed in this EIS, the possibility of a significant restriction, resulting from a change in abundance or distribution, would be the same as or less than the possibility under Alternative 11 of the 1997 Forest Plan Revision Final EIS for five of the seven alternatives. This risk would, however, likely be higher under Alternatives 4 and 7 because these alternatives anticipate a higher level of timber harvest than the current Forest Plan (Alternative 5, No Action). It should be noted that actual timber harvest has been much lower under the current Forest Plan than the levels projected under Alternative 11.

In the short term, the risk of a significant restriction would be about the same under any of the alternatives because the effects of past harvest would override the effects of new harvest during the next 10 years. In the long term, those alternatives that limit the areas available for future timber harvesting the most would result in the largest reduction in risk.

Alternatives 5 and 6 would result in a similar possibility of a significant restriction relative to Alternative 11 of the 1997 Final EIS because they would not produce a substantial change in old-growth harvest rates relative to the that Forest Plan. Development LUD acreage under Alternative 5 is about 3 percent less than under Alternative 11 of the 1997 Final EIS and Alternative 6 would have about 7 percent fewer acres in development LUDs. These reductions are due to land adjustments that have occurred since 1997 and, in the case of Alternative 6, increases in the acreage of land in old-growth reserves and other non-development LUDs. Alternative 6 would have 4 percent fewer acres in development LUDs than Alternative 5, which is the 1997 Forest Plan, as amended. Alternatives 1, 2, and 3 would reduce the possibility of a significant restriction because of a 67, 46, and 18 percent reduction, respectively, in development LUD acreages compared with Alternative 5. Alternatives 7 and 4 would each result in an increase in the possibility of a significant restriction due to respective increases in development LUD acreages of 40 percent and 31 percent relative to Alternative 5.

Access

Subsistence users typically hunt and fish in traditional areas surrounding their communities. Many of the communities in Southeast Alaska are not located on the Alaska road system and tend to be compact, centralized places surrounded by undeveloped land with limited infrastructure. Most subsistence food production is supported by a central or core use area surrounding a community. Traditional household deer hunting areas are identified for the 32 communities in Southeast Alaska in Appendix H to the 1997 Forest Plan EIS. Access to and use of surrounding areas for subsistence activities may be guided by local customary rules, as well as federal and state regulation and economic considerations, with traditional use areas for different communities often overlapping at their margins. Customary rules guiding subsistence harvest may be related to local histories and social customs of clans and communities (Wolfe 2004).

Forest plans are programmatic, meaning that they establish direction and allowable activities for broad land areas, rather than schedule specific activities in specific locations. This makes it difficult to evaluate the effects of the alternatives on particular groups of subsistence users or resources. The following discussion addresses potential impacts at the programmatic or forest scale and assesses relative potential impacts in terms of overall proposed road construction and timber management activities.

Viewed at this scale, none of the alternatives would directly limit the use of public lands for the purposes of subsistence gathering activities. Historical access (by foot, boat, and floatplane) would remain available under all the alternatives for present and foreseeable future activities.

Data on documented deer harvest by transportation type are available at the Game Management Unit (GMU) level (Table 3.17-1). Data from the 2003 Deer Harvest Survey are presented by transportation type and GMU in Table 3.17-1. GMU 4, the ABC Islands (Admiralty, Baranof, and Chicagof Islands), accounted for 69 percent of deer harvested in Southeast Alaska in 2003 (7,621 deer), with GMU 2, Prince of Wales Island, accounting for 16 percent (1,783 deer). Hunters accessing hunting areas by boat accounted for 63 percent of total deer harvest in 2003. Hunters accessing the area by highway vehicle accounted for 23 percent of total deer harvest. The relative share of harvest by transportation type varies by GMU, with boat access, for example, accounting for 76 percent of harvest in GMU 4, but just 20 percent in GMU 2. Highway vehicle was the most frequently used method of access in GMU 2, Prince of Wales Island, accounting for 73 percent of deer harvest in 2003 (Table 3.17-1). This relatively high share reflects the more densely roaded nature of Prince of Wales Island and may be considered generally indicative of the effects of timber harvest and associated road building.

Table 3.17-1
Deer Harvest by Game Management Unit and Transportation Type, 2003

GMU Number[1/]	Area	Deer Harvested	Percent of Deer Harvested by Transportation Type[2/] Airplane	Boat	3- or 4-Wheeler	Highway Vehicle	Foot	Un-known
1A	Ketchikan	211	0	64	11	18	6	0
1B	Petersburg	82	0	39	44	0	17	0
1C	Juneau	467	0	33	0	48	16	2
2	Prince of Wales Island	1,783	2	20	1	73	3	2
3	Central Islands	901	1	52	11	31	1	2
4	ABC Islands[3/]	7,621	11	76	2	9	1	1
	Total	**11,065**	**883**	**6,938**	**329**	**2,529**	**240**	**139**
	Percent of Total	100	8	63	3	23	2	1

Notes:
1 Game Management Units (GMUs) are a geographic unit of measurement established and used by ADF&G.
2 These data were compiled as part of the 2003 Deer Hunter Survey and were collected in response to a question requesting the survey respondent to identify the Transportation Used to Get to the Hunt Area.
3 The ABC Islands are Admiralty, Baranof, and Chichagof Islands.
Source: ADF&G 2004.

New road construction is likely to result in the development of new use patterns around some communities, but these changes are not likely to lead to a significant possibility of a significant restriction of subsistence access to the resources. New use patterns may, however, favor some subsistence groups and disadvantage others. Subsistence access may be via a number of different transportation types and often involves more than one form of transportation. Subsistence users may, for example, access an area via boat followed by road (and on-foot) or via boat and on-foot, with types of access varying by location and user. Some hunters may access specific areas using more than one form of transportation, but others may favor one form of transportation over another, say highway vehicle over foot.

While there would be some new road access under all alternatives in the long run, nearly all new roads constructed under the alternatives would be closed following harvest. These roads would, therefore, not be available for use by highway vehicles or high-clearance vehicles. They may, however, be available for access by other methods and would, as a result, have the potential to affect existing subsistence patterns.

Based on the miles of new road construction projected under each alternative and viewed at a programmatic level, Alternative 1 would have the lowest impact on existing subsistence access patterns with only about 20 percent of the maximum road miles projected under Alternative 5 (No Action) (774 miles versus 3,874 miles). Also, new road construction under Alternative 1 would be limited to areas outside existing Inventoried Roadless Areas (IRAs) and would, therefore, tend to increase road density in already roaded areas rather than provide new access to presently undeveloped areas.

Alternatives 2 and 3 would also have relatively low impacts on existing subsistence access patterns with 1,751 and 887 fewer projected new road miles than under Alternative 5, respectively. These alternatives would also limit the construction of new roads in IRAs and, therefore, limit potential changes in access, but to a lesser extent than under Alternative 1. Alternative 6 (Proposed Action) would have a similar effect to Alternative 5, while Alternatives 4 and 7 would involve 1,136 and 1,913 more new road miles than Alternative 5 (No Action), respectively, and have the potential to provide new access to presently undeveloped areas.

Some subsistence users have a preference for unroaded areas. Viewed at a programmatic level, Alternative 1 would have the lowest impact on subsistence users who prefer unroaded areas because timber management would be primarily limited to areas outside the existing IRAs on the Tongass. Alternatives 2 and 3 would have the next lowest potential impacts, in that order, with timber management under Alternative 2 limited to areas outside the existing IRAs except in locations where existing roads could be logically extended. Alternative 3 would keep the 23 areas proposed for wilderness in HR 987 and the 18 Areas of Special Interest in the 1999 Record of Decision in a natural condition. Alternatives 5 and 6 would be more likely to involve timber harvest in IRAs; this likelihood would be increased further under Alternatives 4 and 7. Alternatives 4 and 7 have an increased emphasis on timber production with respective annual Allowable Sale Quantities (ASQs) of 313 million board feet (MMBF) and 421 MMBF in the first decade, compared to 267 MMBF under Alternative 5 (No Action) and 49 MMBF under Alternative 1.

Another potential access impact relates to the effects of clearcut harvesting on the landscape. Subsistence hunters have varying opinions on the effects of clearcut harvest on hunting success. Some hunters say that timber harvest clearcuts are productive for some years after harvest, while others prefer not to use clearcuts. Hunters interviewed on Prince of Wales Island, for example, reported that the best hunting in clearcut areas begins approximately 2 years after an area is logged, with hunt quality typically starting to decline 9 years after the area was cut (Brinkman 2006). Concern has been expressed by hunters that clearcuts in the process of regrowth become impassable to hunters after a period of time (Galginaitus 2004).

In addition to long-term access effects, timber management activities may also have short-term, temporary displacement effects for subsistence users because it is standard practice to close logging roads to outside traffic when logging is taking place. Subsistence users who use existing roads for access would be preempted from using those roads for the duration of logging activity in the affected area. These types of effects would, however, be short term and temporary, and would not be likely to lead to a significant possibility of a significant restriction of subsistence access to the resources. In addition, as previously noted, most or all new roads would be closed following harvest.

Competition

Just over half of the population in Southeast Alaska in 2005 resided in Juneau or Ketchikan (55 percent) and is, therefore, considered non-rural from a subsistence perspective. Residents in the remaining 30 communities and surrounding areas are considered rural. Competition for the more abundant wildlife and fisheries resources near rural communities results from a combination of factors, such as fish and game regulations, mobility, the natural distribution of game species across the Tongass, decreases in resource populations as a result of habitat reductions, decreases in resource populations as a result of over-harvest, and access provided to rural communities in the form of roads, ferries, and commercial air carriers.

For analyzing competition, the following assumptions are made:

- New road construction adjacent to communities with ferry access will result in increased competition from outside communities.
- New road construction adjacent to existing road systems where interties between communities exist will result in increased competition from surrounding communities associated with the interconnected roads.
- Habitat reductions will result in increased competition if regulations allow sport use to remain constant, with the same number of users seeking fewer huntable resources.
- The demand for resources will remain constant or increase slightly as the habitat capability remains the same or declines over time.

Given these assumptions, the 1997 Forest Plan Revision Final EIS concluded that implementation of Alternative 11 (the Selected Alternative) would result in a significant possibility of a significant restriction of subsistence use by increasing competition for some subsistence resources by non-rural, as well as rural residents. This was judged most likely to occur on Chichagof, Baranof, and/or Prince of Wales Islands, where competition for deer and some other land mammals is currently heavy, and habitat capability has been reduced as a result of timber harvest.

The possibility of a significant restriction, resulting from a change in competition, would be the same as or less than the possibility under Alternative 11 (the Selected Alternative) of the 1997 Forest Plan Revision Final EIS for Alternatives 5 and 6. There would be a relative reduction in risk under Alternatives 1, 2, and 3, and an increase in risk under Alternative 4 and especially under Alternative 7 (see the *Transportation and Utilities* section of this chapter).

Cumulative effects are discussed in four categories.

Cumulative Effects

1. **Effects Resulting from Timber Harvesting of Private Lands**. Native corporation lands adjacent to the Tongass National Forest support extensive timber harvest operations. Over the last two decades, old-growth forest wildlife habitat capability on Native corporation lands (especially that for deer) has declined, and this decline is expected to continue for at least the next two decades. This decline has occurred primarily on North Chichagof, Kupreanof, Admiralty (localized), and Prince of Wales Islands, as well as on mainland areas. Overall, approximately 351,000 acres, or 46 percent, of the original old growth has been harvested on non-National Forest System lands within the Forest boundary. The resulting lower habitat capabilities on these private lands are likely to increase hunting demands in adjacent National Forest areas, increasing competition and potentially leading to reduced hunter success, reduced or eliminated sport seasons, and in some places reduced or eliminated subsistence seasons.
2. **Effects from Past Activities**. Timber harvest has been more influential in changing the landscape than any other use of the resources of the Tongass National Forest. With timber harvest comes roading, log transfer facility development, and reductions in old-growth forest habitat. Intensive timber harvesting, which began in the 1950s, has resulted in approximately 455,000 acres of old growth harvest on National Forest System (NFS) lands.

3. **Effects of Present Activities**. Implementation of the current Forest Plan allowed an annual maximum timber harvest of approximately 267 MMBF (based on the ASQ), with an annual conversion of up to 8,900 acres of old-growth habitat to young growth (although a much lower volume and acreage has been harvested in recent years). This timber harvest involved the projected construction of up to 106 miles of classified road each year. In reality, less than 25 miles of new road has been built each year since the plan was implemented. One major mining operation, the Greens Creek Mine on Admiralty Island is currently operating. In addition, construction of the Kensington Mine project north of Juneau is partially underway and the mine may become operational in the near future.

4. **Effects of Reasonably Foreseeable Future Activities**. The conversion of old-growth forest habitat to young growth would occur at varying rates under all alternatives. The principal subsistence resource effect will be on Sitka black-tailed deer habitat, as previously discussed. If timber harvesting were to continue at maximum allowable rates (under Alternative 7) over the next 10 years, a maximum of 159,000 acres of old-growth habitat could change to young-growth and about 880 miles of road could be built on NFS lands. The comparison of alternatives at the end of Chapter 2, as well as the *Timber* and *Transportation and Utilities* sections, displays the estimated miles of road predicted under each alternative. With timber harvest activities would come new access, possibly new camps, and potential increased use of subsistence resources by rural and non-rural residents. The effects of timber harvest on deer habitat capability would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests.

   Counting all lands in Southeast Alaska, an estimated 87 percent of the original old growth remains today. After 100+ years, it is estimated that the percentage of the original old growth remaining would range from 71 percent (Alternative 7) to 82 percent (Alternative 1), due to combined harvest on NFS and non-NFS lands, assuming maximum rates of harvest. Although the overall percentage reduction would not be excessively high overall, areas of concentrated harvest would have higher effects on subsistence. Areas of concentrated harvest are described in the *Biodiversity* section, which quantifies the estimated effects of cumulative future harvest on the amount of old growth by biogeographic province for all of Southeast Alaska (see Tables 3.9-20, 3.9-21, and 3.9-22).

Timber harvest of Native corporation lands is anticipated to continue at a relatively low but constant level over the next decade. New land selections could result in some previously unharvested areas being logged. Actual mineral development is difficult to predict, but effects to subsistence resources would be highly localized where it does occur.

ANILCA Determination

An ANILCA Section 810 evaluation and determination is not required for approval of a Forest Plan amendment, which is a programmatic level decision that is not a determination whether to “withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition” of National Forest land. This EIS is part of the Forest Plan Amendment process and, therefore, does not require an ANILCA Section 810 evaluation and determination. A Forest-wide evaluation and determination was, however, included for the 1997 Tongass Forest Plan Revision Final EIS to facilitate project-level planning and decisionmaking in compliance with ANILCA Section 810. The analysis and findings conducted for this EIS complement the 1997 effort.

Consistent with Section 810 of ANILCA, the alternatives considered in the Revised SDEIS (prepared prior to the 1997 Forest Plan EIS) were evaluated for potential effects on subsistence uses and needs, as described above. Based on that evaluation, it was determined that, in combination with other past, present, and reasonably foreseeable future actions, one or more of the Revised SDEIS alternatives (if implemented through project-level decisions and actions) may result in a significant restriction of subsistence uses of deer, and possibly other land mammals, due to potential effects on abundance and distribution, and on competition.

As a result of this finding, the Forest Service notified the appropriate state agencies, local communities, the Southeast Alaska Federal Subsistence Regional Advisory Council, and State Fish and Game Advisory Committees, and held hearings in affected communities throughout Southeast Alaska after publication and dissemination of the Revised SDEIS.

Using the information described earlier in this section and comments from the ANILCA 810 Subsistence Hearings, the alternatives considered in the 1997 Forest Plan Revision Final EIS were evaluated for potential effects on subsistence uses and needs, as described above. Based on this evaluation it was again determined that, in combination with other past, present, and reasonably foreseeable future actions, one or more of the 1997 Final EIS alternatives (if implemented through project-level decisions and actions) may result in a significant restriction of subsistence uses of deer, and possibly other land mammals, due to potential effects on abundance and distribution, and on competition.

ANILCA 810 Subsistence Hearings were also held in conjunction with the public meetings/hearings on the 2002 Draft SEIS. These meetings took place in 17 communities across Alaska; an internet hearing was also conducted. Subsistence hearings were also conducted for this EIS. They were held in 24 Alaska communities and on the internet as well (see Chapter 1).

Considering the input from these hearings and the analysis presented here, the same overall conclusion is reached regarding the alternatives evaluated in this EIS. The risk of a significant restriction would be the same or less than for the Selected Alternative from the 1997 Final EIS (current Forest Plan) under five of the alternatives, with the potential risk expected to higher under Alternatives 4 and 7.

Section 810 (a)(3) of ANILCA requires that when a significant restriction may result, three determinations must be made, including the following:

1. **Necessary and Consistent with Sound Management of Public Lands**. The alternatives proposed in this EIS have been examined to determine whether they are necessary and consistent with sound management of public lands. In this regard, the National Forest Management Act, the Alaska National Interest Lands Conservation Act, the Tongass Timber Reform Act, the Wilderness Act, the Alaska Regional Guide, the 1997 Forest Plan Revision Final EIS, as amended, the Alaska State Forest Resources and Practices Act, and the Alaska Coastal Zone Management Program have been considered.

   National Forest land management plans are required by the National Forest Management Act and must provide for the multiple-use and sustained yield of renewable forest resources in accordance with the Multiple-Use Sustained Yield Act of 1960. Multiple-use is defined as “the management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people” (36 CFR 219.3). The alternatives presented herein represent different ways of managing Tongass National Forest resources in combinations that are intended to meet the needs of the American people. Each provides a different mix of resources uses and opportunities and has some potential to affect subsistence uses, although the effects would be the same or less than under the current Forest Plan for five of the alternatives, with the potential effects expected to higher under Alternatives 4 and 7. The potential restrictions associated with each alternative are necessary and consistent with the sound management of public lands.

2. **Amount of Public Land Necessary to Accomplish the Proposed Action**. The amount of land necessary to implement each alternative is, considering sound multiple-use management of public lands, the minimum necessary to accomplish the purpose of that alternative. The entire forested portion of the Tongass is used by at least one rural community for subsistence purposes for, at a minimum, deer hunting. It is not possible to avoid all of these areas in implementing resource use activities, such as timber harvesting and road construction, under any Forest Plan alternative, and attempting to reduce effects in some areas can mean increasing the use of others. The current and proposed Forest-wide standards and guidelines and LUD prescriptions provide for special management or limit activities in many of the areas most important for subsistence uses, such as beaches and estuaries, areas adjacent to roads, and areas with high fish and wildlife habitat values. Forest-wide standards and guidelines and LUD prescriptions are discussed in more detail below.

   The alternatives considered in this EIS, with the exception of Alternatives 4 and 7, would maintain the same levels of resource use and associated activities or would reduce them. There would be an increase in resource use under Alternatives 4 and 7. There would be a reduction in the beach and estuary buffers in the revised Forest Plan under Alternative 7. In addition, the Old-Growth Habitat LUD and its management prescription would be eliminated under Alternative 7.

3. **Reasonable Steps to Minimize Adverse Impacts to Subsistence Uses and Resources**. The Forest-wide standards and guidelines and LUD prescriptions of the current Forest Plan would continue to be implemented as part of Alternative 5 (No Action), where they apply. An updated and edited version of the current Forest Plan has been developed for Alternative 6 (Proposed Action), and for Alternatives 1, 2, and 3. Alternatives 4 and 7 also follow the Proposed Forest Plan, with some exceptions. One important exception in this context is the reduction in the beach and estuary buffers that would occur under Alternative 7. Beaches and estuaries are often important subsistence areas and reducing the buffers in these areas would reduce the level of protection and could have long-term impacts on subsistence users. In addition, the Old-Growth Habitat LUD and its management prescription would be eliminated under Alternative 7. Under Alternative 4, there would be Old-Growth Reserves would be limited to four high risk-biogeographic provinces. In other areas, 30 percent of old-growth would be reserved in each VCU.

   Subsistence use is addressed specifically in a Forest-wide standard and guideline, and subsistence resources are covered by the Forest-wide standards and guidelines for wildlife, fish, riparian areas, and biological diversity, among others. Fish and wildlife habitat productivity would be maintained at the highest level possible under all alternatives, consistent with the overall multiple-use goals of the current Forest Plan, with improved protection under the Proposed Forest Plan. Alternatives 1, 2, 3, and 6 would harvest less productive old-growth than Alternative 5 (No Action) and maintain a larger proportion of original old-growth on the Tongass. Alternatives 4 and 7 would harvest more productive old-growth than Alternative 5. There would be less deer habitat maintained in old-growth reserves under Alternative 4 than under Alternatives 1, 2, 3, 5, and 6. Alternative 7 would not include old-growth reserves and would have the largest potential long-term effects on the availability of deer for subsistence purposes. The potential effects of the alternatives on wildlife productivity are discussed in more detail in the *Wildlife* section of this EIS.

A final determination was made in the Record of Decision for the 1997 Tongass Forest Plan Revision Final EIS, which was consistent with the analysis above. A summary of the evaluation, findings, and determination for the alternative selected following this EIS process will be presented in the Record of Decision for this EIS.

Heritage Resources and Sacred Sites

Affected Environment

Heritage Resources

Heritage resources located within the Tongass National Forest include a diverse range of ancient and historic sites and artifacts that span approximately 10,000 years of human occupation and resource use. Ancient remains include campsites, village sites, graves, resource areas, rock art, portages, and rockshelters. Historic sites include houses, cabins, mines, trails, portages, canneries, boatworks, shipwrecks, and military installations. Many of these heritage remains provide the only record of former human occupation, work areas, and lifestyles.

The Tongass has implemented a Forest-wide heritage database (INFRA) to provide a more definitive tracking system for heritage surveys and sites. Based on this database, as of the end of Fiscal Year 2005, approximately 295,567 acres of National Forest System (NFS) lands have been inventoried for heritage resources and 2,096 heritage resource sites have been identified. As of the end of Fiscal Year 2005, 22 heritage resource sites or properties are listed in the National Register of Historic Places (National Register), while 878 sites or properties have been determined eligible for listing either through concurrence with the Alaska State Historic Preservation Office (SHPO) or by a decision of the keeper of the National Register. The Forest has added 421 newly discovered sites to the Alaska Heritage Resource Survey (a state-wide listing of heritage resources) in the last 4 years. Only a small portion of the Tongass National Forest has been surveyed; therefore, additional heritage sites are expected to be located within the Forest in the future. Information gathered from these inventory efforts provides information about heritage resource distribution and sensitivity to damage. Specific locations associated with Alaska Native traditional and religious use (sacred sites) are identified on an ongoing basis, with site-specific data kept confidential.

Certain types of heritage resources, such as sites, artifacts, and other observable results of human activity, have a greater probability of being located in specific areas, which create patterns of human use across the landscape through time. The environmental characteristics that invited human use and habitation in ancient times are often the same factors that invite use today. These high sensitivity areas, which are not evenly distributed across the landscape, are often below 100 feet in elevation and/or are areas of animal, plant, or mineral resource abundance. In addition, because of elevation and sea level changes after deglaciation, the locations of the earliest human activity areas may be farther inland and at higher elevations than more recent activity areas.

The Forest has established and maintains a heritage resource management program to identify, evaluate, protect, and enhance significant heritage resources on a Forest-wide and project-specific level in compliance with the National Historic Preservation Act (NHPA), as amended, as well as a number of other acts and implementing regulations. The Forest's ability to protect its heritage resources is affected by four factors: the location of the heritage property, the type of management activity conducted in that location, the environmental characteristics of the locality, and an active, effective heritage resource management program. Impacts to the resource may result from natural forces, public use, or project-related activities. Future management options will vary and are likely to be influenced by increased demands for scientific study, educational interpretation, public enjoyment, and preservation of traditional resources and sacred sites.

Inventory of these heritage resources is an ongoing process. Information gathered from inventories will provide insight into resource distribution and the sensitivity of sites to damage. Further scientific study will increase knowledge about early human migration, later exploration and development of the region, and human behavior in response to social and environmental change. Once data are collected, the Forest has the responsibility to curate artifacts and conserve records, photographs, and other data specific to heritage resource projects and sites under the 2005 Curation Agreement with the University of Alaska-Fairbanks Museum.

Sacred Sites

Sacred sites are places that have traditional spiritual values for Alaska Native people (Indian tribes or Indian religious practitioners) that are reverently dedicated to a person, object, event, or activity, and are secured against violation or infringement or interference.

In order to protect and preserve Indian religious practices, Executive Order 13007 and other laws and Executive Orders of the U.S. Government require the Forest Service, to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions to:

- Accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners,
- Avoid adversely affecting the physical integrity of sacred sites, and
- Where appropriate, maintain the confidentiality of sacred sites.

Alaska Native groups or an appropriately authoritative representative of an Indian religion shall be responsible for identifying such sites to the Forest Service as the managing agency.

The Forest has developed Sacred Sites Protection Activities within the Heritage Resources Forest-wide standards and guidelines for the management of sacred sites as an integral part of its land management. The Forest also seeks to accommodate access to, and ceremonial use of, sacred sites by Indian religious practitioners, and to avoid adversely affecting the physical integrity of these sites. As early as possible, the Forest consults with tribes and their representatives on a government-to-government basis to provide notice of proposed actions or policies that may restrict access to or adversely affect the physical integrity of sacred sites.

The Forest is developing a knowledge base about sacred sites and tribal protocols, management recommendations, proposed guidelines, policies, or concerns about proposed actions that may affect sacred sites. Management includes undertaking government-to-government consultations with Alaska Native tribes and corporations and their representatives to monitor and protect sites from public access or other disturbance as needed. The Forest is also providing information and assistance on Alaska Native rights, trust responsibilities, preserving traditional beliefs and practices, and the laws and policies affecting management of historical, cultural, and traditional uses of NFS lands.

Heritage Resource and Sacred Sites Management Program

According to Forest-wide Heritage Resource Standards and Guidelines, the Forest maintains a heritage resource and sacred sites management program to identify, evaluate, protect, and enhance ancient heritage resources on a Forest-wide and project-specific level in compliance with federal legislation, their amendments, and implementing regulations. This includes coordinating management of heritage resources with the Alaska SHPO, Advisory Council on Historic Preservation (ACHP), and neighboring Alaska Native tribes and corporations. ACHP outlines this historic preservation review process in the Code of Federal Regulations (CFR) (36 CFR 800). Public involvement is a cornerstone of successful Section 106 review, and 1992 amendments to the NHPA place major emphasis on the role of Indian tribes. Subsequent revisions to ACHP's regulations, published December 12, 2000, incorporate specific provisions for federal agencies to involve Indian tribes throughout the Section 106 review process.

Heritage resource activities also include identifying and developing appropriate interpretive messages for heritage resource sites and activities; coordinating the management, access, and use of forest products to perpetuate Alaska Native culture and art forms; and developing a heritage resource management assessment that provides a framework for management decisions. The Forest annually reports upon all activities of the Heritage Program to the Alaska SHPO and the ACHP as stipulated in their Programmatic Agreement.

The Programmatic Agreement between the Forest Service – Alaska Region, ACHP, and Alaska SHPO regarding heritage resource management on National Forests was first signed in 1995, with amendments in 1999 and 2002. The purpose of this Agreement is to expedite compliance with the ACHP's regulations (36 CFR 800) implementing Section 106 of the NHPA. In lieu of the individual undertaking procedural requirements of the regulations, implementation of the Agreement enables the Forest Service to fufill some of its Section 110 responsibilities, such as the continuation of preservation and fostering appreciation of heritage resources through inventory, evaluation, protection, research, enhancement, education, restoration, stewardship, and interpretation programs. These programs are part of an effective heritage resource management program focused on heritage stewardship and public outreach. Section 110 of the NHPA and Executive Order 13287 directs federal agencies to use, to the maximum extent feasible, historic properties available to the agency. This direction must be taken into account as the agency considers the future of its administrative and recreation facilities in light of decreasing budgets. The Agreement recognizes the role of consultation with Alaska Native tribes and corporations on a government-to-government basis as well as the public.

The active participation of Alaska Native tribes and corporations and Alaska Native religious practitioners is critical to the success of sacred sites management. Heritage resource and tribal government relations specialists will collaborate to provide the Forest's line officers information necessary to make decisions related to sacred sites management. Tribal consultation will be conducted in a professional manner with tribal government officials, recognized Tribal Elders, and authoritative representatives. The consultation process will include regular review of proposed federal actions, development of a sacred sites knowledge base, protection of the physical integrity of sacred sites, and use alternative dispute resolution processes, if needed. The Forest will implement procedures to protect confidential information related to sacred sites.

If a tribal government chooses not to consult, the Forest will rely on the best available information to make decisions about sacred sites.

Environmental Consequences

Direct and Indirect Effects

Erosion and other environmental processes may deteriorate heritage sites through decomposition or mechanical destruction. Decomposition is most evident in objects or structures made of wood. Stabilization, regular maintenance, rehabilitation, and data recovery are means for preventing the loss of such objects or structures and the information they contain.

Public use may destroy heritage sites or sacred sites inadvertently or by intent. Inadvertent damage results from accessing sites resulting in compaction, or from other ground-disturbing activities. Intentional damage is looting and vandalism, including relic collecting, theft, and defacement, which result in the loss of information and destruction of the resource. Significant sites may be protected from destructive public uses by establishing public education programs, maintaining confidentiality about site-specific locations, monitoring, and directing public use away from the most vulnerable sites.

Areas managed for recreation provide opportunities for heritage resource protection and interpretation to promote public education and enjoyment. Active educational and interpretive programs can create a greater awareness of the importance of heritage resources and foster a sense of stewardship, while adding to the recreational experience. At the same time, protective measures must be implemented to control or eliminate intentional destruction of these areas by relic collecting, theft, and other forms of vandalism.

While multiple-use activities have benefited heritage resources by providing opportunities for inventory, evaluation, and interpretation in remote areas of the Forest, ground-disturbing activities have the most potential to adversely affect these resources and their environmental settings. The amount of impact an activity has is determined largely by the location and nature of the activity, the characteristics of the soils, and the degree of use.

Heritage resource and sacred sites management may increase the cost of project implementation. Some areas may need to be avoided entirely in order to protect the resource. This may increase the cost of site access and result in some loss of commercial products, such as timber. Protection of significant heritage resources or sacred sites often precludes ground-disturbing activities within a designated site boundary. When preservation of heritage resources in place is not desired or possible, mitigation of adverse effects to the resources may be necessary, and this in turn may delay projects and increase project costs. Normally, when the Section 106 process of the NHPA is completed early in the planning process, project delays and additional costs are minimal.

Under all of the alternatives, the preferred management of heritage resource sites eligible for, nominated to, or listed in the National Register is avoidance and protection. When this is not possible or feasible, it may be necessary to implement a mitigation program in order to achieve a finding of no adverse effect. Mitigation plans are developed in consultation with the Alaska SHPO, ACHP, Alaska Native tribes and corporations, and, possibly, other consulting parties. The potential for adverse effects, and therefore the need for mitigation, is diminished when the physical settings around significant heritage resources are maintained in a natural state.

Management of sacred sites includes early consultation with Indian religious practitioners and Indian tribes, development of site-specific protection strategies and enforcement mechanisms, and protection of the confidentiality of site-specific information. If sacred sites are identified during a project, the surrounding natural environment should be maintained and protected while consultation takes place and a protection plan is developed. If a sacred site is inadvertently disturbed or sacred or burial objects are exposed by natural causes, affiliated tribal governments will be notified within 24 hours.

LUDs allowing timber harvesting, mining, and road construction are most likely to affect heritage resources or sacred sites through alteration of environmental settings or damage to unknown sites as projects are implemented. However, existing standards and guidelines (e.g., those for riparian and beach and estuary buffer zones) result in the protection of most of the Forest's heritage resources. Recreation and special uses pose the greatest threat to heritage resources or sacred sites today, simply because people want to recreate and use the forest in the same places people have for thousands of years. In many instances, retention of a natural setting is crucial to imparting and protecting the values that qualify a heritage resource for National Register status or allow the undertaking of religious practices at sacred sites. Conversely, the opportunity for identifying new heritage resource sites is greater within these areas because such developments require more intensive heritage resource inventory efforts. ACHP, in their direction on sacred sites, point to the possibility that a sacred site (per Executive Order 13007) may not meet the eligibility criteria for the National Register. For example, a property with poor integrity might not be eligible to the National Register, but it may still be an important sacred site worthy of protection and other future management under EO 13007. An indirect effect common to all alternatives and prescriptions is that the discovery of new sites can lead to vandalism if locations become known to the public. An indirect effect specific to alternatives with proposed Wilderness designations is that such designation can indirectly lead to adverse effects to historic structures.

Potential effects to heritage resources and the differences in risk between the alternatives are difficult to measure. Table 3.18-1 identifies the maximum estimated acres of old growth and second growth that can be harvested and miles of road likely to be constructed under each alternative. These acreages and mileages provide relative indicators of potential adverse effects, with the alternatives having the most acreage and mileage are likely to produce the highest risk of effects. Under this scenario, Alternatives 4 and 7 have the highest risk because they include more area where development would be permitted. They would be followed by Alternatives 5, 6, 3, 2, and 1, in decreasing order of risk level. However, because project areas are inventoried for ancient and historic heritage resource sites and tribal consultation for sacred sites should occur prior to implementation and avoidance of impacts is the preferred option for resource protection, the levels of risk are considered relatively low for all alternatives. In addition, existing standards and guidelines should result in the protection of most heritage resources and sacred sites in those areas.

Table 3.18-1
Approximate Maximum Acres Likely to be Disturbed over 100+ Years

Alternative	Estimated Maximum Acres of Old Growth to be Harvested	Estimated Maximum Acres of Second Growth to be Harvested	Estimated Maximum Miles of New Road Construction
1	85,972	58,293	774
2	214,511	179,426	2,079
3	313,426	200,250	2,799
4	656,473	235,513	4,890
5	462,556	224,027	3,874
6	445,103	218,368	3,744
7	807,396	262,228	5,825

Source: Tongass National Forest GIS database

While it is true that increased project activity might accelerate the loss of heritage resources, primarily by improving public access and increasing the probability for looting and vandalism of heritage resource sites, there are potential positive effects as well. Over time, decay, neglect, and natural landscape changes threaten the preservation of significant heritage resources. By expanding the Forest's inventory of its heritage resources, development projects result in identification of many sites that might otherwise decay unnoticed. Once sites are known, the Forest is better able to protect and encourage collection of information from a greater number of them. By providing sufficient staff and funding to monitor known heritage resources and sacred sites, the Forest should be able to minimize looting and vandalism.

The Forest Plan and all of the alternatives include requirements for inventory, protection, preservation, and interpretation, and for consultation with Indian tribes or Indian religious practitioners and the Alaska SHPO as described in the Heritage Resource Standards and Guidelines. Effects are avoided or mitigated through a variety of measures at the project level. Avoidance measures may include protective enclosures, systematic monitoring of project activities, or mandatory restrictions on project design. Mitigation at heritage resources is undertaken when impacts cannot be avoided, and includes systematic recovery of the information through excavation, collection of materials, and detailed documentation as determined through consultation with the Alaska SHPO, ACHP, Indian tribes, and others. Protection of significant heritage resource sites and sacred sites from damage through public use includes establishing public education programs, maintaining confidentiality about specific locations, monitoring, and directing public use away from the vulnerable sites. The Forest is also required to consult with Alaska Native tribes and corporations when effects may involve sites of religious and/or cultural importance to them.

Cumulative Effects

The vast majority of Southeast Alaska (16.8 million acres) is occupied by the Tongass National Forest, so the disturbances described above for the Tongass are the major disturbances affecting heritage resources. However, Glacier Bay National Park, Haines State Forest, and other ownerships in the Haines/Skagway area occupy 3.6 million acres, while state, Native corporations, and other ownerships inside the Forest boundary occupy a combined 1.1 million acres. Therefore, activities on these lands contribute to Southeast Alaska cumulative effects. Disturbances in Glacier Bay and Haines/Skagway National Parks are generally very minor and contribute insignificantly to cumulative effects. However, extensive timber harvest, road construction, and urban development occur on these other ownerships. Because of the level of inventory required prior to development and the level of heritage resource protection required for discovered resources on Tongass National Forest lands, none of the alternatives should contribute significantly to the cumulative effects on heritage resources of Southeast Alaska.

Extensive landscape changes and ground disturbance have occurred and will continue to occur on many non-federal lands in Southeast Alaska. Federal laws requiring consideration for the protection of heritage resources do not apply to non-federal lands. Heritage resources are nonrenewable, and once disturbed they are permanently damaged or destroyed; their information and values are lost and cannot be recovered. Preservation of these resources and values on federal lands is critical so that future generations can continue to enjoy the heritage and knowledge about our past that we enjoy today.

Roadless Areas

Affected Environment

This section addresses inventoried roadless areas. The discussion is divided into three parts: the current roadless area inventory, the roadless area conservation rule, and the current situation on the Tongass.

Roadless Area Inventory

Roadless Area Terms

Roadless Area: For purposes of this EIS, this is a generic term that includes inventoried roadless areas and unroaded areas.

Inventoried Roadless Area: An undeveloped area typically exceeding 5,000 acres that meets the minimum criteria for wilderness consideration under the Wilderness Act.

Unroaded Area: An undeveloped area typically less than 5,000 acres but of a size and configuration sufficient to protect the inherent characteristics associated with its roadless condition.

The 1996 Tongass roadless inventory was updated following the March 2001 U.S. District Court of Alaska ruling (*Sierra Club v. Lyons*), which ordered the Forest Service to prepare a Supplemental EIS (SEIS) to evaluate roadless areas and to consider wilderness recommendations. As part of that effort, the Analysis of the Management Situation relative to roadless areas and their relative contribution to the National Wilderness Preservation System was completed.

This process involved a comprehensive update of the inventory of existing roads (including all classified and unclassified roads), harvest units, and land ownership on the Tongass National Forest. Developed areas were subsequently identified by buffering existing roads and harvest units. All areas within 1,200 feet of an existing road and within 600 feet of an existing harvest unit were considered developed; however, in order to be more inclusive, isolated beach-logged and helicopter units were not identified as developed areas. Narrow stringers of land between developed areas were also included as developed. All National Forest System (NFS) lands outside of areas defined as developed were identified as roadless areas. These roadless areas were then divided into two groups: areas greater than 5,000 acres and areas less than 5,000 acres. Inventoried roadless areas were identified as all roadless areas greater than 5,000 acres, as well as all inventoried roadless areas identified in previous inventories, which included some areas less than 5,000 acres. In addition, all other areas less than 5,000 acres were examined to determine if they were eligible for wilderness consideration. These included small roadless areas adjacent to existing wilderness.

The final inventory identified in the Final SEIS included 109 inventoried roadless areas covering 9.6 million acres. These inventoried roadless areas and other unroaded areas on the Tongass are identified on the roadless inventory map produced as part of this assessment and currently available on the SEIS Web site at www.tongass-seis.net.

Detailed descriptions of each individual roadless area that include an overview and a description of the capability, availability, and need for each area to be designated as wilderness are included as Appendix C to the Final SEIS (USDA Forest Service 2003b) and are also available on the SEIS Web site. These descriptions reflect current conditions and Forest Service Manual and Handbook direction. They also include an updated rating for each roadless area called the Wilderness Attribute Rating System (WARS), as well as a description of how each individual roadless area could contribute to the National Wilderness Preservation System.

The roadless area inventory displays the extent of the roadless resource and provides data for use by managers, legislators, and others to formulate land management proposals. Roadless areas may retain their roadless character by being managed in a way that emphasizes relatively large undeveloped or natural areas, such as areas usually required for old-growth habitat, scenic backdrops, or primitive recreation. Roadless areas identified in the inventory that are outside of existing the Wilderness Land Use Designation (LUD) may be considered for wilderness recommendation, or managed for a wide range of other resource management activities.

On the Tongass, the goals for a number of LUDs include the maintenance of areas in a primarily roadless state. One of these is called LUD II; these areas are to be managed in a roadless state to retain their wildland character. LUD II is a permanent LUD that was used by Congress in the Tongass Timber Reform Act (TTRA). TTRA established 12 permanent LUD II areas totaling 730,463 acres (including 2,701 acres of non-NFS land) (Table 3.19-1).

Table 3.19-1
National Forest System Land, Non-National Forest System Land, and Productive Old Growth within Each of the Legislated LUD II Areas Designated by the Tongass Timber Reform Act (in acres)

Name of LUD II Area	Total	National Forest System	Non-National Forest System	Productive Old Growth
Yakutat	139,045	139,035	10	72,312
Berners Bay	45,233	45,233	0	15,390
Anan	38,313	38,313	0	16,426
Kadashan	34,441	34,281	160	20,609
Lisianski/Upper Hoonah	149,088	147,132	1,956	44,178
Mt. Calder-Holbrook	60,863	60,863	0	38,682
Nutkwa	21,723	21,723	0	13,102
Outside Islands	75,720	75,342	378	45,999
Trap Bay	6,595	6,595	0	4,297
Pt. Adolphus/Mud Bay	116,877	116,695	182	38,249
Naha	31,365	31,350	15	17,875
Salmon Bay	11,200	11,200	0	4,811
Total	**730,463**	**727,762**	**2,701**	**331,930**

Source: USDA Forest Service 1997a, Table 3-55.

Roadless Area Conservation Rule

In May 2001, the Forest Service issued the Roadless Area Conservation Rule (Roadless Rule). This rule established prohibitions on road construction, road reconstruction, and timber harvest in inventoried roadless areas on NFS lands. In May 2001, the U.S. District Court for the District of Idaho enjoined the Forest Service from implementing the Roadless Rule, a decision that was subsequently appealed. In December 2002, a three-justice panel of the Ninth Circuit Court of Appeals reversed the Idaho ruling. The case was returned to the Idaho District Court for evaluation of the merits, and the State of Idaho then requested review by the full Ninth Circuit. Several other states, including the State of Alaska, filed lawsuits similar to that filed by the State of Idaho.

The litigation with the State of Alaska was settled in June 2003 and resulted in the July publication of a proposal to temporarily exempt the Tongass National Forest from the prohibitions of the Roadless Rule. On December 30, 2003, the Department of Agriculture adopted a final rule that withdrew the Tongass National Forest from the Roadless Rule, and the management of inventoried roadless areas on the Tongass is currently governed by the 1997 Forest Plan.

In May 2005, in response to legal challenges and the ongoing controversy surrounding the Roadless Rule, the Forest Service issued the Special Areas; State Petitions for Inventoried Roadless Area Management Final Rule, and decision memo (State Petitions Rule), which amended the Roadless Rule and established a petitioning process that provides Governors an opportunity to seek establishment of or adjustment to management requirements for NFS inventoried roadless areas within their states. Governors had until November 2006 to submit petitions.

Three states—California, Oregon, and New Mexico—filed a lawsuit in August 2005 challenging the May 2005 amendment, with Washington State later joining the case. In addition, Earthjustice filed a similar lawsuit in October 2005 on behalf of 20 environmental groups. The U.S. District Court, Northern District of California ruling on this case in October 2006 overturned the State Petitions Rule and reinstated the Roadless Rule, including the Tongass Amendment. (Updated information on the Roadless Rule is regularly posted on the Forest Service's Roadless Area Conservation Web site [www.roadless.fs.fed.us]).

The inventoried roadless areas included in the 2001 Roadless Rule are identified in a set of maps, contained in the Forest Service Roadless Area Conservation, Final Environmental Impact Statement, Volume 2, dated November 2000. For the Tongass, these maps represent 9.3 million acres and correspond closely with the 1996 roadless area inventory that was done for the 1997 Forest Plan Revision. Table 3.19-2 compares the areas protected by the Roadless Rule with the areas included in inventoried roadless areas for the 2003 Final SEIS, which covers 9.6 million acres. The differences are due to additional road building between 1996 and 2003, refinements of boundaries in 2003, and projects that were expected to be built in 1996 that were never implemented. Approximately 9.1 million of the 9.6 million acres in the Final SEIS inventoried roadless areas are also included under the Roadless Rule.

Current Situation

The Tongass National Forest, the largest Forest in the NFS, is more than 90 percent roadless, including wilderness. Only small areas where communities are developing, or where road construction and timber harvest have occurred, are "developed" to any noticeable degree. At various times in the past, "boom and bust" development (associated with fox farming, salmon canneries, mining, and military activity) resulted in the temporary development and occupation of small areas, mostly near the shoreline, that have since been largely reclaimed by nature. Developed areas cover about 1.3 million acres, or about 8 percent, of the Tongass (based on the updated roadless mapping described above). Southeast Alaska residents (approximately 71,000) are, for the most part, surrounded by land that has many of the characteristics of wilderness. Routine travel and ordinary outdoor recreation activities typically require a higher degree of skill, risk-taking, and self-reliance than is usually required of adventurous backcountry visitors on other National Forests. This wildness and the lifestyles associated with it are highly prized by residents and visitors alike.

Summary information is presented for the 109 inventoried roadless areas evaluated in the 2003 Final SEIS in Table 3.19-3 (USDA Forest Service 2003b). This information includes the size of each area in 2003, the amount of each area that is in productive old growth (POG), and the amount of each area that is considered suitable for timber harvest. The table also lists the WARS score for each of the roadless areas as a general indication of the wilderness attributes of the area. There are currently 9,514,105 acres in Inventoried Roadless Areas (IRAs) on the Tongass. This represents about a 44,000-acre reduction since the 2003 analysis, which is due to land adjustments, refinements to boundaries, additional road construction and harvest activity, and mapping corrections. If the additional 5,749,083 acres of the Tongass in Wilderness and Wilderness National Monument are combined with the IRA acreage, the total of 15,263,188 acres represents 91 percent of the Tongass.

Table 3.19-2
Tongass National Forest Inventoried Roadless Areas Analyzed in the Final 2003 SEIS Compared with Roadless Areas Covered by the Roadless Area Conservation Rule

Roadless Area Number	Roadless Area Name	Final SEIS National Forest Acres	Roadless Rule National Forest Acres	Acreage Difference
201	Fanshaw	48,446	48,194	252
202	Spires	542,829	533,269	9,560
203	Thomas	5,232	0	5,232
204	Madan	69,126	68,502	624
205	Aaron	79,147	78,689	458
206	Cone	127,874	127,776	98
207	Harding	179,350	174,209	5,141
208	Bradfield	204,133	198,919	5,214
209	Anan	38,162	36,648	1,514
210	Frosty	45,522	39,865	5,656
211	North Kupreanof	99,566	114,590	(15,023)
212	Missionary	14,825	16,662	(1,837)
213	Five Mile	19,284	19,433	(149)
214	South Kupreanof	213,122	216,645	(3,523)
215	Castle	52,432	49,151	3,281
216	Lindenberg	25,136	25,836	(699)
217	Green Rocks	11,059	11,074	(15)
218	Woewodski	10,647	10,046	601
220	East Mitkof	9,444	8,770	674
223	Manzanita	10,436	8,394	2,042
224	Crystal	19,609	18,962	647
225	Kadin	2,022	2,022	0
227	North Wrangell	11,602	8,089	3,513
229	South Wrangell	14,959	14,211	748
231	Woronkofski	12,932	11,097	1,835
232	North Etolin	41,740	40,911	829
233	Mosman	56,757	53,226	3,531
234	South Etolin	28,678	26,230	2,449
235	West Zarembo	8,544	6,781	1,764
236	East Zarembo	16,175	10,844	5,331
237	South Zarembo	41,999	36,246	5,752
238	Kashevarof Islands	5,743	4,623	1,120
239	Keku	11,170	10,829	340
240	Security	35,497	31,375	4,122
241	North Kuiu	9,544	6,352	3,192
242	Camden	40,395	36,671	3,725
243	Rocky Pass	79,103	77,580	1,523
244	Bay of Pillars	28,728	27,363	1,365
245	East Kuiu	46,395	27,513	18,882
246	South Kuiu	63,063	62,150	913
247	East Wrangell	7,634	7,610	24
288	West Wrangell	-	10,281	(10,281)
289	Central Wrangell	15,210	13,394	1,815
290	Southeast Wrangell	20,297	18,363	1,934
301	Juneau-Skagway Icefield	1,201,473	1,186,606	14,867
302	Taku-Snettisham	685,712	662,400	23,312
303	Sullivan	66,143	67,252	(1,110)
304	Chilkat-West Lynn Canal	198,109	199,418	(1,310)
305	Juneau Urban	94,800	101,518	(6,718)
306	Mansfield Peninsula	51,988	54,883	(2,895)
307	Greens Creek	19,959	27,166	(7,207)
308	Windham-Port Houghton	161,922	161,697	225
310	Douglas Island	25,008	28,055	(3,047)
311	Chichagof	534,309	555,200	(20,891)
312	Trap Bay	13,821	13,213	608
313	Rhine	16,675	22,979	(6,304)
314	Point Craven	10,961	10,900	61
317	Point Augusta	15,629	15,438	191

Table 3.19-2 (continued)
Tongass National Forest Inventoried Roadless Areas Analyzed in the Final 2003 SEIS Compared with Roadless Areas Covered by the Roadless Area Conservation Rule

Roadless Area Number	Roadless Area Name	Final SEIS National Forest Acres	Roadless Rule National Forest Acres	Acreage Difference
318	Whitestone	5,747	5,617	130
319	Pavlof-East Point	4,731	5,368	(638)
321	Tenakee Ridge	21,854	20,523	1,330
323	Game Creek	51,436	54,432	(2,995)
325	Freshwater Bay	47,070	44,909	2,160
326	North Kruzof	25,373	32,961	(7,588)
327	Middle Kruzof	15,127	14,698	428
328	Hoonah Sound	97,329	79,661	17,668
329	South Kruzof	55,726	55,074	653
330	North Baranof	324,317	313,611	10,706
331	Sitka Urban	114,460	111,983	2,477
332	Sitka Sound	20,878	13,390	7,488
333	Redoubt	74,570	67,993	6,577
334	Port Alexander	124,021	120,183	3,838
338	Brabazon Addition	500,597	498,589	2,008
339	Yakutat Forelands	337,374	321,402	15,973
341	Upper Situk	18,411	16,772	1,639
342	Neka Mountain	53,019	6,130	46,889
343	Neka Bay	7,826	7,090	736
501	Dall Island	111,245	105,178	6,066
502	Suemez Island	24,478	19,853	4,626
503	Outer Islands	99,891	99,439	452
504	Sukkwan	49,759	44,055	5,704
505	Soda Bay	63,147	77,937	(14,790)
507	Eudora	200,493	194,220	6,273
508	Christoval	7,367	9,081	(1,714)
509	Kogish	71,420	65,081	6,340
510	Karta	55,527	52,106	3,421
511	Thorne River	74,362	72,971	1,391
512	Ratz	6,414	5,323	1,091
514	Sarkar	62,170	51,635	10,535
515	Kosciusko	71,578	63,878	7,699
516	Calder	12,218	9,807	2,411
517	El Capitan	30,854	26,688	4,166
518	Salmon Bay	27,412	22,697	4,714
519	McKenzie	80,650	82,766	(2,117)
520	Kasaan	7,605	7,573	31
521	Duke	46,863	44,535	2,328
522	Gravina	38,978	37,299	1,679
523	South Revilla	53,559	51,942	1,617
524	Revilla	30,941	29,293	1,648
525	Behm Islands	4,944	4,735	210
526	North Revilla	225,444	215,371	10,073
528	Cleveland	191,477	189,007	2,471
529	North Cleveland	109,639	105,131	4,509
530	Hyder	116,304	121,703	(5,399)
531	Nutkwa	56,818	53,632	3,186
532	Fake Pass	876	466	410
533	Hydaburg	13,720	11,161	2,559
534	Twelvemile	34,333	37,921	(3,587)
535	Carroll	11,180	11,364	(184)
536	Kasaan Bay	-	7,358	(7,358)
577	Quartz	146,657	142,941	3,716
	Total Acres	**9,558,266**	**9,320,651**	**237,613**

Table 3.19-3
Tongass National Forest Inventoried Roadless Area Descriptors (2003)

Roadless Area Number	Roadless Area Name	National Forest Acres	Productive Old-Growth Forest Acres	Estimated Suitable Forest Lands Acres[1]	Wilderness Attribute Rating (WARS)[2,3]
201	Fanshaw	48,443	29,508	8,251	26
202	Spires	543,319	68,220	6,833	26(27)
203	Thomas	5,297	2,031	480	18
204	Madan	69,128	33,372	11,386	25
205	Aaron	79,147	17,159	4	27
206	Cone	127,874	10,698	-	28
207	Harding	179,350	58,288	3,165	20(22)
208	Bradfield	204,128	23,623	1,999	20
209	Anan	38,162	16,038	-	22
210	Frosty	45,522	22,583	4,989	19(21,24)
211	North Kupreanof	103,094	20,746	5,475	19(22)
212	Missionary	17,382	7,307	1,709	16
213	Five Mile	19,272	8,247	2,232	23
214	South Kupreanof	215,391	82,241	19,365	24
215	Castle	52,432	20,313	3,098	25
216	Lindenberg	26,757	11,793	4,639	18
217	Green Rocks	11,216	5,052	337	19
218	Woewodski	10,632	5,786	2,346	21
220	East Mitkof	10,332	3,502	427	15
223	Manzanita	10,792	6,037	1,921	18
224	Crystal	20,003	8,330	2,129	19
225	Kadin	2,022	1,997	-	20
227	North Wrangell	11,518	7,202	2,206	15(17)
229	South Wrangell	14,959	6,489	1,935	20
231	Woronkofski	12,932	6,690	2,216	20
232	North Etolin	42,519	20,276	3,973	18
233	Mosman	56,757	27,040	5,576	22(21,23,24)
234	South Etolin	28,678	11,109	3,204	24(23,25)
235	West Zarembo	8,544	3,945	68	14
236	East Zarembo	21,469	7,113	2,490	14
237	South Zarembo	42,191	17,294	3,634	20
238	Kashevarof Islands	5,743	4,197	-	23
239	Keku	10,770	6,266	1,096	19
240	Security	35,952	24,185	1,510	22
241	North Kuiu	10,214	8,479	3,538	15
242	Camden	40,260	20,549	5,901	23(19,26)
243	Rocky Pass	81,107	39,493	863	26
244	Bay of Pillars	28,994	20,541	3	25
245	East Kuiu	46,438	29,626	7,656	26
246	South Kuiu	63,063	37,388	-	27
247	East Wrangell	7,634	5,032	1,241	17
289	Central Wrangell	15,654	6,887	1,326	16
290	Southeast Wrangell	20,353	8,686	1,109	17
301	Juneau-Skagway Icefield	1,201,474	60,528	1,722	25(24,25)
302	Taku-Snettisham	685,704	99,498	4,027	24
303	Sullivan	66,143	12,883	955	26
304	Chilkat-West Lynn Canal	198,525	47,442	5,981	25
305	Juneau Urban	95,633	34,833	3,256	21
306	Mansfield Peninsula	52,553	25,794	-	20
307	Greens Creek	20,703	12,464	-	19(22)
308	Windham-Port Houghton	161,867	107,308	20,546	25(25,25)
310	Douglas Island	27,761	13,557	-	17
311	Chichagof	545,419	173,701	11,164	25(20,22,23,23,26,26)
312	Trap Bay	13,923	7,058	266	19(23)
313	Rhine	19,628	2,332	335	18
314	Point Craven	11,310	6,907	895	18
317	Point Augusta	15,629	9,246	1,170	19(20)

Table 3.19-3 (continued)
Tongass National Forest Roadless Area Descriptors

Roadless Area Number	Roadless Area Name	National Forest Acres	Productive Old-Growth Forest Acres	Estimated Suitable Forest Lands Acres[1]	Wilderness Attribute Rating (WARS)[2,3]
318	Whitestone	5,745	2,841	439	19
319	Pavlof-East Point	5,348	3,628	255	16
321	Tenakee Ridge	22,014	6,375	1,309	18
323	Game Creek	51,994	18,999	2,243	18
325	Freshwater Bay	48,227	18,612	1,928	17
326	North Kruzof	25,373	12,519	489	22
327	Middle Kruzof	15,127	7,894	1,815	15
328	Hoonah Sound	97,329	34,993	2,226	25
329	South Kruzof	55,840	17,164	885	22
330	North Baranof	331,425	82,901	6,521	25
331	Sitka Urban	114,875	13,747	550	20
332	Sitka Sound	20,878	10,260	486	20
333	Redoubt	74,516	33,122	1,448	21
334	Port Alexander	124,021	30,875	-	25
338	Brabazon Addition	500,597		-	27
339	Yakutat Forelands	336,976	34,829	4,137	22
341	Upper Situk	18,411	6,885	1,236	19
342	Neka Mountain	53,014	23,090	2,066	21
343	Neka Bay	7,826	4,128	-	20
501	Dall Island	110,667	64,784	2,547	23(21,23,24)
502	Suemez Island	24,940	15,060	2,904	20
503	Outer Islands	99,873	52,919	1,170	23(25)
504	Sukkwan	49,614	19,801	1,829	23
505	Soda Bay	63,363	21,288	5,621	20(20,20)
507	Eudora	201,729	87,687	11,572	24(19.25)
508	Christoval	7,367	5,396	24	19
509	Kogish	72,553	29,497	8,090	20(23)
510	Karta	56,816	19,863	6,121	19
511	Thorne River	76,454	38,611	2,816	21(22)
512	Ratz	6,414	3,298	812	19
514	Sarkar	63,656	30,407	2,177	23
515	Kosciusko	71,613	40,810	3,013	24
516	Calder	12,519	8,983	302	22
517	El Capitan	31,141	16,658	3,046	20
518	Salmon Bay	28,602	11,157	1,682	20
519	McKenzie	83,822	30,391	4,849	22(24)
520	Kasaan	7,602	3,082	-	18
521	Duke	46,863	7,360	-	26
522	Gravina	38,845	18,849	4,468	21
523	South Revilla	55,321	21,896	1,598	20(19,20,22)
524	Revilla	30,826	10,427	585	17
525	Behm Islands	4,943	3,263	-	14
526	North Revilla	230,679	102,108	10,274	20(18,19,21,22,23)
528	Cleveland	191,363	98,658	15,556	25
529	North Cleveland	109,639	47,354	199	26
530	Hyder	122,408	11,135	54	25
531	Nutkwa	56,477	32,739	4,697	23
532	Fake Pass	876	765	-	22
533	Hydaburg	13,688	7,880	-	19
534	Twelvemile	36,171	11,811	1,035	16
535	Carroll	11,152	4,474	1,744	16
577	Quartz	146,655	48,475	-	25
	Total Acres	**9,558,266**	**2,684,657**	**307,465**	

[1] The estimated suitable acreage is based on the 1997 Tongass Forest Plan and was adjusted by the Model Implementation Reduction Factor (MIRF) and a Scheduling factor (see the *Timber* section of this chapter).

[2] The Wilderness Attribute Rating System (WARS), which was developed as part of the Roadless Area Review and Evaluation (RARE) II process in 1977, has a potential range from a minimum of 4 to a maximum of 28. WARS considers four main attributes and several supplemental ones. The main attributes are natural integrity, apparent naturalness, opportunity for solitude, and opportunity for primitive recreation.

[3] When more than one number is given, the roadless area was rated once for the entire roadless area and separate rating(s) were done for identified portions of the area. The ratings for portions of the roadless area are in parentheses.

Several characteristics of roadless areas on the Tongass are rather unique relative to other areas in the NFS. The Tongass has very large undeveloped land areas that could potentially be managed as wilderness or in an unroaded condition. Several portions of the Forest constitute contiguous roadless areas exceeding 1 million acres, and thus represent large, unfragmented wildlife habitats and exceptional opportunities for solitude.

Many of the Tongass roadless areas represent wildlife habitats, ecosystems, and visual character, such as coastal islands facing the open Pacific, extensive beaches on inland saltwater, old-growth temperate rain forests, ice fields, and glaciers that exist nowhere else in the NFS. Many of these areas are remote and difficult to access for primitive recreation, and many contain other important resources, such as timber, minerals, and salmon-producing streams. Of the slightly over 1 million acres of forest land that is mapped as suitable for timber production, approximately 763,000 acres are POG forest. Approximately 307,000 acres, or 40 percent, is within roadless areas.

Environmental Consequences

Direct, Indirect, and Cumulative Effects

There are currently 9,514,103 acres in IRAs on the Tongass. The allocation of these acres by LUD is presented for each alternative in Table 3.19-4. The individual LUDs are grouped into one of four categories: Wilderness and National Monument, Natural Setting, Moderate Development, and Intensive Development. The percent of IRA acres allocated to each category is summarized for each alternative in Table 3.19-5.

In general, management prescriptions for LUDs that allow moderate to intensive development include timber harvest with associated road and log transfer facility construction. There are guidelines for the extent and visual impact of such activities. LUDs that emphasize maintaining the natural setting and undeveloped character of the area generally do not allow timber harvesting or the development of major recreation facilities, although roads linking transportation systems, particularly major state corridors, may occur.

Not all areas allocated to LUDs that allow development would actually be developed. Development would occur mainly in areas with suitable forest lands. Some of the road construction would occur in areas already roaded. Some of the road construction would fragment existing roadless areas, either creating new roadless areas (if more than 5,000 acres remains) or simply resulting in small blocks of undeveloped land surrounded by roads and harvest areas. In addition, not all of the effects of the alternatives would occur at once.

Effects of Alternatives

The roadless lands allocated to Natural Setting LUDs would essentially remain roadless for the life of the current/proposed Forest Plan and, therefore, there would be no effect on the roadless values in these areas unless a vital transportation linkage or major utility system was constructed. Site-specific environmental analysis would be undertaken if this type of development were proposed.

Roadless lands allocated to moderate and intensive development LUDs would likely change over time. The amount of acres allocated to development LUDs and acres of forest land suitable for harvest are presented in Table 3.19-6.

It should be noted that the discussion below for each alternative assumes that the current/proposed Forest Plan is in effect and does not assume any effects of the Roadless Rule that was originally promulgated in January 2001 and has since been the subject of a number of lawsuits. As noted in the Affected Environment section,

Table 3.19-4
Allocation of Inventoried Roadless Areas by LUD and Alternative (acres)

	Alternative 1	2	3	4	5	6	7
Wilderness and National Monument[1]							
Non-wilderness National Monument	155,092	155,092	155,092	155,092	155,092	155,092	155,092
Subtotal	**155,092**	**155,092**	**155,092**	**155,092**	**155,092**	**155,092**	**155,092**
Mostly Natural Setting							
LUD II	709,892	709,892	709,892	709,898	709,898	709,892	709,897
Research Natural Area	25,680	25,680	25,680	25,679	25,680	25,680	25,680
Old Growth	996,902	996,902	996,902	306,488	974,757	996,902	0
Special Interest Area	203,629	203,631	203,631	203,631	167,093	203,631	203,631
Enacted Municipal Watershed	39,250	39,250	39,250	39,250	39,250	39,250	39,250
Wild, Scenic, & Recreational River	101,421	101,421	101,421	101,417	101,421	101,421	101,421
Remote Recreation	2,364,733	2,340,364	2,178,552	2,085,536	2,128,353	2,030,967	2,084,639
Semi-Remote Recreation	4,890,486	4,130,193	3,431,241	2,458,814	2,781,758	2,937,123	2,527,327
Subtotal	**9,331,993**	**8,547,333**	**7,686,569**	**5,930,713**	**6,928,210**	**7,044,866**	**5,691,845**
Moderate Development							
Modified Landscape	0	104,631	246,427	497,746	360,831	354,145	572,965
Scenic Viewshed	0	93,714	199,460	554,770	344,424	312,913	599,569
Experimental Forest	27,018	27,018	27,017	27,019	12,708	27,018	27,018
Subtotal	**27,018**	**225,363**	**472,904**	**1,079,535**	**717,963**	**694,076**	**1,199,552**
Intensive Development							
Timber Production	0	586,317	1,199,538	2,348,764	1,712,839	1,620,071	2,467,614
Subtotal	**0**	**586,317**	**1,199,538**	**2,348,764**	**1,712,839**	**1,620,071**	**2,467,614**
Total	**9,514,104**	**9,514,105**	**9,514,104**	**9,514,104**	**9,514,104**	**9,514,105**	**9,514,103**

[1] Table lists only Non-wilderness National Monument in this LUD group because Wilderness and Wilderness National Monument are not identified as Inventoried Roadless Areas (IRAs), even though they are roadless. In addition to the 9,514,105 acres of IRAs, the Tongass has 5,749,083 acres of Wilderness and Wilderness National Monument , for a total of 15,,263,188 acres (representing 91% of the Tongass).

Table 3.19-5
Allocation of Inventoried Roadless Area Acreage by LUD and Alternative (percent)

	Alternative 1	2	3	4	5	6	7
Wilderness and National Monument[1]	2%	2%	2%	2%	2%	2%	2%
Mostly Natural Setting	98%	90%	81%	62%	73%	74%	60%
Moderate Development	0%	2%	5%	11%	8%	7%	13%
Intensive Development	0%	6%	13%	25%	18%	17%	26%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

[1] Only Non-wilderness National Monument is included in this LUD group because Wilderness and Wilderness National Monument are not identified as Inventoried Roadless Areas (IRAs), even though they are roadless. The Tongass currently contains 15,263,188 acres (representing 91 percent of the Tongass) of roadless lands if IRAs are combined with Wilderness and Wilderness National Monument.

Table 3.19-6
Acres of Development LUDs and Forest Land Suitable for Harvest within Current Inventoried Roadless Areas[1] by Alternative

Alternative	Acres of Development LUDs (includes Experimental Forests)		Acres of Forest Land Suitable and Scheduled for Harvest[2]	
	Acres	Percent of IRA Acres	Acres	Percent of IRA Acres
1	27,018	<0.5%	0	0.0%
2	811,680	9%	88,773	0.9%
3	1,672,442	18%	185,647	2.0%
4	3,428,299	36%	497,596	5.2%
5	2,430,802	26%	315,674	3.3%
6	2,314,147	24%	306,592	3.2%
7	3,667,166	39%	583,094	6.1%

[1] Inventoried Roadless Areas (IRAs) do not include Wilderness and Wilderness National Monument, even though they are roadless. In addition to the 9,514,105 acres of IRAs, the Tongass has 5,749,083 acres of Wilderness and Wilderness National Monument, for a total of 15,263,188 acres (representing 91 of the Tongass).
[2] Incorporates a reduction of 33 to 51 percent from mapped suitable, based on old-growth falldown and scheduling factors.

the Roadless Rule including the Tongass Ammendment, was reinstated in October 2006 by the U.S. District Court, Northern District of California.

Alternative 1

This alternative would keep virtually all existing IRAs in a natural condition. Less than 0.5 percent of the IRAs would be allocated to development LUDs under this alternative, compared to 26 percent under Alternative 5 (No Action). Less than 0.1 percent of the IRAs (less than 200 acres) would potentially be harvested (Table 3.19-6).

Alternative 2

This alternative keeps most IRAs in a natural condition, with timber harvest featured on lands outside of these roadless areas except for some areas where roads could logically be extended. Approximately 9 percent of the IRAs would be allocated to development LUDs under this alternative, compared to 26 percent under Alternative 5 (No Action). Approximately 0.9 percent of the IRAs (89,000 acres) would potentially be harvested under this alternative (Table 3.19-6).

Alternative 3

This alternative would keep the 23 areas proposed for wilderness in House Resolution 987 and the 18 Areas of Special Interest in the 1999 ROD in a natural condition. Approximately 18 percent of the IRAs would be allocated to development LUDs under this alternative, compared to 26 percent under Alternative 5 (No Action). Approximately 2.0 percent of the existing IRAs would potentially be harvested under this alternative (Table 3.19-6).

Alternative 4

Alternative 4 would provide for a mix of National Forest uses, with a greater emphasis on timber production relative to Alternatives 1, 2, 3, 5, and 6. Timber management would occur in some IRAs not managed for timber production in the current Forest Plan. Approximately 36 percent of the IRAs would be allocated to development LUDs under this alternative, compared to 26 percent under Alternative 5 (No Action). Approximately 5.2 percent of the existing IRAs would potentially be harvested under Alternative 4 (Table 3.19-6).

Alternatives 5 and 6

Alternative 5 (No Action) is the current Forest Plan (1997 ROD, as amended) and provides for a moderately high level of timber production along with strong resource protection measures. Alternative 6 (Proposed Action) is similar to Alternative 5 (No Action), but includes an expansion of the old-growth reserves and other adjustments to the Plan based on information generated during the recent 5-Year Plan Review, minor clarifications, and updates.

Approximately 26 and 24 percent of existing IRAs would be allocated to development LUDs under Alternatives 5 and 6, respectively. Approximately 3.3 and 3.2 percent would potentially be harvested under Alternatives 5 and 6, respectively.

Alternative 7

Alternative 7 would emphasize timber production relative to the other alternatives. Timber would be managed on a larger land base than under Alternative 4. Approximately 39 percent of the IRAs would be allocated to development LUDs under this alternative and approximately 6.1 percent would potentially be harvested (Table 3.19-6).

Cumulative Effects

This section considers the incremental effects of the alternatives when added to other past, present, and reasonably foreseeable actions. The effects of past and present actions on roadless areas are included in the affected environment portion of this section, which discusses the existing IRAs on the Tongass. IRAs are identified based on past actions—specifically, timber harvest and road development, with all areas on the Forest within 1,200 feet of an existing road or within 600 feet of an existing harvest unit considered developed. Present actions include the impacts of current management policies on roadless areas.

Reasonably foreseeable actions on NFS lands include the projected levels of future timber harvest and road construction. The direct and indirect effects analysis assesses the impacts of these actions on roadless areas under each alternative in terms of the percent of the IRAs that would be allocated to development LUDs and considered suitable for harvest.

Other reasonably foreseeable actions include transportation and utility developments proposed by the State of Alaska. These proposals are summarized in the *Transportation and Utilities* section of this document and in the *Introduction* to Chapter 3. A total of 2,657 miles of roads are projected to be constructed on non-NFS lands throughout all of Southeast Alaska after full implementation of the plan (100+ years) under each of the alternatives (see Table 3.12-3). Most of the projected non-NFS roads are forest roads that would be developed for timber harvest, but the total miles also include road corridors that would connect different communities and connect additional areas in Southeast Alaska to the continental highway system. A number of these state-proposed corridors covered by Public Law 109-59, would, if approved under NEPA and funded, cross IRAs. The Lynn Canal Highway corridor, for example, crosses IRAs 301-Juneau-Skagway Icefield and 305-Juneau Urban, north of Juneau. The Sitka to Baranof Warm Springs road corridor crosses IRAs 331-Sitka Urban and 330-North Baranof. The Bradfield Canal road corridor crosses a number of IRAs, including 208-Bradfield and 207-Harding.

If one or more of these or the other state-proposed corridors that cross IRAs were developed, the overall effect would be a reduction in the existing IRAs. It is not possible at this time to predict exactly which roads would be developed. None of the alternatives is expected to affect this type of future road development, which would be expected to go or not go forward regardless of the selected alternative. The overall cumulative effect of these regional road corridors viewed in conjunction with the proposed Forest Plan alternatives would be a reduction in existing IRAs. This trend would be would be most pronounced under Alternative 7 and least pronounced under Alternative 1, which, with the exception of potential regional transportation corridors, would virtually all remaining IRAs in a natural condition.

New utility line projects, if they were to go forward, would have similar effects. Potential utility projects include power lines between Juneau and Skagway, Juneau and Hoonah, Hoonah and Tenakee Springs, Tenakee Springs and Angoon, Angoon and Sitka, Sitka and Kake, Kake and Petersburg, Thorne Bay and Ketchikan, and Klawock and Hydaburg. Also planned are powerlines between the proposed Lake Dorothy, Otter Creek, Thayer Lake, and Sunrise Lake Hydroelectric Projects and existing powerlines or communities. A powerline from the Tyee hydropower site along a potential Bradfield Canal/Craig River road corridor route to Canada is also a potential route that has been considered. None of the alternatives would affect these developments, which would be expected to go or not go forward regardless of the selected alternative. The overall cumulative effects if one or more of the utility projects that cross IRAs were developed would be a reduction in the existing IRAs; this would be most pronounced under Alternative 7 and least pronounced under Alternative 1.

The Tongass National Forest comprises about 78 percent of the land area of Southeast Alaska. Over 90 percent of the Tongass is currently roadless or wilderness. The other major land ownership in Southeast Alaska is Glacier Bay Park and Preserve (12.5 percent of Southeast Alaska), the vast majority of which is managed as wilderness by the National Park Service. In addition, the State of Alaska and the Bureau of Land Management manage another 6 percent of Southeast Alaska, a large portion of which is roadless. Combining all ownerships, approximately 90 percent of Southeast Alaska is currently roadless. In addition, it is estimated that at least 70 percent of all existing IRAs would remain roadless under any of the alternatives after 100+ years of Forest Plan implementation. As a result, it is estimated that at least 73 percent of Southeast Alaska would remain in wilderness or roadless after 100+ years (assuming all non-NFS lands become roaded, except for Glacier Bay and 50 percent of non-NFS lands in the Haines/Skagway area). Although these percentages remain high, it is likely that a higher proportion of lower elevation lands containing POG forest would become roaded over the long term.

Wilderness

Affected Environment

Introduction

This section provides a general overview of wilderness, describes existing wilderness in Alaska and on the Tongass National Forest, discusses the relative contribution of Tongass wilderness to the National Wilderness Preservation System, and addresses wilderness management direction in Alaska. The only other National Forest in Alaska, the Chugach National Forest, currently has no designated wilderness, but includes 2 million acres of wilderness study area.

Roadless areas within the Tongass National Forest were evaluated for recommendations as potential wilderness in the 2003 Forest Plan Supplemental EIS (SEIS) (USDA Forest Service 2003b). The 2003 SEIS evaluated eight alternatives that ranged from no new recommended wilderness to 9.6 million acres (all inventoried roadless areas) of new recommended wilderness. None of the alternatives evaluated in this EIS includes new Wilderness or LUD II recommendations.

Wilderness Overview

The Wilderness Act of 1964 defines wilderness “as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain.” The Act further elaborates on the definition to mean:

> an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which 1) generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable; 2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; 3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and 4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

Wilderness Character

The Wilderness Act does not define wilderness *character*, but according to Landres et al. (2005), wilderness character may be described as the “combination of biophysical, experiential, and symbolic ideals that distinguish wilderness from all other lands.” Landres et al. identify four qualities of wilderness that may be used to approximate wilderness character for the purposes of monitoring changes to wilderness character over time. These qualities, which were identified based on the Definition of Wilderness, Section 2(c) from the 1964 Wilderness Act, and are described below, are equally important and reinforce one another.

Untrammeled—The Wilderness Act states that wilderness is “an area where the earth and its community of life are untrammeled by man” and “generally appears to have been affected primarily by the forces of nature.” This quality refers to wilderness being essentially unhindered and free from modern human control or manipulation.

Natural—The Wilderness Act states that wilderness is “protected and managed so as to preserve its natural conditions.” This quality refers to the intended and unintended effects of modern people on ecological systems inside wilderness since the time of designation.

Undeveloped—The Wilderness Act states that wilderness is “an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation.” The undeveloped quality refers to the presence of structures, construction, habitations, and other evidence of modern human presence or occupation, including the development level of trails and campsites.

The undeveloped quality also refers to the absence of mechanical transport and motorized equipment. Wilderness was partly established “in order to assure that…growing mechanization, does not occupy and modify all areas within the United States…” (Wilderness Act, Section 2a).

Outstanding opportunities for solitude or a primitive and unconfined type of recreation—The Wilderness Act states that wilderness has “outstanding opportunities for solitude or a primitive and unconfined type of recreation.” This quality includes the values of inspiration and physical and mental challenge. Primitive recreation in wilderness has largely been interpreted as travel by nonmotorized and nonmechanical means. It also encompasses reliance on personal skills to travel and camp in an area. Unconfined encompasses attributes such as self-discovery, exploration, and freedom from societal and managerial controls.

The existing wilderness on the Tongass was established under the 1980 Alaska National Interest Lands Conservation Act (ANILCA) and the 1990 Tongass Timber Reform Act (TTRA), which subsequently amended ANILCA. In ANILCA, Congress reaffirmed and expanded upon the purposes of wilderness as stated in the 1964 Wilderness Act, specifically for wilderness established in Alaska. In recognition of unique situations and established uses in Alaska, ANILCA also provided a number of important specific exceptions to the prohibitions of the Wilderness Act. These included exceptions related to subsistence, access, and public use cabins among others. These exceptions are addressed in detail in the final part of this Affected Environment section and also apply to wilderness established under TTRA.

Wilderness Values

People value wilderness for a variety of reasons, but most reasons involve three central themes: the *experiential* value, the *scientific* and *ecological resource* value, and the *symbolic* and *spiritual* values (slightly modified from Hendee and Dawson 2002). The *experiential* value is the direct value of the wilderness experience. The experience is seen as valuable in its own right because of its primitive recreation, aesthetic, closeness to nature, education, freedom, solitude, simplicity, spiritual, and mystical dimensions. The value of wilderness as a *scientific* and *ecological resource* includes the importance of wilderness to science, including its importance in preservation of fauna and flora, particularly those species requiring large tracts of unmodified habitats. Finally, the *symbolic* and *spiritual* values of wilderness are represented by the high values some people place on the knowledge that wilderness exists, whether they use it or not. In a world characterized by rapid change and complexity, wilderness symbolizes comforting stability and simplicity to many.

Wilderness in Alaska and the Tongass

Congress has the sole authority for designating additions to the National Wilderness Preservation System. Congressionally designated wilderness on the Tongass National Forest comes from two pieces of legislation: ANILCA of 1980 and TTRA of 1990. Fourteen wildernesses totaling 5.5 million acres were established under ANILCA. Two of these areas, Admiralty Island and Misty Fiords, are also designated as National Monuments. Prior to ANILCA, there was no designated wilderness on the Tongass. TTRA subsequently amended ANILCA and designated five new wildernesses and one wilderness addition totaling 296,080 acres. As a result of these two pieces of legislation, there are currently 5.8 million acres of wilderness on the Tongass in 19 separate wildernesses (Table 3.20-1).

Wilderness recommendations were not considered in the 1997 Forest Plan Final EIS and Record of Decision (ROD) because additional wilderness had been created under TTRA. In March 2001, the U.S. District Court of Alaska ruled in response to a lawsuit filed by the Sierra Club (*Sierra Club v. Lyons*) and other environmental groups that the 1997 Final EIS should have considered making additional wilderness recommendations and ordered the Forest Service to prepare a Supplemental EIS (SEIS) to evaluate wilderness recommendations and update the Analysis of the Management Situation (AMS) relative to roadless areas and their relative contribution to the National Wilderness Preservation System. The Forest Service subsequently updated the AMS and determined the eligibility of each of the inventoried roadless areas for wilderness recommendation. Eight alternatives that identified roadless areas within the Tongass for recommendation as potential wilderness were evaluated in a Final SEIS to the 1997 Forest Plan Final EIS in 2003 (USDA Forest Service 2003b). The ROD for the Final SEIS concluded that it was not “the appropriate time for significantly changing land use designations on the Tongass National Forest” and did not recommend any additional wilderness on the Tongass at that time (USDA Forest Service 2003b).

The wilderness acreages summarized in Table 3.20-1 reflect the legal descriptions as reported to Congress. These acres are not exactly the same as those generated by the geographic information system (GIS) used in the analysis for the 1997 Tongass Forest Plan Revision Final EIS or for this Final EIS. The differences are due to different resolutions in mapping and the method of generating acres. The 1997 Final EIS used a point grid system to measure acreage using the GIS, based on the legal descriptions. This Final EIS measures the area based on the mapped GIS polygons. In addition, there were slight differences in mapping small islands or large rocks in saltwater. These differences in measurement and mapping result in a total wilderness acreage of 5,756,472, compared to the legal description total of 5,752,221. This represents a difference of less than 0.1 percent. The slightly higher total is used in this document for the purposes of analysis.

Table 3.20-1
Existing Wildernesses on the Tongass National Forest

Name	Total Acres	Non-National Forest Acres	National Forest Acres
Wildernesses Established December 2, 1980, by ANILCA			
Kootznoowoo Wilderness (Admiralty Island National Monument)	988,050[1]	32,129	955,858[1]
Coronation Island Wilderness	19,232	0	19,232
Endicott River Wilderness	98,729	0	98,729
Maurelle Islands Wilderness	4,937	0	4,937
Misty Fiords National Monument Wilderness	2,142,907	600	2,142,307
Petersburg Creek-Duncan Salt Chuck Wilderness	46,849	0	46,849
Russell Fiord Wilderness	348,701	0	348,701
South Baranof Wilderness	319,568	0	319,568
South Prince of Wales Wilderness	91,018	50	90,968
Stikine-LeConte Wilderness	449,951	1,025	448,926
Tebenkof Bay Wilderness	66,839	27	66,812
Tracy Arm-Fords Terror Wilderness	653,179	0	653,179
Warren Island Wilderness	11,181	0	11,181
West Chichagof-Yakobi Wilderness	265,529	1,038	264,491
Wildernesses Established November 28, 1990, by TTRA			
Chuck River Wilderness	74,990	692	74,298
Karta Wilderness	39,894	5	39,889
Kuiu Wilderness	60,581	0	60,581
Pleasant-Lemusurier-Inian Islands Wilderness	23,151	55	23,096
South Etolin Wilderness	83,371	752	82,619
Total Acreage	**5,788,657**	**36,436**	**5,752,221**

[1] Kootznoowoo Wilderness includes 18,486 acres, including 24 acres of Non-National Forest System lands in the Young Lake Addition established by TTRA, November 28, 1990.

Source: Total acreages are as reported to Congress with official boundary maps. These wildernesses include only the public lands above mean high tide.

Relative Contribution of Tongass Wilderness

General Perspective

The National Wilderness Preservation System includes almost 105 million acres. More than half of this acreage is in Alaska (Figure 3.20-1). In addition to having the largest land area in wilderness, Alaska also has the highest percentage of its land area in wilderness among the 50 states (Figure 3.20-2). The states with both the greatest land area and highest percent land area in wilderness are Alaska, California, Washington, Idaho, and Arizona (Landres and Meyer 2000).

In addition to having the greatest amount of land and the highest percentage of its land base in wilderness, Alaska also has the highest number of wilderness acres per resident, with almost 90 acres per resident. This ratio increases to slightly more than 120 acres per resident when only Southeast Alaska is considered. The next closest state is Wyoming with about 6 acres of wilderness per resident.

Existing wilderness on the Tongass, approximately 5.8 million acres, represents about 34 percent of the forest land base and 28 percent of the land in Southeast Alaska. Viewed on a national basis, existing wilderness on the Tongass represents 17 percent of all wilderness on National Forest System (NFS) lands and 5.5 percent of all lands in the National Wilderness Preservation System (USDA Forest Service 2000a).

Two of the largest wildernesses on the Tongass, Misty Fiords National Monument Wilderness (2.1 million acres) and Kootznoowoo (Admiralty Island) Wilderness (almost 1 million acres), contain vast, virtually intact ecosystems. Five other wildernesses are each more than 250,000 acres. The wildernesses of the Tongass are mostly in a pristine condition, with the imprint of humans generally not noticeable. They offer outstanding opportunities for solitude and primitive recreation.

In the remainder of this section, the Tongass National Forest is evaluated in terms of how well its landforms and ecosystems are represented in existing wilderness (and LUD II areas). Four ways of classifying the Tongass landforms and ecosystems are considered, ranging from very broad (e.g., ecoregions, with two categories covering the Tongass) to fairly detailed (e.g., ecological subsections, with 73 categories covering the Tongass).

Ecoregions

DeVelice and Martin (2001) provide a national summary of acreage in National Forest roadless areas versus designated wilderness, National Parks, and other areas primarily managed to maintain natural values (i.e., conservation reserves). In Alaska, all but 1 of 15 ecoregions (as defined by Ricketts et al. 1999) have greater than 12 percent of its area in reserves. No other region in the country surpasses Alaska in ecological representation in reserves.

Two ecoregions cover the Tongass National Forest: the Northern Pacific Coastal Forest and the Pacific Coastal Mountain Tundra and Ice Fields (Ricketts et al. 1999). These two ecoregions extend from eastern Kodiak Island to the southern end of the Alaska panhandle. Approximately 19 percent of the Northern Pacific Coastal Forest and 37 percent of the Pacific Coastal Mountain Tundra and Ice Fields ecoregions are in reserves (DeVelice and Martin 2001). The portions of both of these areas protected in wilderness are well above the 12 percent threshold considered by some authorities (e.g., World Commission on Environment and Development 1987) as the minimum area for representation (DeVelice and Martin 2001).

Figure 3.20-1. Acres of Wilderness by State

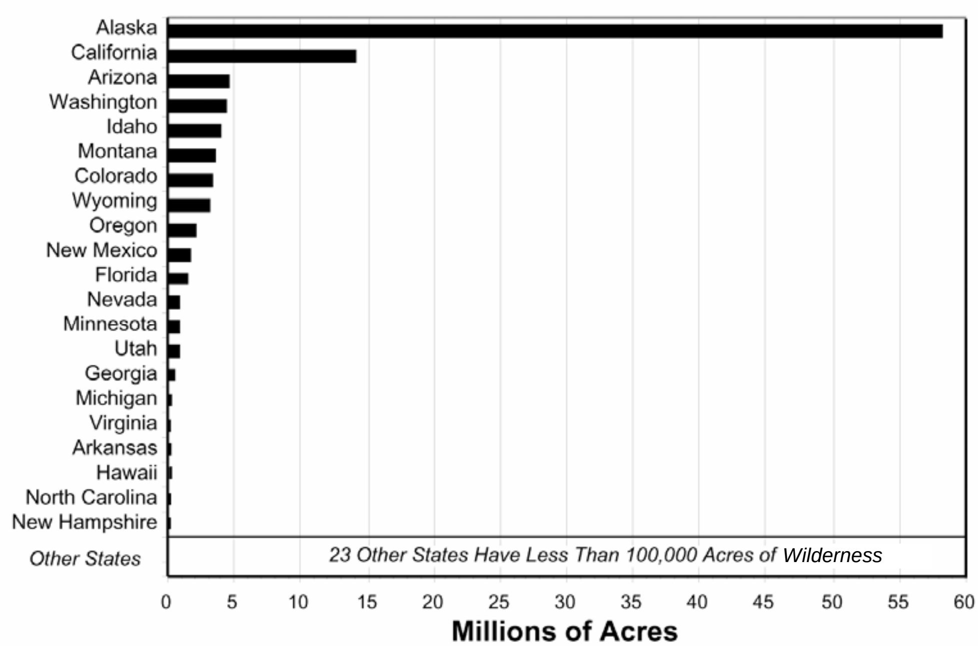
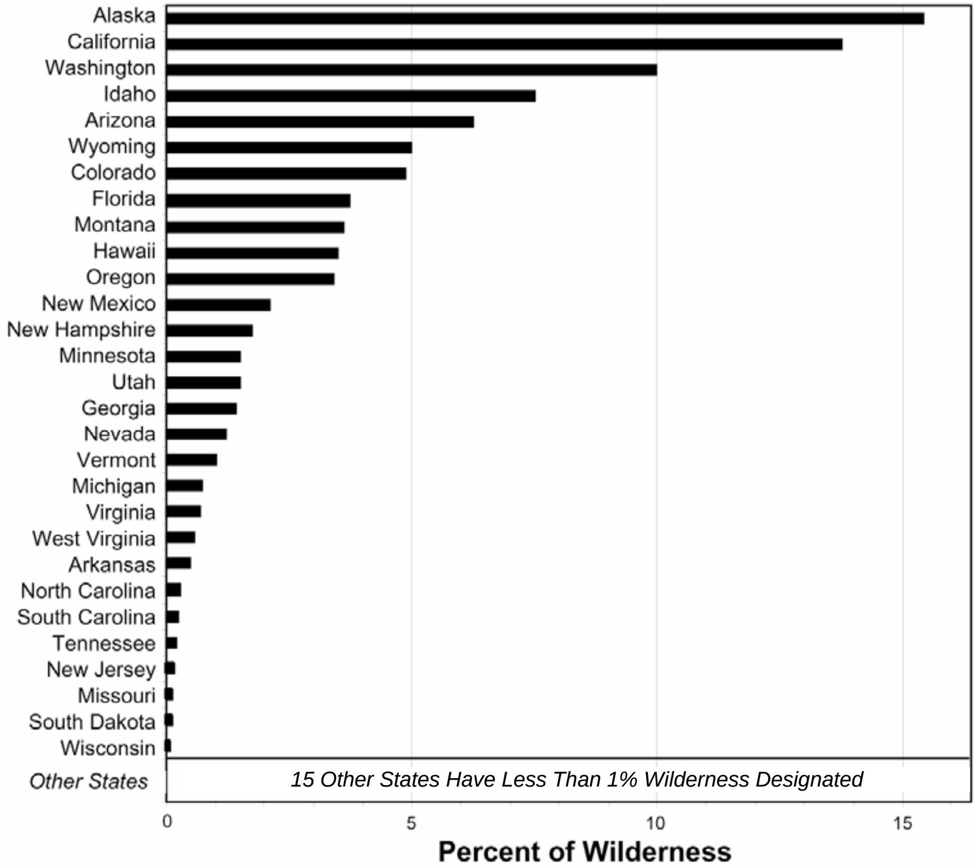


Figure 3.20-2. Percentage of Land Area in Wilderness by State



When the acreage of inventoried roadless areas is added to the acreage of conservation reserves in the two ecoregions, the percentage increases to 64 percent for the Northern Pacific Coastal Forest and 66 percent for the Pacific Coastal Mountain Tundra and Ice Fields ecoregions (DeVelice and Martin 2001). These values are in the 25 to 75 percent range that Noss and Cooperrider (1994) argue is required to achieve representation and are substantially higher than the 12 percent threshold.

When one considers only NFS lands, the percentage of NFS lands area in wilderness in these ecoregions is 25 percent for the Northern Pacific Coastal Forest and 21 percent for the Pacific Coastal Mountain Tundra and Ice Fields. If all inventoried roadless areas are counted along with wilderness, the total area of wilderness plus inventoried roadless areas on the Tongass in these ecoregions increases to 69 percent and 79 percent, respectively (DeVelice and Martin 2001).

Land Cover Classes

The various wildland ecosystems of Southeast Alaska are generally represented within the Tongass' wilderness. These areas include glaciers and ice fields, off-shore islands and seacoasts facing both the open Pacific Ocean and inland passages, major river systems, and 1.5 million acres of old-growth temperate rain forests. Viewed in terms of broad National Forest land cover classes, designated Wilderness on the Tongass exceeds 12 percent of the area in five land cover classes that are prevalent in Southeast Alaska. These five classes are: 1) Evergreen Forest (23 percent), 2) Tundra (15 percent), 3) Barren Land (37 percent), 4) Water (23 percent), and 5) Glaciers-Snow (15 percent). Designated

Wilderness does not exceed 12 percent of the area for Deciduous Forest (0 percent), Mixed Forest (0 percent), and Shrub-Brush (9 percent) (Martin et al. 2000). However, these latter three land cover types are not prevalent in Southeast Alaska.

Biogeographic Provinces

The extent to which identifiable landform types and ecosystems are represented in the wildernesses (and other natural setting LUDs) of the Tongass National Forest is addressed by reviewing the extent to which the biogeographic provinces of Southeast Alaska are represented. The Tongass can be subdivided into 21 biogeographic provinces characterized by similar species composition, similar patterns in distribution for many species, similar geologic barriers and historic events (such as glaciation), and similar climatic conditions. These provinces are discussed in the *Biodiversity* section of this chapter. Table 3.20-2 identifies the percentage of each biogeographic province that is included in existing wilderness. This table also identifies the percentage in LUD II areas because these are Congressionally designated areas managed for long-term protection to retain their wildland character. It also includes the percentage of each biogeographic province in other natural setting LUDs.

Table 3.20-2
Percent of Each Biogeographic Province in Wilderness, LUD II, or other Natural Setting LUD (within the Tongass National Forest boundary)

	Province	Percent in Wilderness or National Monument	Percent in LUD II	Percent in Other Natural Setting LUDs[1]	Total Percent in Wilderness or Natural Setting LUDs[1]
1	Yakutat Forelands	2%	39%	38%	79%
2	Yakutat Uplands	37%	0%	62%	100%
3	East Chichagof Island	6%	25%	16%	47%
4	West Chichagof Island	81%	6%	12%	99%
5	East Baranof Island	23%	0%	50%	73%
6	West Baranof Island	29%	0%	55%	84%
7	Admiralty Island	90%	0%	5%	96%
8	Lynn Canal	15%	6%	58%	78%
9	North Coast Range	23%	0%	48%	71%
10	Kupreanof/Mitkof Island	6%	0%	27%	32%
11	Kuiu Island	26%	1%	38%	64%
12	Central Coast Range	38%	0%	37%	75%
13	Etolin Island	16%	0%	25%	41%
14	North Central Prince of Wales	3%	5%	28%	35%
15	Revilla Island/Cleveland	18%	5%	35%	58%
16	South Outer Islands	16%	33%	23%	72%
17	Dall Island and Vicinity	0%	0%	51%	51%
18	South Prince of Wales	22%	5%	33%	61%
19	North Misty Fiords	82%	0%	14%	96%
20	South Misty Fiords	100%	0%	0%	100%
21	Ice Fields	33%	0%	62%	95%
	Total	**33%**	**4%**	**37%**	**74%**

[1] Note that totals may not add due to rounding.

Seventeen of the 21 biogeographic provinces on the Tongass have 20 percent or more of their lands within the National Forest boundary, in Wilderness, National Monument, or LUD II areas; 18 of the 21 have 15 percent or more. Three provinces—Dall Island and Vicinity, Kupreanof/Mitkof Island, and North Central Prince of Wales—have from 0 to 8 percent in Wilderness, National Monument, or LUD II areas. However, these areas have from 32 to 51 percent of their land areas within wilderness or natural setting LUDs. Overall, 17 of the 21 provinces have more than 50 percent of their land areas in either wilderness or natural setting LUDs. The remaining four have 32 to 47 percent.

Ecological Subsections

The extent to which identifiable landform types and ecosystems are represented in wilderness LUDs (and other natural setting LUDs) of the Tongass can also be evaluated by reviewing the extent to which the ecological subsections of Southeast Alaska are represented (Nowacki et al. 2001). These subsections are discussed in the Biodiversity section of this chapter. Table 3.20-3 identifies the percentage of each subsection that is covered by existing Wilderness (or National Monument), LUD II areas, and other natural setting LUDs.

Table 3.20-3
Percent of Each Ecological Subsection in Wilderness, LUD II, or Other Natural Setting LUD (within the Tongass National Forest boundary)

Number	Ecological Subsection	Percent in Wilderness or National Monument	Percent in LUD II	Percent in Other Natural Setting LUDs[1]	Total Percent in Wilderness or Natural Setting LUDs[1]
M244Ca	St. Elias-Fairweather Icefields	27%	1%	70%	98%
M244Cb	Puget Peninsula Metasediments	100%	0%	0%	100%
M245Bc	Yakutat-Lituya Forelands	9%	33%	39%	80%
M246Aa	Chilkat Complex	0%	0%	95%	95%
M246Ba	Boundary Ranges Icefields	32%	1%	61%	94%
M246Bb	Stikine-Taku River Valleys	43%	0%	53%	97%
M247Ac	Wachusett-Adams Hills	100%	0%	0%	100%
M247Ag	Berg Bay Complex	99%	0%	0%	99%
M247Ak	Chilkat Peninsula Carbonates	26%	0%	51%	77%
M247Bb	North Chichagof Granitics	19%	38%	15%	72%
M247Bc	Outer Coast Wave-cut Terraces	75%	0%	21%	96%
M247Bd	West Chichagof Complex	94%	6%	0%	99%
M247Be	Ushk-Patterson Bay Granitics	19%	43%	6%	67%
M247Bf	Peril Strait Granitics	0%	25%	15%	40%
M247Bg	North Baranof Complex	0%	0%	36%	36%
M247Bh	Sitka Sound Complex	0%	0%	67%	67%
M247Bi	Mount Edgecumbe Volcanics	0%	0%	75%	75%
M247Bj	Central Baranof Metasediments	20%	0%	64%	84%
M247Bk	Necker Bay Granitics	83%	0%	16%	100%
M247Bl	South Baranof Sediments	32%	0%	68%	100%
M247Ca	Point Adolphus Carbonates	0%	16%	32%	48%
M247Cb	Freshwater Bay Carbonates	0%	0%	28%	28%
M247Cc	Kook Lake Carbonates	0%	15%	16%	31%
M247Da	Stephens Passage Glaciomarine Terraces	36%	5%	31%	72%
M247Db	North Admiralty Complex	82%	0%	7%	89%
M247Dc	Stephens Passage Volcanics	58%	0%	26%	84%
M247Dd	Thayer Lake Granitics	100%	0%	0%	100%
M247De	Mitchell-Hasselborg Till Lowlands	100%	0%	0%	100%

Table 3.20-3 (continued)
Percent of Each Ecological Subsection in Wilderness, LUD II, or Other Natural Setting LUD (within the Tongass National Forest boundary)

Number	Ecological Subsection	Percent in Wilderness or National Monument	Percent in LUD II	Percent in Other Natural Setting LUDs[1]	Total Percent in Wilderness or Natural Setting LUDs[1]
M247Df	Hood-Gambier Bay Carbonates	98%	0%	0%	98%
M247Dg	South Admiralty Volcanics	100%	0%	0%	100%
M247Ea	Holkham Bay Complex	32%	0%	28%	60%
M247Eb	Cape Fanshaw Complex	0%	0%	29%	29%
M247Ec	Thomas Bay Outwash Plains	0%	0%	25%	25%
M247Ed	Wrangell Narrows Metasediments	11%	0%	18%	29%
M247Ee	Eastern Passage Complex	23%	3%	29%	55%
M247Ef	Stikine River Delta	77%	0%	5%	82%
M247Eg	Bell Island Granitics	14%	9%	57%	81%
M247Eh	Stikine Strait Complex	0%	0%	42%	42%
M247Ei	Etolin Granitics	37%	0%	19%	55%
M247Ej	Zimovia Strait Complex	5%	0%	26%	30%
M247Ek	Clarence Strait Volcanics	15%	0%	34%	50%
M247El	Ketchikan Mafics/Ultramafics	0%	0%	46%	46%
M247Em	Vixen Inlet Till Lowlands	0%	0%	40%	40%
M247En	Traitors Cove Metasediments	0%	10%	26%	36%
M247Eo	Behm Canal Complex	65%	0%	18%	83%
M247Fa	Kuiu-POW Granitics	19%	23%	36%	78%
M247Fb	Rowan Sediments	27%	0%	27%	54%
M247Fc	North POW-Kuiu Carbonates	0%	2%	25%	27%
M247Fd	Alvin Bay Sediments	53%	0%	25%	78%
M247Fe	Affleck Canal Till Lowlands	38%	2%	60%	100%
M247Ff	North POW Complex	0%	28%	18%	46%
M247Fg	Elevenmile Till Lowlands	0%	0%	52%	52%
M247Fh	Gulf of Esquibel Till Lowlands	12%	40%	48%	100%
M247Fi	Klawock Inlet Till Lowlands	0%	0%	7%	7%
M247Fj	Soda Bay Till Lowlands	0%	0%	44%	44%
M247Ga	Kake Volcanics	0%	0%	23%	23%
M247Gb	Duncan Canal Till Lowlands	6%	0%	35%	41%
M247Gc	Sumner Strait Volcanics	0%	1%	32%	32%
M247Gd	Central POW Till Lowlands	0%	3%	42%	45%
M247Ge	Kasaan Peninsula Volcanics	0%	0%	21%	21%
M247Gf	Skowl Arm Till Lowlands	0%	0%	29%	29%
M247Ha	Outer Islands Complex	100%	0%	0%	100%
M247Hb	Dall-Outside Complex	0%	19%	40%	59%
M247Ia	Central POW Volcanics	8%	0%	23%	31%
M247Ib	Hetta Inlet Metasediments	1%	9%	14%	25%
M247Ic	Moira Sound Complex	23%	0%	35%	59%
M247Ja	South POW Granitics	39%	0%	48%	88%
M247Jb	Duke Island Till Lowlands	0%	0%	72%	72%
M247Jc	Thorne Arm Granitics	19%	0%	40%	58%
M247Jd	Princess Bay Volcanics	62%	0%	8%	70%
M247Je	Foggy Bay Till Lowlands	100%	0%	0%	100%
M247Jf	Boca De Quadra Complex	100%	0%	0%	100%
M247Ka	Misty Fiords Granitics	96%	0%	2%	98%
	Total	**33%**	**4%**	**37%**	**74%**

[1] Note that totals may not add due to rounding.

Forty-two of the 73 ecological subsections on the Tongass National Forest have 20 percent or more of their lands inside the National Forest boundary within Wilderness, National Monument, or LUD II areas; 47 of the 73 subsections have 15 percent or more. Twenty-six of the subsections are not represented in Wilderness, National Monument, or LUD II areas. All of these subsections are represented in natural setting LUDs. Sixteen of the 17 ecological subsections with no Wilderness, National Monument, or LUD II representation have more than 20 percent of their areas in natural setting LUDs. The Klawock Inlet Till Lowlands has only 7 percent in natural setting LUDs.

Wilderness Management in Alaska

Monitoring has been minimal in most of the wilderness, but some resource damage and user conflicts have been observed in localized concentrated use areas. Monitoring in some of the more remote areas, such as the South Prince of Wales and Coronation Island wildernesses, indicates very little use but some resource damage and occupancy trespass. The areas with the greatest use and most management activities tend to have the greatest need for additional management direction to help resolve user conflicts and preserve the wilderness resource.

Implementation of existing direction has varied greatly between the various wildernesses. Some areas, such as Kootznoowoo (Admiralty Island) and Misty Fiords Wildernesses, have had significant management programs and accomplishments, while others have had minimal management activities. Some of these activities, such as fisheries enhancement projects and the authorization of temporary facilities for the taking of fish and wildlife, have resulted in administrative appeals by user groups who view these activities as conflicting with their use or wilderness values.

Management under the Wilderness Act

The Wilderness Act of 1964 mandates that designated "wilderness areas … shall be administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness."

Subject to existing private rights, the Act prohibits permanent roads and, except as necessary for realizing the recreation and other wilderness purposes of the area, commercial enterprises. Temporary roads, the use of motor vehicles, motorized equipment, other mechanized equipment, motorboats, the landing of aircraft, and structures and installations are prohibited except as necessary to meet minimum requirements for the administration of the area as wilderness. The Act provides that the use of aircraft or motorboats, where these uses have already become established, may be permitted to continue subject to restrictions by the Secretary of Agriculture. Wildernesses were withdrawn from mineral entry as of December 31, 1983, and patenting of valid claims is limited to subsurface mineral rights.

Management under the Alaska National Interest Lands Conservation Act

In ANILCA, Congress reaffirmed and expanded upon the purposes of wilderness as stated in the Wilderness Act of 1964, specifically for wilderness established in Alaska. In recognition of unique situations and established uses in Alaska, ANILCA also provided a number of important specific exceptions to the requirements of the Wilderness Act. These apply equally to TTRA Wilderness.

Subsistence Policy

Section 811 mandates that the Secretary "shall ensure that rural residents engaged in subsistence uses shall have reasonable access to subsistence resources on public lands." This section further directs that, other laws (including the Wilderness Act) notwithstanding, the Secretary "shall permit on the public lands appropriate use for subsistence purposes of snowmobiles, motorboats, and other means of surface transportation traditionally employed for such purposes by local residents, subject to reasonable regulation."

Transportation and Utility Systems

Section 1105 provides that in any case in which there is no applicable law with respect to a transportation or utility system, the head of the federal agency concerned shall make recommendations to authorize the system within the Conservation Unit concerned (including Wilderness) if he determines that the system would be compatible with the purposes for which the unit was established, and there is no economically feasible and prudent alternative route for the system. ANILCA (Section 506) includes specific exceptions for Admiralty Island National Monument Wilderness regarding the right to develop hydroelectric resources and public access and use.

Special Access

Section 1110(a) requires that the Secretary "shall permit" on Conservation Units, which include Wilderness, "the use of snowmachines (during periods of adequate snow cover or frozen river conditions, in the case of Wild or Scenic rivers), motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities (where such activities are permitted by this Act or other law) and travel to and from villages and homesites." Such use is subject to reasonable regulation, but shall not be prohibited unless after notice and hearing the Secretary finds that such use would be detrimental to the resource values of the area.

Inholding Access

Section 1110(b) assures adequate and feasible access to state and private land and to valid occupancies, including valid mining claims.

Navigation Aids and Facilities

Section 1310(a) provides that reasonable access to, and operation and maintenance of, existing air and water navigation aids, communication sites, facilities for national defense, and related facilities and existing facilities for weather, climate and fisheries research, and monitoring shall be permitted. "Nothing in the Wilderness Act shall be deemed to prohibit such access, operation and maintenance within wilderness areas designated by this Act." Section 1310(b) provides that the establishment, operation, and maintenance of new such facilities shall be permitted within wilderness after consultation with the Secretary and in accordance with mutually agreed upon terms and conditions to minimize the adverse effects within the unit.

Aquaculture

Section 1315(b) provides that the Secretary may permit fishery research, management, enhancement, and rehabilitation activities within National Forest System Wilderness, in a manner that adequately assures protection, preservation, enhancement, and rehabilitation of the wilderness resource. Subject to reasonable regulations, permanent improvements and facilities such as fishways, fish weirs, fish ladders, fish hatcheries, spawning channels, stream clearance, egg planting, and other accepted means of maintaining, enhancing, and rehabilitating fish stocks may be permitted.

Public Use Cabins

Section 1315(c) provides for the continued use, maintenance, and replacement of existing public use cabins within wilderness. Section 1315(d) authorizes the construction and maintenance of a limited number of new public use cabins and shelters, if necessary, for public health and safety, and also requires the Secretary to notify Congress of his intention to remove an existing or construct a new public use cabin or shelter.

Beach Log Salvage

Section 1315(f) allows the Secretary to permit or otherwise regulate the recovery and salvage of logs from the coastlines of National Forest Wilderness and National Monuments.

Temporary Hunting and Fishing Facilities

Section 1316(a) provides that the Secretary shall permit, subject to reasonable regulation to ensure compatibility, the continuation of existing uses and future establishment and use of temporary campsites, tent platforms, shelters, and other temporary facilities and equipment directly and necessarily related to the taking of fish and game. Facilities and equipment shall be constructed, used, and maintained in a manner consistent with the protection of the area where they are located. New facilities shall be constructed of materials that blend with and are compatible with the surrounding landscape. Section 1316(b) allows the Secretary to deny new facilities and equipment upon making a determination, after public notice, that the establishment and use of new facilities or equipment would constitute a significant expansion of existing facilities or uses that would be detrimental to the purposes for which the unit was established, including “wilderness character.”

Other Forest Plan Restrictions

In spite of its many exceptions to the Wilderness Act, ANILCA defines “wilderness” as having the same meaning as when it is used in the Wilderness Act (Sec. 102(13)). Further, Section 707 states that, except as expressly provided in ANILCA, Alaskan wilderness “shall be administered in accordance with applicable provisions of the Wilderness Act governing areas designated by that Act as Wilderness.” Some of the additional restrictions identified for Tongass wilderness by the current Forest Plan include the following:

- New roads and airstrips are not permitted, except to access state and private inholdings and valid mining claims, subject to stipulations for protection of natural and other values of the land.
- Helicopter use is generally not permitted, except on a case-by-case basis. In the 1997 Record of Decision for the Helicopter Landings in Wilderness Final EIS, the Regional Forester decided not to allow establishment of helicopter access areas within wilderness on the Tongass National Forest for use by individuals and helicopter companies transporting the general public.
- There is a party size limitation for outfitter/guide operations of no more than 12 persons for any one site or activity.
- No new permanent administrative facilities are allowed, except as consistent with ANILCA.

Environmental Consequences

None of the alternatives involves recommending new areas for Wilderness or LUD II designation. Roadless areas within the Tongass National Forest were evaluated for recommendations as potential wilderness in the 2003 Forest Plan SEIS (USDA Forest Service 2003b). The 2003 SEIS evaluated eight alternatives that range from no new recommended wilderness to 9.6 million acres (all inventoried roadless areas) of new recommended wilderness. This evaluation and the ROD for the 2003 SEIS are incorporated here by reference.

Direct and Indirect Effects

Existing wilderness on the Tongass, which encompasses approximately 5.8 million acres and represents about 34 percent of the forest land base and 28 percent of the land in Southeast Alaska, would remain unchanged under all of the alternatives. The existing 19 wildernesses on the Tongass are identified in Table 3.20-1. The acres of each biogeographic province and ecological subsection presently in Wilderness or LUD II areas on the Tongass would also remain unchanged (see Tables 3.20-2 and 3.20-3).

Alternatives 1 through 4, 6, and 7 would, however, differ from Alternative 5 (No Action) because under these alternatives wilderness on the Tongass would be managed under the updated and edited version of the current Forest Plan presented as Volume II to this EIS. The updated version of the Forest Plan includes substantial edits and clarifications to the Wilderness and Wilderness National Monument LUD prescriptions. These edits emphasize that wilderness should remain untrammeled and free from modern human control or manipulation, including actions taken to manage wilderness. The edits also modify the objectives of both LUD prescriptions to emphasize primitive Recreation Opportunity Spectrum (ROS) classes, rather than both primitive and semi-primitive ROS classes. Areas managed as semi-primitive within a wilderness are an exception and are not encouraged. In addition, new standards and guidelines that address forest health with respect to non-native, invasive species, sacred site protection activities, and karst management are included in the revised Wilderness and Wilderness National Monument LUD prescriptions. These edits and others are shown in the revised Forest Plan included in Volume II.

The updated Forest Plan also provides more specific standards and guidelines with respect to managing recreation activities to meet appropriate levels of social encounters. This includes limiting group sizes to no more than 12 persons for commercial and general public use of a wilderness, limiting the length of stay at one location to 14 days, and limiting commercial recreation use to two groups of 12 people from a single vessel (or other form of transportation), with the groups required to disperse out of sight and sound from each other. Implementation of these standards and guidelines is expected to help preserve outstanding opportunities for solitude and emphasize primitive recreation opportunities.

These edits and revisions are not intended to change the management of Wilderness or Wilderness National Monument areas. Rather, the intent is to ensure that the objectives of the LUD prescriptions laid out in the current Forest Plan are met. As a result, with the possible exception of the revised Recreation and Tourism Standards and Guidelines (discussed above), there is not expected to be a substantial difference between Alternative 5 (No Action) and the other alternatives in this respect.

Cumulative Effects

There would be no change in the number of acres with Wilderness or LUD II designations on the Tongass under any of the alternatives. While there are edits and clarifications to the Wilderness and Wilderness National Monument LUD prescriptions under six of the alternatives, these would not substantially change the management of these areas.

The Tongass National Forest comprises about 78 percent of the land area of Southeast Alaska. The other major land ownership is Glacier Bay Park and Preserve, the vast majority of which is managed as wilderness by the National Park Service. Combining the Glacier Bay Wilderness with the wildernesses on the Tongass, nearly 40 percent of Southeast Alaska is in wilderness under existing conditions. Thus, the proportion of lands in wilderness in Southeast Alaska is substantially higher than the statewide average for Alaska (15 percent). Further, the State of Alaska contains more wilderness, on both an acreage and percentage basis, than any of the other 49 states. In addition, as discussed in the *Roadless* section of this EIS, at least 60 percent of all existing inventoried roadless areas would remain roadless after 100+ years of Forest Plan implementation. As a result, it is estimated that at least 73 percent of Southeast Alaska would remain in wilderness or roadless after 100+ years (assuming all non-NFS lands become roaded, except for Glacier Bay and 50 percent of non-NFS lands in the Haines/Skagway area). Thus, the potential for cumulative effects associated with precluding options for future wilderness is considered low.

Other Special Land Use Designations

A number of specific areas on the Tongass National Forest that have not been designated as Wilderness or Land Use Designation (LUD) II areas are given special LUDs because they possess outstanding resources, research opportunities, or other factors of special interest. These areas include experimental forests, research natural areas, Special Interest Areas, and wild and scenic rivers. Each of these special areas is described, as are the effects of the alternatives on these areas, in this section.

Affected Environment

Experimental Forests

Experimental forests provide areas for conducting manipulative research that serves as a basis for forest management. Natural resources in experimental forests are used or altered under controlled scientific studies. The Tongass currently has two experimental forests, Maybeso and Young Bay, with a combined area of 17,260 acres. Their locations are indicated on the alternative maps.

Maybeso

Established in the early 1950s as a part of an intensive research program to document the effects of large-scale clearcutting on hydrology, fisheries, and timber productivity, the Maybeso Experimental Forest (10,600 acres) is located in a large steep-sided alluvial valley with a south to southeast-facing aspect near the central-eastern coast of Prince of Wales Island. By the early 1960s, most of the suitable forest land on the experimental area had been harvested. Permanent research plots were established and monitored to study hillslope erosion, movement of large woody debris in and through streams, forest regeneration, and silvicultural responses to precommercial thinning. Most of these plots are still monitored. The upper slopes of the Maybeso watershed are included in Roadless Area 510.

Because nearly all of the old-growth timber on the Maybeso Experimental Forest has been harvested, the timber in the area is primarily young growth. Consequently, there are limited opportunities to design new harvest-related experiments, except potential experiments concerning second-growth timber of up to 45 years in age. Only a limited variety of vegetation and timber types are now available within the area.

Young Bay

The Young Bay Experimental Forest (6,660 acres) is located just south of Juneau on northern Admiralty Island. Originally selected for long-term hydrologic and fisheries monitoring with a paired comparison between streams, this site was used extensively for fisheries and hydrology research in the 1960s and 1970s.

The Young Bay Experimental Forest has an extensive terrace, or bench, underlain by poorly drained marine silt (the Gastineau Formation) that extends across its lower slopes between sea level and an elevation of 100 feet. As a result of this formation, part of the experimental forest is open and relatively unproductive, which is atypical of areas normally managed for timber production in Southeast Alaska. Young Bay exhibits little forest vegetation-type diversity, making its use for studies not related to timber production difficult. High winds often limit access to the area during winter. There are no roads and, to date, no experimental vegetation treatments have occurred. The Young Bay Experimental Forest is located entirely within the Greens Creek Roadless Area 307.

The Tongass Timber Reform Act (TTRA) designated lands to the east of the Young Bay Experimental Forest as the "Young Lake Addition" to be managed as part of the Admiralty National Monument and Kootznoowoo Wilderness.

Young Bay has been considered for delisting as an experimental forest. This area has limited research opportunity, and limited applicability to other areas of the Forest. Manipulative research may not be compatible with the adjacent Monument/Wilderness addition.

Because of the TTRA legislation or other resource conflicts, Shaheen Creek, Trap Bay, Staney Creek and Chicken Creek watersheds, previously identified as possible experimental forests in the 1990 DEIS, are no longer appropriate for consideration and these areas were not included in the 1997 Forest Plan.

Research Natural Areas

Research Natural Areas (RNAs) are part of a national network of ecological areas designated for research and education and/or to maintain biological diversity of representative ecosystems on National Forest System (NFS) lands. RNAs are used for non-manipulative research, observation, and study. They also may serve to carry out provisions of special acts, such as the Endangered Species Act and the monitoring provisions of the National Forest Management Act.

Current Situation

Six RNAs were established within the Tongass National Forest prior to 1996. One of the six, Pack Creek, was declassified in the Record of Decision (ROD) for the 1997 Tongass Land Management Plan due to a long history of human presence related to viewing brown bears. At the same time, Pack Creek was re-designated as a zoological area to be managed under the Special Interest Area LUD. Seven additional areas were classified as RNAs by the 1997 ROD. That action resulted in the current total of 12 Tongass RNAs incorporating a total area of 66,059 acres. Brief descriptions of each follow below.

Cape Fanshaw RNA

Established in 1965, this 614-acre RNA is located at the junction of Frederick Sound and the Stephens Passage in Roadless Area 201. This area was established to represent undisturbed old-growth yellow-cedar and western hemlock forests. It represents a good example of cedar decline on the mainland, and has been used for long-term monitoring of changes in species composition and stand dynamics.

Dog Island RNA

Established in 1976, this 705-acre RNA is located on Dog Island in Roadless Area 521. The area represents a small island ecosystem containing the northern limit of

Pacific yew (*Taxus brevifolia*), associated scrub timber, and low-volume, mixed-conifer sites of southern Southeast Alaska.

Kadin Island RNA

Established in 1997, this 1,623-acre RNA is located just north of Wrangell in Roadless Area 225. Kadin Island experiences high winds blowing down through the Stikine River corridor. The high winds pick up silt from the unvegetated glacial river floodplain and cause the deposition of loess on the island at the river's mouth. The continuing rain of loess onto the upper soil layers provides a supply of unleached, nutrient-rich soil material to the forests of the island. The loess deposition overcomes the process of acid bog formation (paludification) that overtakes most stable sites of moderate topographic relief on the Tongass National Forest. Few areas in the world have a combination of high rainfall and recent loess deposition, so the properties of the soils here are of special interest. The fringe of the island is subject to tidal influence and changes in water level because of shifts of the river. Wetland marsh communities are included in this area. The bald eagle nest concentration on Kadin Island is second only to parts of Admiralty Island, according to the U.S. Fish and Wildlife Service.

Marten River RNA

Established in 1997, this 6,213-acre RNA is located within the Misty Fiords National Monument Wilderness adjacent to the Red River RNA. The Marten River RNA contains riparian spruce stands and has excellent habitat for brown bears along its major mainland streams.

Limestone Inlet RNA

Established in 1951 and expanded in 1971, this 9,102-acre RNA is located in Stephens Passage in Roadless Area 302. The area represents typical vegetation types common to the Juneau mainland, including many avalanche chutes and a mainland stream with a good fish population. In 1951, Limestone Inlet was considered the most pristine drainage in the northern mainland coast, making it an excellent area for documenting baseline conditions on the mainland. Alaska Department of Fish and Game has altered the native salmon runs since 1980 by operating a hatchery in nearby Snettisham Lake; however, upland areas remain intact.

Old Tom Creek RNA

Established in 1951, this 4,544-acre RNA is located on central Prince of Wales Island in Roadless Area 519. Situated in a low-site, cedar-dominated watershed, this RNA was established as an example of cedar-hemlock old-growth forest. It also includes some examples of riparian spruce forest, extensive tidal meadows, and dense bald eagle and black bear populations.

Red River RNA

Established in 1980, this 8,031-acre RNA is located in Misty Fiords National Monument Wilderness. This RNA represents the northern range of Pacific silver fir (*Abies amabilis).*

Rio Roberts RNA

Established in 1997, this 1,560-acre RNA is located on central Prince of Wales Island in Roadless Area 511. This area contains riparian flood plain spruce stands, upland old-growth and natural young-growth stands, and upland hemlock on drumlin fields. A high level of recreation use occurs in the area, including hiking, camping, boating, and fishing in the Thorne River near this RNA.

Robinson Lake RNA

Established in 1997, this 4,297-acre RNA is located in the Misty Fiords National Monument Wilderness. This RNA focuses on a natural slump lake, forest types typical of the southern portion of mainland Southeast Alaska, and some uncommon plants of restricted distribution in Alaska. Robinson Lake formed in recent years when a natural earthslide dammed Robinson Creek. The area extends to the shore of Behm Canal in order to include habitat diversity associated with the shoreline and proximity to deep water.

Tonalite Creek RNA

Established in 1997, this 9,515-acre RNA is located south of Tenakee Springs across Tenakee Inlet in Roadless Area 311. This RNA includes pristine examples of Sitka spruce, western and mountain hemlock, and yellow cedar forest types. The Tonalite drainage is a narrow glacial valley that supports runs of pink, chum, and coho salmon. The drainage is prime brown bear, Sitka black-tailed deer, and beaver habitat.

Warm Pass Valley RNA

Established in 1997, this 8,306-acre RNA is located along the U.S.-Canada border between the Taku River and Chilkat Pass in Roadless Area 301; the valley includes the northernmost example of subalpine fir in Alaska. The valley is also an important migration corridor for interior vegetation species that mix with the coastal forest and tundra. The Warm Pass Valley RNA has a very different climate caused by a pronounced rain shadow effect. The valley supports a good population of moose that use both the alpine shrub belt and riparian shrubs at lower elevation.

West Gambier Bay RNA

Established in 1997 to replace the Pack Creek RNA, this 11,549-acre RNA is located at the head of the west arm of Gambier Bay in Admiralty Island National Monument-Kootznoowoo Wilderness. The area includes long, narrow Pybus Lake and several smaller lakes; productive wildlife habitat; an anadromous fish stream; and a variety of geological features, including karst. West Gambier Bay contains forest and nonforest vegetation types typically found on the islands of northern Southeast Alaska.

Special Interest Areas

Special Interest Areas are areas possessing unique or unusual scenic, historic, prehistoric, scientific, natural, or other characteristics. The objective of designating and managing such areas is to protect their unique values and, where appropriate, to foster public use and enjoyment of these areas. Special Interest Areas may be designated as scenic, recreation, historic, archaeological, geological, botanical, zoological, or paleontological areas. Special Interest Areas differ from RNAs in that management may promote public use as well as scientific study.

Special Interest Area designations are intended to maintain natural to near-natural conditions in most cases; the Recreation Area designation may include developed facilities within a natural or near-natural setting. The resources contained within these areas are not available for development, except for public facilities designed to allow recreation use while protecting the values of the area, or for interpretation and scientific study. Each area may require unique management direction determined through individualized study and planning. Special Interest Areas may be withdrawn from mineral entry. The LUD for Special Interest Areas applies to all the designated areas.

Current Situation

Twenty-four Special Interest Areas have been designated within the Tongass National Forest. They occupy a total area of 629,782 acres (it should be noted that many of these acres are sometimes tabulated under another LUD category when the Special Interest Area occurs within a Congressionally designated area, e.g., Wilderness, National Monument, and LUD II). Eight of the 24 areas were designated prior to the 1997 Land Management Plan Revision. These include the following:

- Mendenhall Glacier Recreation Area (5,791 acres)
- Ward Lake Recreation Area (440 acres)
- Walker Cove-Rudyerd Bay Scenic Area (93,540 acres)
- Admiralty Lakes Recreation Area (8,710 acres)
- New Eddystone Rock Geological Area (1 acre)
- Hubbard Glacier Geological Area (46,000 acres)
- Tracy Arm-Fords Terror Scenic Area (283,000 acres)
- Naha Recreation Area (2,363 acres)

The remaining 16 Special Interest Areas, plus 1 expansion, were identified and designated with the 1997 Land Management Plan Revision as the following:

- Arena Cove/Cape Felix Geological Area (9,465 acres)
- Bailey Bay Hot Spring Recreation Area (3,510 acres)
- Blind Slough Recreation Area (8,150 acres)
- Blue River Lava Flow Geological Area (13,520 acres)
- Clear River Zoological Area (11,530 acres)
- Duke Island Zoological Area (44,650 acres)
- Falls Creek Windthrow Botanical Area (820 acres)
- Fish Creek Hotsprings Recreation Area (100 acres)
- Karst Areas Geological Areas (multiple areas totaling 13,635 acres)
- Keku Islet Geological and Scenic Area (2,300 acres)
- Mt. Edgecumbe Geological Area (49,050 acres)
- North Hamilton River Red Cedar Cultural and Botanical Area (80 acres)
- Pack Creek Zoological Special Interest Area (5,837 acres)
- Patterson Glacier Geological and Botanical Area (13,900 acres)

- Pike Lakes Recreation Area (2,340 acres)
- Soda Springs Geological Area (3,515 acres)
- Ward Lake Recreation Area Expansion (7,535 acres)

Eight of the Special Interest Areas have been designated within Wildernesses and/or National Monuments, or LUD II areas. These areas are already managed in a way that accounts for the Wilderness, National Monument, or LUD II area surrounding them. They include the following:

- Admiralty Lakes (Admiralty Island National Monument and Kootznoowoo Wilderness)
- Blue River Lava Flow (Misty Fiords National Monument and Wilderness)
- Hubbard Glacier (Russell Fiord Wilderness)
- Naha Recreation Area (Naha LUD II)
- New Eddystone Rock Geological Area (Misty Fiords National Monument and Wilderness)
- Pack Creek Zoological Special Interest Area (Admiralty Island National Monument and Kootznoowoo Wilderness)
- Tracy Arm-Fords Terror (Tracy Arm-Fords Terror Wilderness)
- Walker Cove-Rudyerd Bay (Misty Fiords National Monument and Wilderness)

Because the National Monument, Wilderness, and LUD II designations recognize and protect the same values for which the areas were originally designated, the Special Interest Area designation may have become redundant, and the possibility of declassifying these areas as Special Interest Areas is being explored by the Forest Service. No proposals for declassification are being made at this time.

The Tongass also contains a small portion of the 5-acre Fort Durham National Historic Landmark (most of which is on private land).

Special Interest Areas are not available for timber harvest, and roads would be allowed only if they are compatible with the interpretive goals of a particular area. Other restrictions may be imposed on a case-by-case basis to protect an area's unique values. These could include closures to off-highway (or off-road) vehicle (OHV) use, and withdrawals from mineral entry. Currently, the Mendenhall Glacier, Ward Lake, and Naha Recreation Areas are withdrawn from mineral entry. The need for such restrictions for newly designated or expanded areas may be determined during Forest Plan implementation.

Wild and Scenic Rivers

This section describes the process for Wild and Scenic River designation, and the rivers on the Tongass National Forest that are currently managed as wild and scenic rivers.

Background

The Wild and Scenic Rivers Act of 1968, as amended, provides a means for recognizing and protecting the "outstandingly remarkable" scenic, recreation, geologic, fish and wildlife, historic, cultural, ecological, and other values of selected rivers. The intent of including a river in the National Wild and Scenic Rivers System is to preserve the free-flowing condition of the river itself, as well as the characteristics of the river's immediate environment for the enjoyment and benefit of present and future generations. The U.S. Congress is responsible for final designation of rivers to be included in the National Wild and Scenic Rivers System.

ANILCA designated 26 rivers in central and northern Alaska as components of the National Wild and Scenic Rivers System under the Wild and Scenic Rivers Act of 1968. No rivers in Southeast Alaska or the Tongass National Forest were designated under ANILCA. An additional 12 rivers were designated as “study rivers” by ANILCA, of which only one, the Situk River near the community of Yakutat, is in Southeast Alaska and in the Tongass National Forest.

The Situk River, including the West Fork and Old Situk Creek, was studied in 1983 and was found to possess outstandingly remarkable fish, wildlife, and recreational values of national significance, but was not recommended for designation. The community of Yakutat, the local and regional Native corporations, the Citizens Advisory Council of Federal Areas, the Governor of the State of Alaska, and the Regional Forester on behalf of the Forest Service, signed an agreement to recognize each others’ responsibility in cooperative management of the Situk River corridor in lieu of designation as a Wild and Scenic River. The Alaska Land Use Council supported development of a management plan for the Situk River, rather than designation as a Wild and Scenic River (USDA Forest Service 1993a)) and the Secretary of the Interior formally determined to not recommend designation of the Situk River. The Situk River corridor continues to be managed through a cooperative process among the signatories to that agreement.

The National Park Service initiated an evaluation to determine the eligibility of the rivers within the National Parks and Preserves in Alaska. The Alsek River near Yakutat is included in that evaluation. The Tongass National Forest includes the surface and west bank of an 18-mile segment that was found to be eligible and meeting a “Scenic” classification.

The analysis and planning that led to the 1997 Forest Plan included a process for identifying rivers that could be eligible for inclusion in the National Wild and Scenic Rivers System. The process started with an inventory and evaluation to determine the eligibility, potential classification, and suitability for inclusion in the National Wild and Scenic Rivers System.

Rivers are eligible to be considered for inclusion in the National Wild and Scenic River System if they are essentially free-flowing (without major dams, diversions, or channel modifications), and if they possess at least one “outstandingly remarkable” scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar value. These values should be a unique or exceptional representation for the area studied, and must be related to the river or its immediate environment.

The potential classification for each eligible stream segment was done according to the criteria in the Wild and Scenic Rivers Act into either Wild, Scenic, or Recreational Rivers defined as follows:

- Wild River areas are defined as those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive in character and waters unpolluted. These represent vestiges of primitive America.
- Scenic River areas are defined as those rivers or sections of rivers that are free of impoundments with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.
- Recreational River areas are defined as those rivers or sections of rivers that are readily accessible by road or railroad, that may have undergone some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Eligible rivers are further evaluated for “suitability.” Generally this analysis considers the appropriateness of Congressional designation as a Wild, Scenic, or Recreational

River in light of social and economic values, or the resource opportunities enhanced, curtailed, or foregone, and the effect on private lands and other uses of the area. Suitable rivers may be recommended to Congress by the administration for designation. If designation occurs, a final boundary is established and a management plan developed.

There are nearly 900 watersheds on the Tongass National Forest containing some 42,500 miles of perennial stream. All of the rivers and streams on the Forest were examined and evaluated for eligibility for the National Wild and Scenic Rivers System. An initial evaluation identified 300 rivers and streams for further study. Of these, 112 rivers with 1,394 stream miles were determined to be eligible for consideration as components of the National Wild and Scenic Rivers System. More detail about the process that was used and the individual rivers studied is available in the 1997 Tongass Forest Plan Revision Final EIS.

Based on a suitability analysis, the Regional Forester recommended 32 of the 112 eligible rivers for inclusion in the National Wild and Scenic Rivers System as either Wild, Scenic, or Recreational (Table 3.21-1). Appendix E of the 1997 Tongass Land Management Plan Revision Final EIS provides descriptions of each river. The 1997 ROD contains the rationale for the decision made for each river. The recommendation was a preliminary administrative recommendation that would be forwarded to the Chief of the Forest Service. It could receive further review and possible modification by the Secretary of Agriculture and the President of the United States. Congressional action is necessary to designate rivers as part of the National Wild and Scenic Rivers System.

Because this was a preliminary administrative recommendation, the 1997 Forest Plan directs that the rivers be managed, within the existing authorities of the Forest Service, to retain their free-flowing character and outstandingly remarkable values. Three LUDs were created for these rivers, one for each classification: Wild River, Scenic River, and Recreational River. The 1997 Forest Plan includes goals, objectives, desired conditions, and specific management prescriptions for each LUD. The Wild and Scenic Rivers Act provides that the study boundary includes, at a minimum, the area within 0.25 mile of the ordinary high water mark on each side of the river (USDA Forest Service 1993b). Final boundaries can and do vary from this minimum, but generally follow the 0.25-mile guideline. The area of the recommended rivers managed under the Wild, Scenic, and Recreational River LUDs were determined so as to maintain the eligibility of the total miles of river for each classification.

Subsequent to the Regional Forester's 1997 Wild and Scenic River recommendations, the Acting Forest Supervisor determined that the recommendation for Niblack Lakes and Streams was based on incorrect information related to the anadromous fish productivity of the system. In November 1998, a non-significant of the 1997 Forest Plan rescinded the Wild and Scenic River recommendation and associated LUDs for Niblack Lakes and Streams (USDA Forest Service 1999c); therefore, Niblack Lakes and Streams is not included in this analysis.

Table 3.21-1
Rivers (Segments) Recommended for Inclusion in National Wild and Scenic River Program (in miles)

River Name	Wild	Scenic	Rec.	Outstandingly Remarkable Values: Fish	Wildlife	Recreation	Scenic	Hist./Cult.	Geology	Ecology
Aaron, Oerns, Berg Creeks	-	21	16	X	X	X	X	-	-	-
Anan Creek	17.5	.5	-	X	X	X	-	-	-	-
Blind River	-	-	5	X	X	X	-	-	-	X
Blue River	26	-	-	-	X	-	X	-	X	X
Chickamin River	94	2	-	X	X	X	X	X	X	-
Essowah Lake and Streams	13	-	-	X	X	-	X	-	-	-
Fall Dog Creek (local)	4	-	-	X	X	-	X	X	-	-
Farragut River	29	1	-	X	X	-	X	-	-	-
Gilkey River	9	-	-	-	-	-	X	-	X	-
Glacial River	10	-	-	-	-	-	X	-	X	X
Gokachin-Mirror-Low-Fish Creeks	30	-	-	X	X	X	X	X	-	-
Harding River	-	16	-	X	X	X	-	-	-	-
Hasselborg River and Lakes	24	-	-	X	X	X	-	X	-	-
Kadake Creek	-	-	23	X	X	X	X	X	-	-
Kadashan River	-	8	-	X	X	-	-	-	-	X
Kah Sheets Creek and Lake	5	4	-	X	X	X	-	X	-	-
Katzehin River	10	-	-	X	-	-	X	-	X	-
Kegan Lake and Streams	9	-	-	X	-	X	X	-	-	-
King Salmon River	8	-	-	X	X	-	-	-	-	-
Kutlaku Creek and Lake	2	-	-	X	-	-	-	-	-	-
LeConte Glacier	6	-	-	-	-	-	X	-	X	-
Lisianski River	5	-	-	-	X	-	-	-	-	X
Naha River	17	2	-	X	X	X	-	X	-	-
Niblack Lakes and Streams[1]	5	-	-	X	-	-	-	-	-	-
Orchard Creek and Lake	10	-	16	X	X	X	X	-	-	X
Petersburg Creek	7	-	-	X	-	X	X	X	-	-
Salmon Bay Lake and Stream	4	2	-	X	X	-	X	-	-	-
Santa Anna Creek - L. Helen	-	4	-	X	-	X	-	-	-	X
Sarkar Lakes	14	3	2	X	X	-	X	X	-	-
Thorne River-Hatchery Creek	-	24	18	X	X	X	X	-	-	-
Virginia Lake and Creek	-	-	9	X	-	X	-	-	-	-
Wolverine Creek-McDonald Lake	6	-	-	X	X	X	-	-	-	-
Total Miles	**359.5**	**87.5**	**89.0**							

[1] Niblack was later removed from the list.

Current Situation

Congress has not yet designated any rivers on the Tongass National Forest to be included in the National Wild and Scenic Rivers System.

The goal for management of the rivers that were recommended for Wild and Scenic designations is to maintain their outstandingly remarkable values and their free-flowing conditions. The objective is to manage the 31 rivers (or segments), pending designation by Congress as Wild, Scenic, or Recreational Rivers, to maintain the eligibility of the total miles of river for the Wild, Scenic, or Recreational classification.

The goal is to be achieved through the management of the rivers (or segments) under the LUD of Wild River, Scenic River, or Recreational River and implementation of the standards and guidelines specified for the LUD. These are summarized below and described in more detail in the 1997 Forest Plan.

Wild River LUD. This is the most restrictive of the three LUDs. Scheduled timber harvest and construction of major recreation facilities, roads, and hydroelectric power projects are not allowed. Mining may be allowed or the area may be withdrawn from mineral entry by Congress at the time of designation as a Wild River. Some fish and wildlife habitat enhancement are permitted. This is a Transportation and Utility Systems "Avoidance Area," but corridors will be allowed in accordance with ANILCA, Title XI. Twenty-three river segments, or 359.5 river miles, are currently managed under this LUD.

Scenic River LUD. Hydroelectric power projects are not allowed, but timber harvest is allowed if the adjacent LUD allows timber harvest. Major recreational developments may be compatible with this LUD and minor developments are allowed. The construction of NFS roads is allowed and bridges may occasionally span the river. Mining and some fish and wildlife habitat enhancement are permitted. This is a Transportation and Utility Systems "Avoidance Area" but corridors will be allowed in accordance with ANILCA, Title XI. Twelve river segments, or 87.5 river miles, are currently managed under this LUD.

Recreational River LUD. Although hydroelectric power projects are not allowed, many other management activities are permitted. Timber harvest is allowed if the adjacent LUD allows timber harvest. Major and minor recreational developments and NFS roads that make the river easily accessible are allowed. Mining and some fish and wildlife habitat enhancement are permitted. This is a Transportation and Utility Systems "Avoidance Area," but corridors will be allowed in accordance with ANILCA, Title XI. Seven river segments, or 89 river miles, are currently managed under this LUD.

The LUD(s) for adjacent land can have significant influence on the management of resources inside Wild, Scenic, or Recreational River LUDs. Many of the corridors designated to the Wild River, Scenic River, or Recreational River LUD are narrow and include the width of the river plus 0.25 mile on each side. The most obvious example of the adjacent LUD influence is that the ability to harvest timber in Scenic or Recreational River LUDs is dependent on the management prescription for timber in the LUD(s) of the adjacent land. In a more indirect way, it may influence other resources, such as scenery, recreation, or road building. For example, if the surrounding land is designated Remote Recreation where no new roads are allowed, it is less likely that a road will be proposed for a Scenic or Recreational River area.

Of the 536 miles of recommended Wild, Scenic, or Recreational Rivers, 221 miles of seven rivers, or 41 percent of the river miles in Wild, Scenic, or Recreational River LUDs, are already in areas allocated to Wilderness or National Monument Wilderness. Most of the remaining Wild, Scenic, or Recreational River miles outside of designated wilderness are surrounded by land currently in non-development LUD designations. Although there are differences in specific management prescriptions for each of the LUDs, there are some common directions. In general, timber harvest is not suitable in the non-development LUDs, and new roads are not allowed or are restricted to specific uses. Minor recreational development is consistent with most non-development LUDs and major recreational development is consistent only with Semi-Remote Recreation. Generally, the non-development status and resulting management prescriptions in these adjacent lands may reduce the likelihood of development in the Scenic or Recreational River LUD.

Wild and Scenic Rivers and Wilderness Management

According to the Wild and Scenic Rivers Act, any portion of a component of the Wild and Scenic Rivers System that is within a wilderness shall be subject to the provisions of both the Wilderness Act and the Wild and Scenic Rivers Act. In the case of conflict between the provisions of these Acts, the more restrictive provisions shall apply (USDA Forest Service 1993b). Thus, there are the dual, but overlapping goals of the preservation of the wilderness resources while at the same time preserving the river and its immediate environment. Because the two laws differ somewhat, legislative action should address specific issues in a particular river corridor.

A variety of recreation types are allowed by managing the rivers as Wild, Scenic, or Recreational. Wild River designation is compatible with wilderness designation because they both provide primitive and semi-primitive recreation opportunities. Scenic and Recreational River designations provide other opportunities that are more developed than those allowed in areas designated as Wild River.

Environmental Effects

Direct and Indirect Effects

Experimental Forests

The primary proposed change involving experimental forests under the action alternatives is the recommended replacement of one of the two existing experimental forests with a management unit better suited to this purpose. As indicated in the Affected Environment discussion, the Young Bay Experimental Forest provides limited opportunities for forestry research and has not been used for experimental purposes in recent decades. Therefore, all alternatives except Alternative 5 propose to eliminate the Young Bay Experimental Forest and designate the Cowee-Davies area as a new experimental forest. Alternative 5, No Action, continues the current designations and retains the Young Bay Experimental Forest.

The current Forest Plan provides standards and guidelines to maintain research opportunities within the two existing experimental forests. Those standards and guidelines have been updated for the Forest Plan Amendment, primarily to include protection for sacred sites and to address inventory and interpretation activities for minerals and geologic resources. Those changes would have no substantive effects on resources present within the experimental forest areas, other than to provide updated management direction for protection of sacred sites, minerals, and geologic resources. The updated standards and guidelines would be applied to the experimental forests designated under all of the action alternatives.

The potential effects associated with the land use allocations of the alternatives on existing and proposed experimental forest areas are described below.

Maybeso Experimental Forest

The Maybeso Experimental Forest offers limited opportunities in the near term to design new experiments (except relative to thinning regimes and management of very young second-growth timber) because most of the suitable forest land had been harvested by the 1960s. Monitoring of research plots established in this area some time ago would continue under all alternatives. New experiments could be conducted in the future. If so, they would likely be rather limited in scope and would probably occur in areas that had previously been harvested.

Young Bay Experimental Forest

The Young Bay Experimental Forest has for some time been considered for delisting as an experimental forest because of the vegetative and access conditions that limit the value of the area for research. The primary reason to retain Young Bay as an experimental forest is to maintain options in light of the Alaska Region's Ecosystem Management Strategy. Potential research could include alternative silvicultural systems and/or manipulating vegetation to create desired wildlife habitat conditions.

If or when such research activities are undertaken, any silvicultural activity would likely use a helicopter yarding method with no road construction, and would likely focus on alternatives to clearcutting. Vegetative manipulation for desired wildlife habitat conditions would likely result in small openings or single tree selection harvesting, also using a helicopter with no roads. This type of research activity would be a possible occurrence under Alternative 5.

Under Alternatives 1, 2, 3, 4, 6, and 7, the Young Bay area would no longer be designated as an experimental forest. Under these alternatives, the Young Bay area would be changed to the Semi-Remote Recreation LUD, consistent with the adjacent NFS lands to the northwest on the Mansfield Peninsula of Admiralty Island. While this is a non-development, mostly natural LUD that is nominally more restrictive of management activities than the Experimental Forest LUD, there would actually be little tangible change in management of the area given the lack of research activities conducted in this area under the past designation.

Cowee-Davies Experimental Forest

Alternatives 1, 2, 3, 4, 6, and 7 include changing the LUD of approximately 22,300 acres in the Cowee-Davies watershed to experimental forest and recommending this area for official designation as an experimental forest. This area comprises Value Comparison Units 230 and 240 and is located on the east side of Lynn Canal approximately 40 to 50 miles north of Juneau. The southwestern side of the proposed experimental forest follows the Lynn Canal shoreline but is set back a few miles, and the northern edge abuts the Berners Bay LUD II designation. The current LUD for the proposed Cowee-Davies Experimental Forest is Scenic Viewshed which, like the Experimental Forest designation, is a moderate development LUD. There would be little change in the type and intensity of management activities in this area under the proposed designation compared to current management.

Research Natural Areas

This section focuses on the effects of the alternatives on current RNAs. All seven alternatives include continued RNA designation for the 12 existing RNAs at their current respective acreages. Likewise, none of the alternatives includes proposed designation of any new RNAs. Therefore, none of the alternatives would have any direct effects on RNAs. Any potential effects of the proposal would be indirect effects associated with changes in LUDs in areas adjacent to RNAs.

Table 3.21-2 summarizes the types of LUDs surrounding RNAs under each alternative. Alternatives 1 and 2 are the same with respect to the distribution of LUDs in areas adjacent to RNAs. Both alternatives maintain current management practices that would have little to no effect on 10 of the 12 RNAs. In both cases, the only changes from current management direction are that the Limestone Inlet and Tonalite Creek RNAs would be entirely surrounded by LUDs in the natural setting group, while those areas currently have LUDs in the natural setting, moderate development, and intensive development groups. Alternatives 1 and 2 would slightly reduce the chance that management activities in adjacent areas would indirectly affect research activities in those two RNAs.

LUDs surrounding the 12 RNAs under Alternative 3 are very similar to those currently in effect (Alternative 5) and to what would occur under Alternatives 1 and 2. Limestone Inlet would also be surrounded by natural setting LUDs under Alternative 3, instead of the current mix of natural setting, moderate development, and intensive development LUDs. Both natural setting and intensive development

Table 3.21-2
Summary of LUDs Surrounding Research Natural Areas by Alternative

Research Natural Area	Alternative						
	1	2	3	4	5	6	7
Cape Fanshaw	N	N	N	M	N	N	M
Dog Island	-	-	-	-	-	-	-
Kadin Island	-	-	-	-	-	-	-
West Gambier Bay	W	W	W	W	W	W	W
Marten River	W	W	W	W	W	W	W
Limestone Inlet	N	N	N	M/I	M/I/N	M/N/I	M/N/I
Old Tom Creek	N/I	N/I	N/I	N/I	N/I	N/I	I
Red River	W	W	W	W	W	W	W
Rio Roberts	N	N	N	M/I	N	N	N/M/I
Robinson Lake	W	W	W	W	W	W	W
Tonalite Creek	N	N	N/I	N/I	N/I	N/I	N/I
Warm Pass Valley	N	N	N	N	N	N	N

Note: Letter symbols represent the following: N = Natural Setting LUD group; W = Wilderness LUD group; M = Moderate Development LUD group; I = Intensive Development LUD group.

LUDs would adjoin the Tonalite Creek RNA under Alternative 3 because they do under current management.

Under Alternative 4, management designations would change for some lands adjacent to three of the RNAs. The Rio Roberts RNA would be surrounded by LUDs in the moderate and intensive development groups. This would be a change from current management, under which natural setting LUDs surround the RNA. Similarly, the Limestone Inlet RNA would be surrounded by LUDs in the moderate and intensive development groups, while a natural setting LUD (old-growth habitat) currently abuts the west and south sides of this RNA. Finally, the NFS lands adjacent to the Cape Fanshaw RNA would be changed from a natural setting LUD (old growth) to a moderate development LUD (scenic viewshed). Based on these changes, Alternative 4 would increase the chance that management activities in adjacent areas would indirectly affect research activities in these three RNAs.

Alternative 6 would maintain the current LUDs in areas adjacent to all 12 RNAs. Therefore, Alternative 6 would have no direct or indirect effects on RNAs.

Similar to Alternative 4, Alternative 7 would intensify management designations adjacent to three RNAs. As with Alternative 4, the NFS lands adjacent to the Cape Fanshaw RNA would be changed from a natural setting LUD (old growth) to a moderate development LUD (scenic viewshed). The Rio Roberts RNA would be surrounded by LUDs in the natural setting and moderate and intensive development groups, while under current management only natural setting LUDs surround the RNA. Similarly, the Old Tom Creek RNA would be adjoined by an intensive development LUD (timber production), rather than the current mix of natural and intensive development LUDs. Overall, Alternative 7 would increase the chance that management activities in adjacent areas would indirectly affect research activities in these three RNAs.

The West Gambier Bay, Marten River, Red River, and Robinson Lake RNAs are already part of designated wildernesses, and the management situation for these areas would not change under any alternative. Similarly, the Dog Island and Kadin Island RNAs are surrounded by water and would not be affected by any LUD changes among the alternatives.

The current Forest Plan provides standards and guidelines to preserve areas of ecological importance and maintain research opportunities within the existing RNAs. Those standards and guidelines have been updated for the Forest Plan Amendment, primarily to include consultation and protection for heritage and sacred sites and to address inventory and interpretation activities for minerals and geologic resources. The updated standards and guidelines also direct that designation of motorized routes for OHVs in RNAs is generally not allowed. Those changes would have no substantive effects on resources present within the RNAs, other than to provide updated management direction for protection of sacred sites, minerals, and geologic resources. The updated standards and guidelines would be applied to the RNAs designated under all of the action alternatives.

Special Interest Areas

This section focuses on the effects that each alternative would have on existing or proposed Special Interest Areas. Alternative 5 (No Action) would maintain the 24 existing Special Interest Areas at their current acreages, and would result in no direct effects on these areas. Alternatives 1 through 4 and 6 and 7 would also continue the current designations and acreages for 23 of the 24 existing Special Interest Areas, modify the acreage of one geologic area, and add new geologic Special Interest Areas in nine regions of the Tongass.

Under Alternative 5, the total acreage within Special Interest Areas (outside of Wilderness, National Monument, and LUD II) would remain at approximately 174,000 acres. Under all other alternatives this figure would be approximately 221,000 acres, an increase of 47,000 acres. Alternatives 1 through 4 and 6 and 7 would provide increased management protection for sensitive geologic resources on the Tongass, primarily karst and cave areas, and would result in a reduced chance that these resources would be damaged by development activities.

The proposed acreage reduction among geologic Special Interest Areas involves the Arena Cove/Cape Felix area on Suemez Island. The current boundary of this area includes approximately 9,700 acres; the revised boundary encompasses approximately 7,400 acres, which is sufficient to protect the volcanic features that are the primary interest for this area. This change in the LUD represents a technical adjustment to correct a mapping error from the 1997 Tongass Land and Management Plan.

Increased acreage in proposed Special Interest Area LUDs under Alternatives 1, 2, 3, 4, 6, and 7 reflect both designation of new areas and expansion of existing areas. These changes are summarized as follows:

- Eastern Chichagof Geological Areas – 12 new areas encompassing approximately 23,900 acres, primarily to protect alpine karst areas, except for one that includes the Kook Lake cave system.
- Kosciusko Island Geological Areas – two new areas including approximately 9,400 acres with intense karst development.
- Northern Prince of Wales Geological Areas – three new areas and one expanded area (part of the Karst Areas Geological Area) covering approximately 2,800 acres (adding to 11,100 existing designated acres in this region), primarily to protect several cave systems in karst areas.
- Heceta Island Geological Area – one new area of approximately 4,100 acres that includes a number of karst-related caves.
- North-central Prince of Wales Geological Areas – two new areas including approximately 700 acres with similar cave systems.

- Dall Island Geological Areas – minor reductions to two existing areas (part of the Karst Areas Geological Area), based on improved inventory work on cave systems, and one new area for a net increase of approximately 9,100 acres.
- Big Creek Geological Area – one new area of alpine karst near Big Creek, just south of the West Arm of Cholmondeley Sound on southern Prince of Wales Island, incorporating approximately 2,000 acres.
- Calamity Creek Caves Geological Area – one new area of approximately 200 acres on Revillagigedo Island, to protect the Calamity Creek Caves and associated karst features.
- Blake Channel Geological Area – one new area of approximately 700 acres near Aaron Creek, to protect a karst and cave system.

The current Forest Plan provides standards and guidelines for managing the existing Special Interest Areas. Those standards and guidelines have been updated for the Forest Plan Amendment, primarily to include direction to inventory and manage karst resources and minerals and geologic resources. The updated standards and guidelines also direct that designation of motorized routes for OHVs in Special Interest Areas is generally not allowed. Those changes would have no substantive effects on resources present within the Special Interest Areas, other than to provide additional specific direction for protection of resources in those areas. The updated standards and guidelines would be applied to the Special Interest Areas designated under all of the action alternatives.

The acreage allocated to the existing and proposed Special Interest Areas is believed to be sufficient to include and protect the resources of interest for each respective unit. Therefore, none of the alternatives are expected to result in indirect effects associated with management activities that might occur in LUDs adjacent to Special Interest Areas.

Wild and Scenic Rivers

All seven alternatives include continued Wild, Scenic, and/or Recreational River LUD designation for the 31 existing river segments designated as potential Wild, Scenic, and/or Recreational Rivers under the current Forest Plan, and at their current respective acreages. These river segments would continue to be managed to protect the outstandingly remarkable values that make them eligible for designation as Wild, Scenic and/or Recreational Rivers by Congress. Likewise, none of the alternatives include proposed designation of any new Wild, Scenic, and/or Recreational Rivers. Therefore, none of the alternatives would have any direct effects on the potential future status of any Wild, Scenic, and/or Recreational Rivers. Any potential effects of the proposal would be indirect effects associated with changes in LUDs in areas adjacent to RNAs.

The current Forest Plan provides standards and guidelines for managing the existing Wild, Scenic, and Recreational River LUDs. Those standards and guidelines have been updated for the Forest Plan Amendment, primarily to include consultation protection for heritage and sacred sites and direction to inventory and manage karst resources and minerals and geologic resources. The updated standards and guidelines also direct that designation of motorized routes for OHVs in Special Interest Areas is generally not allowed in Wild River LUDs, but is allowed in Scenic and Recreational rivers. Those changes would have no substantive effects on resources present within the Wild, Scenic, and Recreational River LUDs, other than to provide additional specific direction for protection of resources in those areas. The updated standards and guidelines would be applied to the Special Interest Areas designated under all of the action alternatives.

Management Provisions

The kinds and amounts of activities and changes acceptable within a river corridor depend on whether it was recommended as a Wild, Scenic, or Recreational River and, to some extent, the LUDs of areas adjacent to the river segment. Variations in management restrictions among Wild, Scenic, and Recreational River LUDs are summarized below.

Recreation. The recreational objectives for management of Wild, Scenic, and Recreational River LUDs are substantially different. While the Wild River LUD ROS class is the same as Wilderness, there are small differences in specific implementation guidelines. Wilderness management has much more restrictive management than Scenic and Recreational River LUDs. LUD II management is less restrictive than Wild River or Wilderness, but more restrictive than Scenic or Recreational River.

Timber Harvesting. Timber harvesting and associated roads and log transfer facilities are presently only allowed in the Scenic and Recreational Rivers when they are adjacent to LUDs that allow timber harvest. There are only 13 miles of rivers in this situation. Costs of harvest in the Scenic and Recreational River LUDs may be higher than other LUDs as a result of standards to maintain identified values.

Water Project Development. New diversions, water supply dams, and hydroelectric power development are not allowed under the Wild, Scenic, and Recreational River LUDs.

Transportation and Utility Corridors. All three river designations are in Transportation and Utility System “Avoidance Areas.” Thus, transportation and utility sites or corridors may be located within these LUDs only after an analysis of potential sites shows that there is no feasible alternative outside these LUDs.

Mining. Mineral entry is not denied in Wild, Scenic, or Recreational River LUDs, but it does need to be consistent with the purposes of the LUD so the eligibility for Congressional designation is maintained. Costs of mining in these areas may be higher than in other LUDs as a result of standards to maintain identified river values. Congressional designation of a river as Wild under the national program would then deny mineral entry, subject to valid claims, but would not affect Scenic or Recreational Rivers.

Roads. New road construction is not allowed in the Wild River LUD. Roads are allowed in the Scenic and Recreational River LUDs and bridges can span the river. If road construction is not allowed in the adjacent area, it is less likely that roads would be planned in the river area. Only 13 miles of the river corridors in roadless areas are within LUDs that allow road construction for forest development.

Fish Improvement Projects. Fish habitat improvements are generally more restricted under Wild, Scenic, and Recreational River designations than under Wilderness or LUD II. In the three Wild and Scenic River LUDs, the free-flowing characteristic and outstandingly remarkable values must be maintained, which limits the projects that can be implemented. Weirs and other stream obstructions are either prohibited or discouraged. However, weirs are a tool of state management of fisheries, installed seasonally, and are not considered to be stream obstructions in the same vein as dams and permanent facilities.

Wildlife Habitat Improvements. In Wild, Scenic, and Recreational River designations, the wildlife habitat improvements are limited to those with the objective of protecting or restoring the river resource and enhancing the outstandingly remarkable value. Manipulation of vegetation or improvements, such as fencing or artificial nest structures, would likely be incompatible with Wild classification. Other improvements might be compatible with a Scenic designation, as long as the undeveloped character was maintained. Most improvements would be acceptable in a Recreational classification, consistent with the outstandingly remarkable values.

Area-Specific Considerations

In addition to the general issues for the Forest activities described above, there are specific resource issues associated with some individual rivers (segments).

Aaron, Oerns, Berg Creeks – Approximately 4 miles of Aaron and Berg creeks are within and adjacent to a corridor with known mineral potential for zinc, copper, silver, and lead. The Bureau of Land Management (BLM) lists this area's potential for mineral development at its highest level (USDA Forest Service 1997a). It has a Mineral LUD overlay that encourages mineral development and may allow road building for mining purposes. There are no existing mineral claims on the river corridor, but the claims in adjacent land may require roads through the river corridor. This corridor has been recommended as Scenic or Recreational River, and designation by Congress as such would not deny mineral rights.

Glacial River – This is not an area of identified high mineral potential for known resources, but the upper half of the river is in a Class 3 tract of undiscovered mineral resources, as mapped by the U.S. Geologic Survey (USGS). This area was recommended to be included in the National Wild and Scenic Rivers System as Wild. Congressional designation as a Wild River would close the corridor to mineral entry, subject to valid existing claims.

Gokachin-Mirror-Low-Fish Creeks – The area within and adjacent to the corridor near Gokachin Creek has been identified by the BLM as having high priority for minerals development. There are several unpatented mine claims within the corridor. This area was recommended to be included in the National Wild and Scenic Rivers System as Wild, which, with Congressional action, would withdraw it from mineral entry.

Kadake Creek – The timber sale schedule identifies numerous entries in and adjacent to this corridor. The river was recommended as a recreational river, thus preserving the ability to harvest timber on most of the corridor's 23 miles (USDA Forest Service 1997a).

Kah Sheets Creek and Lake – Approximately 5 miles of this area are in the Wild River LUD, where timber production is not allowed. Approximately 2 miles are in a Scenic River LUD and are adjacent to a Timber Production LUD. Timber production is allowed in those 2 miles.

Orchard Creek and Lake – The lower portion of the river was recommended as Recreational River to allow the construction of the Swan Lake-Lake Tyee transmission line (USDA Forest Service 1997a). The transmission line has since been located outside this area.

Sarkar Lakes – This area is extremely popular for recreation, with an emphasis on fishing (USDA Forest Service 1997a). Portions of it were recommended as Scenic and Recreational Rivers. The area on the south side of Sarkar Cove is known to have potential mineral development. BLM has not identified the area as having high potential for mineral development and no mining claims exist (USDA Forest Service 1997a).

Virginia Lake – USGS estimates the undiscovered mineral resource to have a moderate value. BLM lists this area as having potential for mineral development. There are no existing claims in the river corridor in the Recreational River LUD (USDA Forest Service 1997a). The timber sale schedule identifies two sales for this management area that could occur within and adjacent to this corridor, consistent with the Recreational River prescription (USDA Forest Service 1997a).

Ecological, scenic, and recreational attributes within the Wild, Scenic, and Recreational River LUDs could be indirectly affected by activities permitted within adjacent LUDs. Table 3.21-3 summarizes the types of LUDs adjacent to Wild, Scenic, and Recreational River LUDs under each alternative.

For most of the river segments, all seven alternatives are identical with respect to the LUDs for lands adjacent to the rivers. Six of the river LUDs (Blue River, Chickamin River, Hasselborg River and Lakes, King Salmon River, LeConte Glacier and Petersburg Creek) are within designated wilderness areas. Similarly, five river LUDs (Anan Creek, Kadashan River, Lisianski River, Naha River, and Salmon Bay Lake and Stream) are entirely or predominantly within LUD II areas. Aside from these river segments within Congressionally designated units, lands adjacent to nine other Wild, Scenic, or Recreational River LUDs remain the same for all seven alternatives. In almost all cases, these adjacent LUDs are in the mostly natural setting LUD group.

Differences among the alternatives with respect to LUDs adjacent to Wild, Scenic or Recreational Rivers apply to 11 of the river LUDs. In most cases, Alternatives 1 and 2 would result in more lands adjacent to river segments in natural setting LUDs. Alternative 7 and, to a lesser extent, Alternative 4 would result in more extensive areas of moderate and intensive development LUDs adjacent to river segments.

Table 3.21-3
LUDs Adjacent to Wild, Scenic, and Recreational Rivers by Alternative

River Name	Alternative						
	1	2	3	4	5	6	7
Aaron, Oerns, Berg Creeks	N	N	N	N	N	N	N
Anan Creek	N	N	N	N	N	N	N
Blind River	N	N	N	N	N	N	N/M
Blue River	W	W	W	W	W	W	W
Chickamin River	W	W	W	W	W	W	W
Essowah Lake and streams	N	N	N	N	N	N	N
Fall Dog Creek (local)	N	N	N	N	N	N	N
Farragut River	N	N	N	N	N	N	N
Gilkey River	N	N	N	N	N	N	N
Glacial River	N	N	N	N	N	N	N
Gokachin-Mirror-Low-Fish Creeks	N/W	N/W	N/W	N/W/I	N/W	N/W	W/M/I
Harding River	N	N	N	N/M	N/M	N/M	N/M
Hasselborg River and Lakes	W	W	W	W	W	W	W
Kadake Creek	N/M/I	N/M/I	N/M/I	N/M/I	N/M/I	N/M/I	N/M/I
Kadashan River	N	N	N	N	N	N	N
Kah Sheets Creek and Lake	N	N	N/I	N/I	N/I	N/I	N/I
Katzehin River	N	N	N	N	N	N	N
Kegan Lake and streams	N	N	N/I	N/M/I	N/I	N/I	N/M/I
King Salmon River	W	W	W	W	W	W	W
Kutlaku Creek and Lake	N	N	N	N	N	N	N
LeConte Glacier	W	W	W	W	W	W	W
Lisianski River	N	N	N	N	N	N	N
Naha River	N	N	N	N	N	N	N
Orchard Creek and Lake	N	N	N/I	N/M/I	N	N/I	N/M/I
Petersburg Creek	W	W	W	W	W	W	W
Salmon Bay Lake and stream	N/M	N/M	N/M	N/M	N/M	N/M	N/M
Santa Anna Creek - Lake Helen	N	N	N/I	I	N/M/I	N/I	M/I
Sarkar Lakes	N/M/I	N/M/I	N/M/I	N/M/I	N/M/I	N/M/I	N/M/I
Thorne River-Hatchery Creek	N/M/I	N/M/I	N/M/I	N/M/I	N/M/I	N/M/I	M/N
Virginia Lake and Creek	N	N	M	M	M	M	M
Wolverine Creek-McDonald Lake	N	N	I	N	N	N	N

Note: Letter symbols represent the following: N = Natural Setting LUD group; W = Wilderness LUD group; M = Moderate Development LUD group; I = Intensive Development LUD group.

Cumulative Effects

There would be no change in the number of units or acres with RNA or Wild, Scenic, or Recreational River LUDs under any of the alternatives. As a result, there would be no cumulative effects associated with these types of special LUDs under the Forest Plan Amendment. With respect to both Experimental Forests and Special Interest Areas, Alternative 5 would maintain the current acreage within these LUDs, while all other alternatives would recommend increases in the acreage. The net effect of these proposed changes would be a minor increase in the total acreage within mostly natural setting LUDs, and a slight decrease in the extent of developmental activities within the Tongass. As a result, there would be no cumulative effects associated with special LUDs under Alternative 5, and a slightly reduced potential for cumulative effects to Tongass resources under all other alternatives.

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Economic and Social Environment

Affected Environment

Introduction

The Tongass National Forest stretches roughly 500 miles from Ketchikan in the southeast to Yakutat in the northwest and includes approximately 80 percent of the land area in Southeast Alaska. The region is sparsely settled with more than 70,000 people living in 32 towns and villages located in and around the Forest. The communities of Southeast Alaska depend on the Tongass National Forest in various ways, including employment in the wood products, commercial fishing and fish processing, recreation, tourism, and mining and mineral development sectors. Many residents depend heavily on subsistence hunting and fishing to meet their basic needs. In addition, natural amenities, subsistence resources, and recreation activities associated with the Tongass National Forest form an important part of the quality of life for many residents of Southeast Alaska. Since there is very little private land in the region to provide these resources and opportunities, appropriate management of the Tongass National Forest is extremely important to local communities and the overall regional economy.

The Tongass National Forest is also an important national and international resource, with an estimated 948,000 cruise ship passengers visiting Juneau in 2005 (McDowell Group 2005), representing a 48 percent increase since 2000. For many, a visit to the Tongass is a once-in-a-lifetime experience and the spending by these visitors drives the recreation and tourism sector, which is the largest natural resource-based sector in the regional economy. The Tongass National Forest contains large areas of essentially undisturbed forest lands, which represent increasingly scarce and, therefore, increasingly valuable ecosystems. These lands have value for many people who may never visit Southeast Alaska, but benefit from knowing that the Tongass National Forest is there. This type of value, often referred to as non-use value, includes existence, option, and bequest values. These values represent the value that individuals obtain from knowing that the Forest exists, knowing that it would be available to visit in the future should they choose to do so, and knowing that it would be left for future generations to inherit.

The economic and social assessment prepared for this EIS is divided into two main sections: 1) Regional and National Economy, and 2) Subregional Overview and Communities. This section—*Economic and Social Environment*—evaluates the potential regional and national economic impacts. The next section—*Subregional Overview and Communities*—also assesses impacts to the economic and social environment, but at the subregional and community level.

Southeast Alaska is divided into five boroughs and three census areas. The five boroughs correspond with the county governments found elsewhere in the United States. Three of these boroughs, Juneau, Sitka, and Yakutat, are city/boroughs. The other two, Ketchikan Gateway and Haines, have independent incorporated communities within their boundaries. The remaining areas that are not part of a borough are allocated to three census areas: Prince of Wales-Outer Ketchikan, Skagway-Hoonah-Angoon, and Wrangell-Petersburg. While census areas are only statistical units, they are widely recognized from a data reporting standpoint by federal agencies and most state agencies as county equivalents.

More than 70,000 people live in the towns, communities, and villages of Alaska's southeastern panhandle, most of which are located on islands or along the narrow coastal strip. Only four of Southeast Alaska's 32 communities met the U.S. Census Bureau's 2000 definition of an urban cluster (population greater than 2,500) in 2005 (Juneau, Sitka, Ketchikan, and Petersburg). Juneau, which is the state capital and a regional trade center, accounted for 43 percent of Southeast Alaska's total population in 2005 (Alaska Department of Labor [DOL] 2006a). Ketchikan Gateway Borough, the second largest borough in Southeast Alaska, accounted for about 19 percent of the region's population in 2005. Ketchikan is a smaller regional trade center that serves Prince of Wales Island and the surrounding area. Population is discussed in more detail in the *Subregional Overview and Communities* section of this EIS.

The remote nature of the region is reflected in a population density of approximately two persons per square mile, which is much lower than the United States' average of 80 persons per square mile. Population densities by borough/census area in 2000 ranged from 0.4 in the Skagway-Hoonah-Angoon census area to 11.4 in Ketchikan Gateway Borough (U.S. Census Bureau 2001). Many locations are accessible only by boat or plane, and landing strips or seaplane facilities are located in virtually all communities. The Alaska State ferry system transports people and vehicles between several ports in Southeast Alaska, and Prince Rupert, British Columbia, and Bellingham, Washington. Haines and Skagway, at the northern end of the Forest, and Hyder at the southern end, offer access to interior and Southcentral Alaska via the Alaska Highway, and Canada via the Cassiar Highway.

The following sections provide an overview of the social and economic conditions in Southeast Alaska and provide a baseline against which the potential effects of the proposed alternatives are measured.

Regional Economic Overview

The Tongass National Forest plays an important role in the formal and informal economies of Southeast Alaska. The formal economy includes those economic activities that are recorded in official statistics. The informal economy includes activities that are not typically recorded in official statistics, such as subsistence, in-kind contributions, non-cash income, unpaid labor and labor exchanges, and care giving to the young and old (Ratner 2000).

Summary economic data are presented for Southeast Alaska for 1996 and 2005 in Table 3.22-1. Annual rates of growth are presented for this period. These data indicate that employment in Southeast Alaska increased by approximately 2 percent over this period (Table 3.22-1). Data compiled by the Alaska DOL indicate that employment in Southeast Alaska has fluctuated over the last decade with a year of job growth often followed by a year of net job loss (Gilbertson 2006).

Adjusted for inflation, total personal income in Southeast Alaska was almost the same in 2005 as it was in 1996 ($2,598 million versus $2,587 million). Total personal income in Alaska and the U.S. increased over this period with respective annual growth rates of 2.2 percent and 2.7 percent. Per capita income in Southeast Alaska was higher in 2005 than 1996, but increased at a slower rate than the Alaska and U.S. averages. Average earnings per job in Southeast Alaska, adjusted for inflation, were 7 percent lower in 2005 then 1996, a decrease of 0.8 percent per year, compared to state and U.S. annual growth rates of 0.2 percent and 1.4 percent over the same time period (Table 3.22-1).

Per capita income in Southeast Alaska was similar to the statewide average in 2005, and six percent higher than the national average. Average earnings per job, which were higher than the national average in 1996 were lower in 2005, with average earnings per job in Southeast Alaska equal to 88 percent of the national average (Table 3.22-1). The region's unemployment rate (7.9 percent) was higher than the state (6.9 percent) and national (5.1 percent) averages in 2005.

Table 3.22-1
Southeast Alaska Economic Overview

	SE AK		1996 to 2005			
	1996	2005	SE AK Percent Change	SE AK Growth Rate (%)	Alaska Growth Rate (%)	U.S. Growth Rate (%)
Total Personal Income (Million 2005 dollars)	2,598	2,587	0%	0.0	2.2	2.7
Population	74,559	71,043	-5%	-0.5	1.0	1.1
Average Annual Employment	50,208	51,188	2%	0.2	1.8	1.5
Per Capita Personal Income (2005 dollars)	34,848	36,411	4%	0.5	1.2	1.6
As percent of Alaska Average	109%	102%	-	-	-	-
As percent of U.S. Average	116%	106%	-	-	-	-
Average Earnings per Job (2005 dollars /year)	37,801	35,170	-7%	-0.8	0.2	1.4
As percent of Alaska Average	95%	87%	-	-	-	-
As percent of U.S. Average	107%	88%	-	-	-	-
Non-Job Related Earnings Per Capita (2005 dollars)	11,148	11,171	0%	0.0	0.2	0.7
As percent of Total Per Capita Income	32%	31%	-	-	-	-
SE Alaska Unemployment Rate	7.0	7.9	-	-	-	-
Alaska Unemployment Rate	7.3	6.9	-	-	-	-
U.S. Unemployment Rate	5.4	5.1	-	-	-	-

Notes:
SE AK = Southeast Alaska
1. Income and earnings figures for 1996 are adjusted for inflation and presented as the amount they would be worth in 2005.
2. Full and part-time employment includes self-employed workers. Employment data are by place of work, not place of residence, and therefore include people who work in Southeast Alaska but do not live there. The nonresident share of total private employment in Southeast Alaska was estimated to be approximately 28.1 percent in 2004 (Hadland et al. 2006). Employment is measured as the average annual number of jobs, full-time plus part-time, with each job that a person holds counted at full weight.

Source: Alaska DOL 2007a, 2007b, 2007c; U.S. Department of Commerce, Bureau of Economic Analysis 2007a, 2007b, 2007c, 2007d; U.S. Department of Labor, Bureau of Labor Statistics 2007

Southeast Alaska employment is summarized by sector in Table 3.22-2. State and local government, consumer services, and retail trade were the largest employers in 2001 and 2005, accounting for 21, 14, and 12 percent of total employment in 2005, respectively. Total employment increased by about 1,630 jobs or 3 percent between 2001 and 2005, with self-employed workers (proprietors) accounting for 66 percent of this increase. The largest increases in absolute terms were in the health care (1,235 jobs), retail trade (510 jobs), and real estate and rental and leasing (444 jobs) sectors. The largest absolute decreases occurred in the construction (-346 jobs) and the professional and technical services (-242) sectors. These gains and losses were not evenly distributed throughout the region, as discussed in the *Subregional Overview and Communities* section.

Table 3.22-2
Southeast Alaska Employment by Sector, 2001 and 2005

	Number of Jobs		Share of Total (percent)		Percent Change	
Total full-time and part-time employment[1]	**2001**	**2005**	**2001**	**2005**	**2001 to 2005**	**2005 Location Quotient**[3]
	49,556	**51,188**	**100**	**100**	**3**	**1.0**
Type of Employment						
Wage and salary employment	37,850	38,401	76.4	75.0	1	1.0
Proprietors employment	11,706	12,787	23.6	25.0	9	1.1
Wage and Salary Employment by Industry						
Farming	29	30	0.1	0.1	3	0.3
Forestry, fishing, related activities, and other	805	775	1.6	1.5	-4	0.5
Mining	36	38	0.1	0.1	6	0.0
Construction	2,388	2,040	4.8	4.0	-15	0.6
Manufacturing	1,838	1,764	3.7	3.4	-4	1.0
Wholesale trade	60	67	0.1	0.1	12	0.1
Retail trade	5,442	5,952	11.0	11.6	9	1.1
Transportation and warehousing	2,757	2,655	5.6	5.2	-4	1.0
Finance and insurance	965	917	1.9	1.8	-5	0.7
Real estate and rental and leasing	1,105	1,549	2.2	3.0	40	0.7
Services (Consumer)[2]	7,117	7,073	14.4	13.8	-1	1.0
Services (Producer)[2]	2,405	2,361	4.9	4.6	-2	0.4
Services (Social)[2]	3,306	4,719	6.7	9.2	43	0.8
Federal government	2,827	3,226	5.7	6.3	14	0.7
State and local government	11,072	10,928	22.3	21.3	-1	1.5

[1] See Table 3.22-1, note 2.
[2] Nine 2-digit North American Industry Classification System (NAICS) categories are combined into these three divisions for ease of presentation. Consumer service includes: other services; arts, entertainment, and recreation; and accommodation and food services. Producer services includes: information; professional and technical services; management of companies and enterprises; and administrative and waste services. Social services includes: educational services; and health care and social assistance.
[3] The location quotient is a relative measure of industry specialization that compares the percentage of employment concentrated in each sector in the study region with a benchmark region, in this case the State of Alaska. A location quotient of 1.0 indicates that the study region has the same percentage of employment in this sector as the benchmark region does. Location quotients above or below 1.0 indicate that the study region is over or under represented in this sector, respectively.
Source: U.S. Department of Commerce, Bureau of Economic Analysis 2007b.

The location quotients in Table 3.22-2 (see note 3) compare the regional employment distribution with the state average and indicate Southeast Alaska's economy is specialized in the state and local government and retail trade sectors (Table 3.22-2). The relative concentration in the government sector largely reflects the location of the state capital in Juneau, but the relatively high proportion of government employment in the other Southeast Alaska communities also plays a part. With the exception of manufacturing, transportation and warehousing, and consumer services, which have location quotients of 1.0, all other sectors in Southeast Alaska are relatively underrepresented.

The government sector is the main source of year round employment in all the communities in Southeast Alaska. In addition to direct employment in the government sector, many of the area's private sector jobs are also dependent on government funding and contracts. Private sector activities dependent on government funding include road construction and even health services, with the region's largest private employer, Southeast Alaska Regional Health Corporation, relying heavily on government funding (Gilbertson 2004).

Recreation and tourism are heavily represented in the economy of Southeast Alaska. This is not readily apparent from Table 3.22-2 because recreation and tourism-related activities are distributed over a number of standard economic sectors, mainly retail trade and consumer services. The percent of the total workforce that is self-employed in Southeast Alaska is slightly higher than the state average, 24 percent compared to 22 percent (location quotient of 1.1), and higher than the national average of 19 percent. Much of this self-employment is associated with the retail trade and consumer services sectors and is sensitive to recreation and tourism activity. Commercial fishing also accounts for a large share of self-employment in Southeast Alaska.

The following section discusses the relative contribution of natural resource-based industries to the regional economy, and more specifically those industries that could be potentially affected by the proposed alternatives.

Natural Resource-Based Industries

Overview

Wood products, recreation and tourism, and mining are the primary natural resource-based industries that could be affected by the alternatives. The following discussion focuses on these industries, but also provides summary information on commercial fishing and seafood processing to provide a more complete overview of the contribution of natural resource-based industry to the regional economy of Southeast Alaska.

In most cases, the employment, income, and revenue figures derived for these industries required a series of steps, each involving assumptions and potential sources of error. Where possible, these assumptions are stated and the nature of the associated problems discussed.

Direct Employment

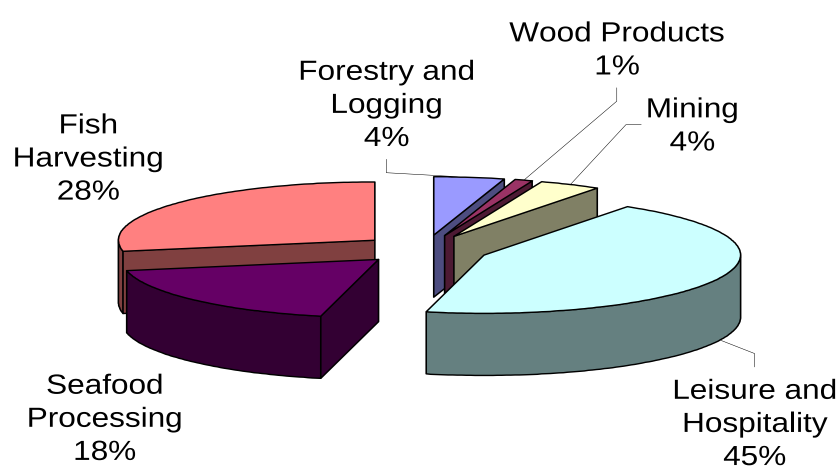
Direct employment in natural resource-based industries accounted for 21 percent of total employment in Southeast Alaska in 2005 (Table 3.22-3). The distribution of resource-dependent employment is shown by industry in Figure 3.22-1. The leisure and hospitality sector, used here to represent recreation and tourism, accounted for 45 percent of direct resource-dependent employment in 2005. Fish harvesting and seafood processing accounted for an estimated 28 percent and 18 percent, respectively. Forestry and logging and wood products together accounted for 5 percent of natural resource employment, with mining accounting for the remaining 4 percent (Figure 3.22-1).

Table 3.22-3
Natural Resource-Based Industry Employment, 2005

Industry	2005 Direct Employment	Direct Employment as a Percent of SE Alaska Total[4/]	2005 Total Employment	Total Employment as a Percent of SE Alaska Total
Forestry and Logging	351	1%	674	2%
Wood Products	105	0%	219	1%
Mining	312	1%	462	1%
Leisure and Hospitality[1/]	3,586	9%	4,339	11%
Seafood Processing	1,500	4%	2,460	6%
Resource Dependent Total[2/]	5,854	15%	NA	NA
Total Wage and Salary Employment[3/]	**36,700**	94%	**36,700**	93%
Fish Harvesting (proprietors)	2,281	6%	2,806	7%
Southeast Alaska Total[4/]	**38,981**	**100%**	**39,506**	**100%**

1/There are no recent available estimates of recreation and tourism employment available for Southeast Alaska. The Leisure and Hospitality sector is used here as a relative indication of the importance of this industry. This sector includes the Arts, Entertainment, and Recreation and Accommodation and Food Services sub-sectors.
2/There is no total provided for 2004 Total Employment because indirect employment for the seafood processing sector includes salmon harvesting and summing the totals for these sectors would result in some salmon harvesting employment being double counted.
3/This total and the direct employment numbers for the above sectors represent non-agricultural wage and salary employment and do not include proprietors or self-employed workers.
4/This total includes proprietors employment for the fish harvesting sector only.
Sources: Alaska DOL 2006a, 2006b, 2007d.

Figure 3.22-1
Direct Resource-Dependent Employment by Sector 2005



Total = 8,135 Employees (Average Annual Employment)
Source: see Table 3.22-3

Total Employment and Earnings

Economic activity in one sector generates activity in others as firms purchase services and materials as inputs (termed "indirect" effects) and employees spend their earnings within the local economy ("induced" effects). In what is known as the multiplier effect, each industry possesses a multiplier that represents its impact on the regional economy given its particular distribution of local purchases and payments. The total effects (i.e., direct, indirect, and induced) generated by an industry are calculated by multiplying employment within that industry ("direct" effects) by the appropriate multiplier.

The analysis presented in this EIS uses industry-specific multipliers to assess the total employment and income effects of the alternatives. These multipliers are also used to estimate total natural resource-based employment in 2005 (Table 3.22-3). The multipliers used in this analysis are presented in Table 3.22-4. These multipliers were estimated using IMPLAN, an input-output model commonly used in this type of application. Total employment and income estimates derived using these multipliers include both indirect and induced effects.

Table 3.22-4
Employment and Income Multipliers

	Employment	Income
Sawmills	2.09	1.51
Logging	1.92	1.39
Mining	1.48	1.25
Recreation and Tourism	1.21	1.32
Salmon Harvesting	1.23	2.37
Seafood Processing	1.64	1.32

Notes:
1. These multipliers were estimated using the 1998 IMPLAN model.
2. The multipliers shown in this table are for total (direct, indirect, and induced) employment or income. Ten direct sawmill jobs would, for example, result in total (direct, indirect, and induced) employment of approximately 21 jobs.

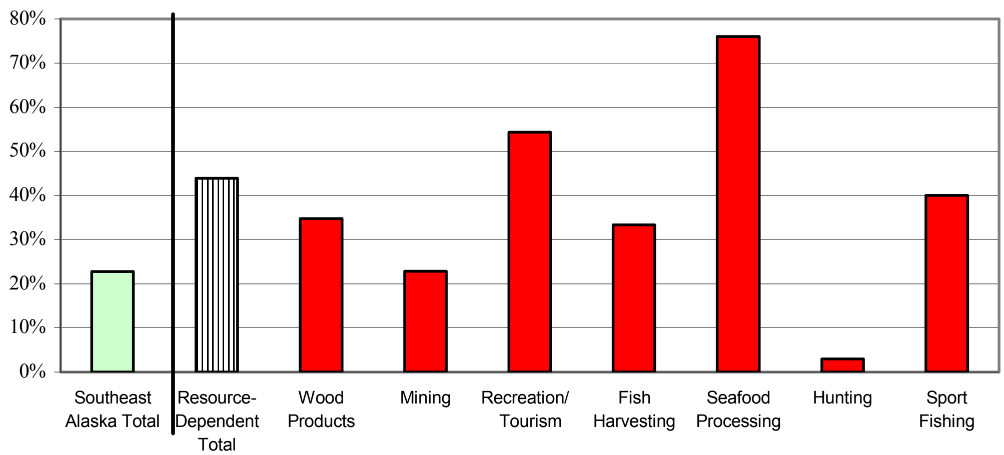
The software and databases necessary to run IMPLAN are available commercially from the Minnesota IMPLAN Group. The IMPLAN system adjusts national level data to fit the economic composition and estimated trade balance of a chosen region and can be used to construct county or multi-county models for any region in the United States. The model used for this analysis consists of the boroughs and census areas that comprise Southeast Alaska. The data used to estimate the multipliers in Table 3.22-4 were obtained from standard data sets produced and maintained by the Minnesota IMPLAN Group. Concerns have been raised with respect to the ability of IMPLAN and similar input-output models to accurately predict indirect and induced effects. Alternate techniques for estimating these effects are, however, subject to the same, or similar, criticisms and more accurate estimates are not readily available for this analysis. While the multipliers presented here should be viewed with caution, the resulting estimates of indirect and induced employment provide a basis for comparison between alternatives.

The estimates of resource-dependent employment shown in Figure 3.22-1 are only for direct employment and, as a result, do not fully illustrate the role that resource-dependent industries play in the regional economy. Adding indirect and induced employment effects alters the relative contribution of the various sectors because employment multipliers vary by industry, but provides a more complete picture of the economic importance of resource dependent industries. The relative contribution is also different when measured in terms of income because wage rates vary by sector, with higher average wages paid in the mining and wood products sectors. Total employment estimates are presented in Table 3.22-3 to provide perspective on the overall contribution of natural resource-based industries to the region's economy, as well as the relative significance of each sector.

Nonresident and Seasonal Employment

Nonresident and seasonal employment are two important and related aspects of resource-dependent employment in Southeast Alaska. Nonresident employment shares are shown for each resource-dependent industry and the region as a whole in Figure 3.22-2. Nonresident workers accounted for 44 percent of employment in the resource-dependent sector as a whole in 1994, approximately twice the regional average. Seafood processing and recreation and tourism had the largest nonresident shares, but all of the resource-dependent industries, with the exception of guided hunting, had nonresident shares above the regional average. Many nonresidents work a relatively short time in Alaska, often for just 2 or 3 months, generally spend the bulk of their earnings elsewhere, and, as a result, contribute less to the regional economy than resident workers.

Figure 3.22-2
1994 Nonresident Share of Direct Employment in Southeast Alaska, Total and Resource-Dependent Industries



Note: All employment figures are standardized to annual average employment.
Source: USDA Forest Service 1997a (Figure 3-16).

Figure 3.22-2 was prepared for the 1997 Forest Plan EIS using data compiled by the Alaska DOL. More recent comparable data are not available. However, statewide nonresident data suggest the nonresident shares shown in Figure 3.22-2 are generally representative of current patterns. Seafood processing had the highest percentage of nonresident workers in Alaska in 2004, with almost three quarters of the labor force (72 percent) comprised of nonresidents. This is comparable with the 1994 data, which showed that 75 percent of workers in the seafood processing sector in Southeast Alaska were nonresidents. Similarly, statewide in 2004, nonresident workers comprised 33 percent of statewide employment in the logging and wood products sector in 2004, compared to 35 percent in Southeast in 1994 (Hadland et al. 2006).

Nonresidents accounted for approximately 28.1 percent of private sector employment in Southeast Alaska in 2004, compared to 21.3 percent for the state as a whole. Within Southeast Alaska, the nonresident share of employment ranged from 18.9 percent in Juneau to 44.3 percent and 49.7 percent in Haines and Skagway-Hoonah-Angoon, respectively. The relatively low level of nonresident employment in Juneau reflects the importance of the government sector, which accounted for 42 percent of employment in Juneau in 2005 (Alaska DOL 2006b).

Average annual seasonal variations in employment are shown for resource-dependent industries and the region as a whole in Figure 3.22-3. As shown in this figure, seasonal variations in resource-based employment—the difference between peak levels of employment in the summer and dips in the winter—are often quite pronounced. The measure shown in the figure is calculated by dividing the difference between summer maximum and winter minimum employment by annual average employment. Expressed as a percentage, this figure allows comparison between different industries and the regional economy as a whole. Seafood processing shows a very high degree of seasonal variation. Data for 2000 through 2004 for salmon harvesting are not shown in Figure 3.22-3, but using the same measure show an annual degree of seasonal variation that is slightly more than twice the variation for seafood processing, with employment ranging from about 100 people in January to as many as 18,700 in July (Patton and Robinson 2006).

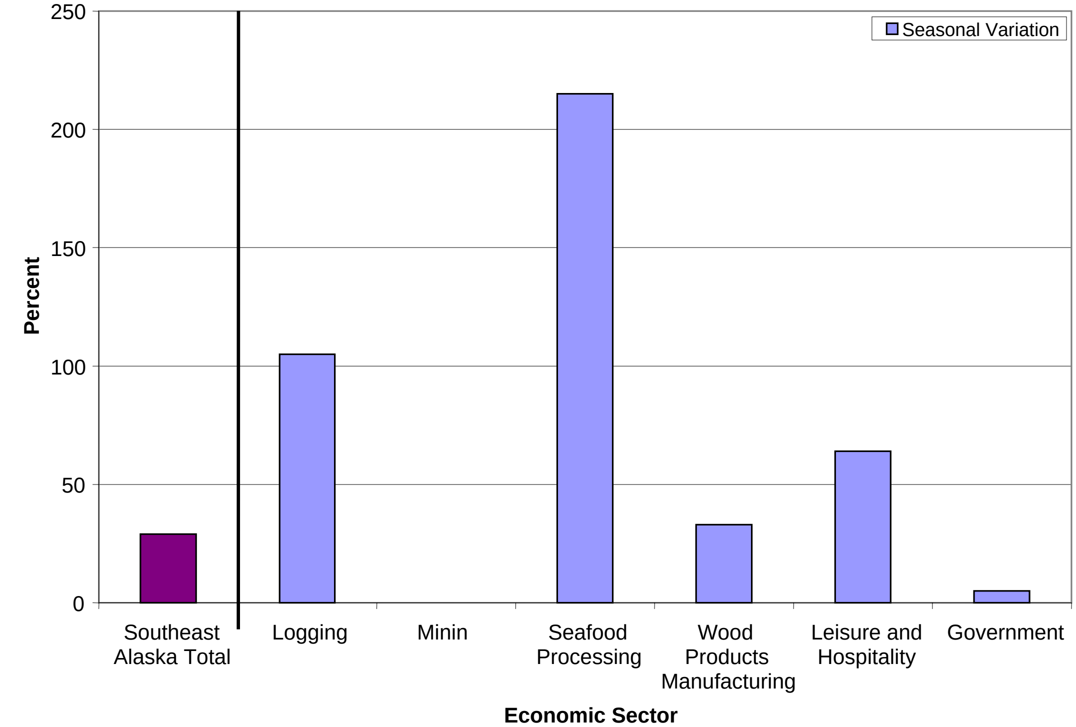
Although not reported here, it is safe to assume, based on the distribution of visitors throughout the year among other things, that recreation and tourism also shows a high degree of seasonal variation. Data are presented for the Leisure and Hospitality sector in Figure 3.22-4 as a proxy for recreation and tourism and show a degree of variation substantially lower than the salmon harvesting and seafood processing sectors, but more than twice the Southeast Alaska average. Data for the logging sector also show a high degree of seasonal variation; about half the variation for the seafood processing sector. Seasonal variation for wood products manufacturing was generally comparable with the Southeast Alaska average. The mining sector showed no seasonal variation, with 300 people reported in this sector for the entire three year period that data are available. Data are also presented for the government sector, which showed much less seasonal variation than the Southeast Alaska average (Figure 3.22-4). There is, however, some variation by type of government employment, with the seasonal variation for federal government employment more than twice the variation for state and local government, but still less than the Southeast Alaska average.

These data indicate that much of the employment in resource-based industries in Southeast Alaska is seasonal and typically relies on a transient labor force. Communities that rely on this type of employment often have difficulty attracting other service providing industries that rely upon year round customers. Gilbertson (2004) suggests that Juneau has experienced relatively large private sector growth over the last decade or so because the stable year round government employment there attracts service providing industries. This is not, unfortunately, the case with many smaller Southeast Alaska communities.

Industry-Specific Descriptions

The following subsections contain more detailed descriptions of each resource-dependent industry.

Figure 3.22-3
Average Annual Seasonal Variation in Employment 2001-2005 (percent)



Notes:
1. Average seasonal variation is calculated here by dividing the difference between summer maximum and winter minimum employment by annual average employment. The resulting measure is expressed as a percentage.
2. The estimates for logging and mining are based on three years data only (2001 to 2003). The wood products manufacturing estimate is based on just two years (2001, 2002). The other estimates are based on five years of data (2001 to 2005).
3. There was no seasonal variation in mining employment during 2001 through 2003.
4. Data for the salmon harvesting sector are available for 2000 through 2004. These data are not included in the graph because the degree of annual seasonal variation is an estimated 447 percent, slightly more than twice the variation for seafood processing.
5. Data for the Leisure and Hospitality sector are used here to represent the Recreation and Tourism sector.
Source: Alaska DOL 2006a, Patton and Robinson 2006

Wood Products

Overview

Direct employment in the wood products industry declined dramatically from its peak of 3,543 jobs in 1990 to 456 jobs in 2005, accounting for approximately 1 percent of total regional employment in 2004. Much of this job loss was associated with closure of the large pulp mills in Sitka (1993) and Ketchikan (1997), which collectively accounted for 899 jobs in 1990. These pulp mills accounted for about half of the federal timber harvest from 1970 up until their closure and also processed much of the chip by-products (manufacturing residues) from the region's sawmills over this period. Closure of the pulp mills had a major effect on the regional demand for timber and the market for wood chips, which has directly affected the region's remaining sawmills.

A larger absolute decline in wood products employment over this period occurred in the logging sector with a net decline of 1,842 jobs over the same period, a decrease from 2,144 jobs in 1990 to just 302 jobs in 2004. This decline in logging employment partly occurred due to a reduction in harvest from the Tongass National Forest, with annual harvest declining from 471 million board feet (MMBF) in 1990 to 46.3 MMBF in 2004, but large reductions in annual harvest also occurred on private lands, with annual private harvests declining from 506.1 MMBF to 98.9 MMBF over the same period.

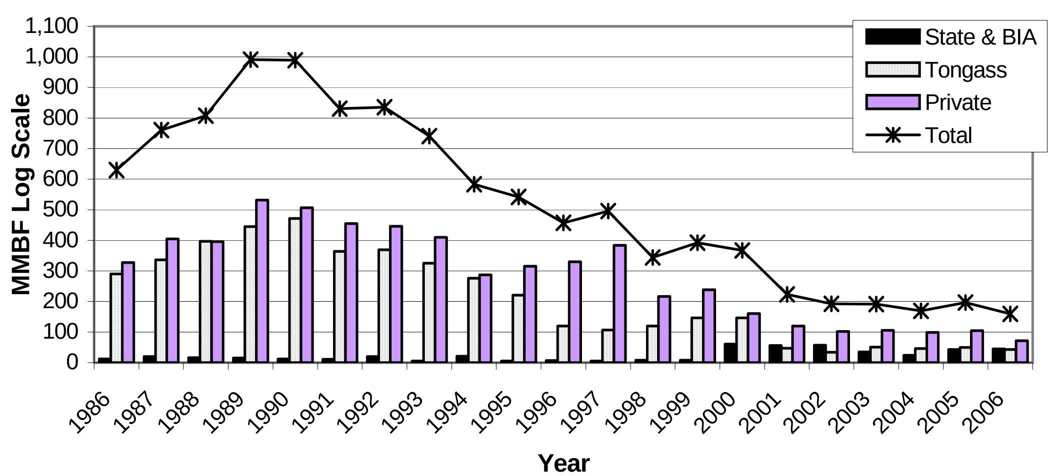
There have been major shifts in markets served by Alaska sawmills over the past decade. Up to 95 percent of production was exported to Japan prior to 1997. Foreign exports have fallen since 2000 and the proportion of volume shipped to domestic markets in the lower 48 states has increased, ranging from 60 percent to 83 percent of total production. Shipments to domestic markets are primarily shop lumber or niche specialty products. Western hemlock is the main species processed by Alaska mills, accounting for 50 to 56 percent of total production (Brackley et al. 2006a). Sawn wood products, like any other commodity, will be sold in the markets that create the most profit for the seller. Domestic markets for Southeast Alaskan sawn wood products are often more attractive at present than foreign markets. Changes in demand, prices, and cost structures have had dramatic effects on the Southeast Alaskan timber industry and on the profitability of the remaining facilities.

Harvest

Timber harvest within Southeast Alaska is the main source of raw materials for the region's wood products industry. Raw material imports averaged just two percent of Southeast Alaska's total round wood consumption from 1983 through 1994 and there have been no notable saw log or utility log imports into the region in recent years (USDA Forest Service 2007d). The Ketchikan veneer mill restarted in 2007 using timber imported from British Columbia. More recently, the mill has acquired timber from a logging contractor that purchased timber from several Southeast Alaska timber sales (Brackley and Haynes, in press; Damstedt 2007). Annual Southeast Alaska timber harvest is shown by landowner for 1986 through 2005 in Figure 3.22-4. Total harvest levels ranged from peak levels of just under 1,000 MMBF in 1989 and 1990 to a low of 169 MMBF in 2004. Total annual harvest increased to about 197 MMBF in 2005, with an increase in harvest on State lands accounting for much of this increase. Total harvest decreased in 2006, with much of the decline (33 MMBF) attributable to further reductions in harvest on Native Corporation lands (USDA Forest Service 2007d).

The overall pattern of harvest levels shown in Figure 3.22-4 generally reflects broader trends in the wood products market. These include the global recession in the wood products industry that depressed output in the early to mid 1980s, the following boom, and the subsequent decline. In Southeast Alaska, harvest levels have shown an overall pattern of decline since 1990 (Figure 3.22-4).

Figure 3.22-4
Southeast Alaska Total Timber Harvests by Ownership, 1986-2006



Notes: Harvests from Alaska Mental Health Trust and University of Alaska lands omitted prior to 2000.
BIA = Bureau of Indian Affairs
Source: USDA Forest Service 2002a, 2007d

The majority of the region's harvest has historically come from two ownerships: the Tongass National Forest and Native corporation (private) lands. Prior to 2000, harvest from these two ownerships ranged from 96 percent to 99 percent of total harvest in Southeast Alaska. The combined Tongass and Native corporation share dropped to 83 and 76 percent in 2000 and 2001, respectively, with the inclusion of the Alaska Mental Health Trust and University of Alaska harvests as part of the state total (Figure 3.22-5). Harvest from the Tongass and Native corporation lands comprised 78 percent of total harvest in 2005. Harvest from Native corporation lands accounted for the majority of this, with harvest from the Tongass accounting for 25 percent (49.5 MMBF) of the total. Harvest from state lands since 2000 has ranged from 59.9 MMBF in 2000 to 24.2 MMBF in 2004, with a total of 42.9 MMBF harvested from state lands in 2005. Most timber harvested from state lands is processed in Alaska. In recent years the state has sold above its annual projected harvest levels to help bridge the gap between national forest harvest and local industry needs.

Timber harvested from the Tongass and Native corporation lands largely flows into different markets which are not solely driven by price. In the case of the Tongass National Forest there are restrictions on shipments of raw materials that dictate how and to whom products can be sold. Yellow-cedar for example can be exported into foreign markets while western redcedar is appraised for local manufacture. Much of the Sitka spruce and western hemlock is processed locally, although under certain circumstances, those species can be shipped out of state. Low grade and small diameter Sitka spruce and western hemlock are appraised for shipment to markets in the lower 48 U.S. states. Once a timber sale is purchased, under certain circumstances, the purchaser can apply for a permit to ship logs to markets other than those they were appraised for. From 2001 to 2006, an average of 19 percent of the total volume harvested on the Tongass has been shipped in whole log form to domestic markets in other states or exported to foreign markets. Levels fluctuated greatly from year to year over this period, ranging from a low of 8 percent to a high of 39 percent. Virtually all of timber harvested on Native corporation land is sold as whole log exports.

Production and Employment

The 1997 Forest Plan EIS (USDA Forest Service 1997a) noted that log exports comprised 43 percent of total Southeast Alaska production on a volume basis from 1981 to 1995. At 36 percent of the total, pulp was the second largest production component over this period and far more stable than log exports. Lumber was noted as the smallest component of total production, averaging 19 percent of the total from 1981 to 1995. The Ketchikan Pulp Corporation (KPC) pulp mill closed in 1997 and brought pulp production in the region to an end. Since 2000, logging has comprised 70 percent of timber sector employment with sawmill employment accounting for the remaining 30 percent.

In 2000 the total annual active sawmill processing capacity in Southeast Alaska was 340 MMBF. A total of 87 MMBF was processed that year, utilizing 26 percent of the existing active capacity. Total active capacity has since declined to around 250 MMBF and the volumes processed from 2003 to 2006 ranged from 31 MMBF (2004) to 34 MMBF (2005), and 12 to 13 percent of total capacity (Brackley et al. 2006b, Juneau Economic Development Council 2006, 2007).

Employment in the Southeast Alaska wood products sector has declined substantially since the peak of 1990 (see Figure 3.22-6), decreasing by 3,093 jobs, or 87 percent, between 1990 and 2004. While this total includes the entire pulp mill labor force, which accounted for 899 jobs in 1990, a larger absolute loss occurred in the logging sector, with 1,842 jobs lost between 1990 and 2004. A total of 456 people were employed in the wood products sector in 2005. Wood products-related indirect and induced employment was estimated at 437 jobs, resulting in a total of 893 jobs supported by the wood products industry in that year (Table 3.22-3).

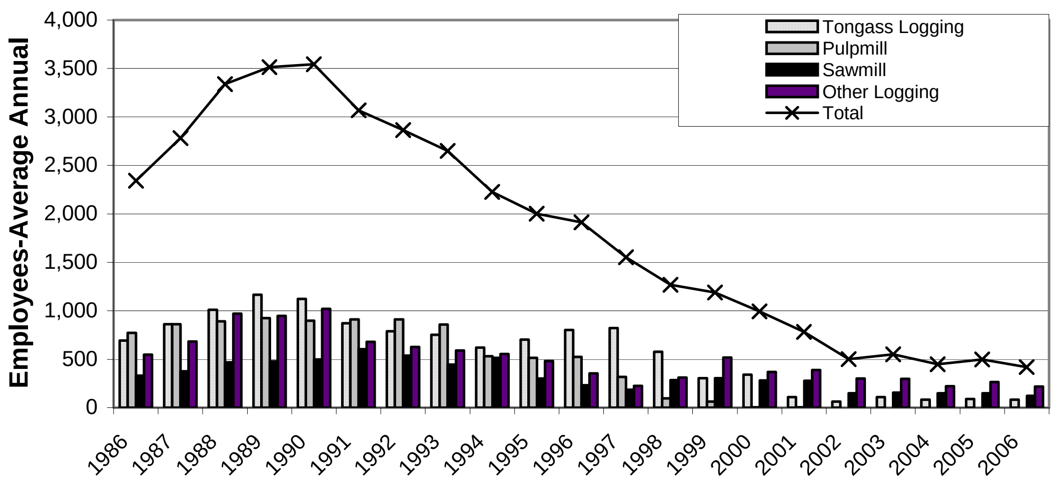
Employment increased slightly in 2005, with a total of 499 people employed in the wood products sector. Logging and sawmills accounted for 70 percent and 30 percent of the total, respectively (USDA Forest Service 2007d). This small increase was mainly associated with an increase in logging employment not related to the Tongass National Forest (Figure 3.22-6). Employment decreased to 421 wood products jobs in 2006, with decreases in employment in all three active categories (Tongass logging, sawmill, and other logging) shown in Figure 3.22-6 (USDA Forest Service 2007d).

Employment decreases tend to lag behind decreases in production, and further declines in employment levels are possible even if there are no further changes in harvest levels.

Current Status of the Industry

It is clear from the preceding sections that the wood products industry in Southeast Alaska has undergone considerable change over the past decade. The closure of the Alaska Pulp Corporation (APC) pulp mill in Sitka and the KPC pulp mill in Ketchikan in 1993 and 1997, respectively, had a substantial effect on the overall regional demand for timber. Wood consumption by these pulp mills accounted for about half of Tongass National Forest timber harvest from 1970 through the early 1990s and chip by-products from the region's sawmills were historically used in pulp production (Brooks and Haynes 1997). The KPC pulp mill, for example, required 190 MMBF of pulpwood and/or chips to operate at its reported full annual capacity of 210,000 tons of pulp (USDA Forest Service 1997a). The analysis prepared for the 1997 Forest Plan Revision Final EIS noted that, on average, 19 percent of Native Corporation harvests were reportedly used in pulp production. The 1997 Forest Plan Revision Final EIS also noted that an average of 17 percent of Tongass National Forest logs were classified as utility grade, meaning that they were more likely to be used for pulp or chips because they could not be made into boards.

Figure 3.22-6
Southeast Alaska Timber Sector Direct Employment by Type, 1986-2006



Sources: USDA Forest Service 2002a, 2007d

Recent harvest data indicate the utility share of total annual harvests on the Tongass decreased from approximately 19 percent in 1996 to around 12 percent in 2004 and 9 percent in 2006 (USDA Forest Service 2002a, 2007d). Approximately 46.1 MMBF of utility and low grade saw logs were chipped in 2000 (26.9 and 19.2 MMBF, respectively). The majority of these chips were shipped to pulp mills in the continental U.S. (61.6 percent) and Canada (31.3 percent), with just 7.1 percent consumed in

Alaska. While these data indicate that a market existed for chips in 2000, the market is limited for low-grade log chips at this time (Brackley et al. 2006a).

Utility logs are logs that are at least two-thirds defective and, therefore, do not meet sawlog specifications. Since utility logs and sawlogs are mixed in the same tree stands, the loss of the market for wood chips has important implications for the economic viability of timber sales on the Tongass. (This is discussed further in the environmental consequences part of this section). As a result, timber sales on the Tongass include an Optional Removal clause (Forest Service Handbook [FSH]: 2409.22 Chapter 630) that allows sale purchasers to leave behind utility logs. These logs still have to be purchased as part of the timber sale but the purchaser no longer has to remove them, saving on logging and haul costs.

The Alaska Regional Forester (Region 10) signed a new policy in March 2007 that approved limited interstate shipments of unprocessed Sitka spruce and western hemlock (Bschor 2007). The policy allows shipment to the lower 48 states of unprocessed Sitka spruce and western hemlock sawlogs smaller than 15 inches in diameter at the small end of a 40-foot log, and grade 3 or 4 logs of any diameter. Shipments are limited on each sale to a maximum of 50 percent of total sawlog contract volume harvested of all species, including western redcedar and Alaska yellow-cedar, unless the Regional Forester grants an exception in advance based on case-specific unusual circumstances.

This policy, referred to as the Limited Interstate Shipment Policy, is expected to increase the utilization of timber harvested on the Tongass and improve the economics of timber sales by providing a market for smaller diameter and low grade material that cannot be processed profitably by sawmills in Southeast Alaska (Alexander et al. 2007).

A federal grant program was approved in 2001 and 2002 to help Alaska operators purchase drying and secondary processing equipment and mills in Alaska now have the ability to dry about 6.6 MMBF annually, with about 3.9 MMBF or 59 percent of the total State capacity located in Southeast Alaska. Approximately 0.8 MMBF of dry, surfaced lumber was produced in Alaska in 2004, with slightly more than half (51 percent or 412 thousand board feet [MBF]) of this total produced in Southeast Alaska (Nicholls et al. 2006). In addition, the Ketchikan Wood Technology Center (KWTC), a nonprofit research and product development center that operates in partnership with the USDA Forest Service and the University of Alaska, was established in 2000. The center's projects include development of new lumber grades and structural design values for Alaska wood species. Yellow cedar, hemlock, Sitka spruce and white spruce have been accepted as unique species for grading purposes by the American Lumber Standards Committee, with new design values for the species. In addition, KWTC implemented a testing program to develop new glued laminated timber beam designs utilizing Alaskan species and has been conducting other tests with potential future benefits to the industry in Southeast Alaska. The increased ability to produce dry, planed wood and updated grading rules for Alaskan lumber has allowed Alaskan producers to sell dimension lumber in local markets.

Market shifts partly reflect the movement of smaller operators away from exporting round logs, chips, or rough-cut green lumber toward value added products and a movement toward direct marketing of finished products. Value-added products produced by small mills on Prince of Wales Island, for example, include molding, tongue-and-groove, log cabin-style paneling, and shingles (Petersen and Bruns 2005), as well as wood for musical instruments.

Utilization of Mill Capacity

Changes in demand and prices have affected the Southeast Alaskan wood products industry and the profitability of the remaining facilities. The 1997 Forest Plan Revision

Final EIS reported an average utilization rate of 66 percent during the 1985 to 1994 time period (USDA Forest Service 1997a, Table 3-133). Utilization rates have shown a consistent downward trend in recent years, with mills in Southeast Alaska using just 12 percent (31 MMBF) of total active capacity in 2004 and 13 percent (32.1 MMBF) in 2005 (Table 3.22-5). Not only has the utilization rate decreased since the 1985 through 1994 time period, but the total active capacity that production is measured against has also declined, stabilizing at 250 MMBF since 2002 (Brackley et al. 2006a). Actual mill output has, however, been fairly consistent over the past five years: 39.7 MMBF in 2002, 32.0 MMBF in 2003, 31.0 MMBF in 2004, 34.7 MMBF in 2005, and 32.1 MMBF in 2006 (Brackley et al. 2006b; Juneau Economic Development Council 2006, 2007).

The results of the utilization studies summarized in Table 3.22-5 include the larger mills and operators in Southeast Alaska. There are also a number of smaller mills not included in the study. According to Petersen and Bruns (2005), for example, there are 16 small operations on Prince of Wales Island and only six of the facilities are included in Table 3.22-5. Although they are relatively small, these facilities may be important sources of economic activity for the communities they are located in or nearby.

Table 3.22-5
Active Timber Processors in Southeast Alaska in Calendar Years 2005 and 2006

			2005		2006	
Mill[1]	Location	Estimated Mill Capacity (MBF)[2]	Actual Mill Output (MBF)[3]	Utilization of Installed Capacity (Percent)	Actual Mill Output (MBF)[3]	Utilization of Installed Capacity (Percent)
Viking Lumber Co.	Craig	80,000	18,000	22.5	19,000	23.8
Silver Bay, Inc.	Wrangell	65,000	8,747	13.5	6,031	9.3
Pacific Log & Lumber	Ketchikan	39,600	4,824	12.2	4,234	10.7
Icy Straits Lumber Co.	Hoonah	20,000	500	2.5	700	3.1
Northern Star Cedar Products[4]	Thorne Bay	14,500	322	2.2	0	0
Porter Lumber Co.	Thorne Bay	12,500	600	4.8	500	4.0
The Mill	Petersburg	8,500	30	0.4	45	0.5
Thuja Plicata Lumber Co.	Thorne Bay	7,500	100	1.3	130	1.7
Thorne Bay Wood Products	Thorne Bay	5,000	682	13.6	600	12.0
Southeast Alaska Wood Products	Petersburg	4,500	100	2.2	200	4.4
D&L Woodworks	Hoonah	1,750	100	5.7	100	5.7
Alaska Fiber[4]	Petersburg	1,500	0	0.0	0	0
W.R. Jones and Son Lumber Co	Craig	1,000	690	69.0	600	60.0
Total	Location	**261,350**	**34,695**	**13.3**	**32,140**	**13.1**

[1] Only mills that were active in 2005 are included here. Two inactive mills were identified in the 2006 mill survey: KPC/Annette Island Hemlock Mill (70 MMBF) and Gateway Forest Products Veneer Mill (30 MMBF), and (15 MMBF). Five mills were identified in the 2006 survey as "out-of-business": Chilkoot Lumber Co., Gateway Forest Products Sawmill, Herring Bay Lumber Co., Kasaan Mountain Lumber & Log, and Metlakatla Forest Products. There are also a number of smaller mills not included in this study.
[2] Annual capacity is estimated based on the volume of material used during 500 eight-hour shifts.
[3] Actual mill production is the net sawlog volume (Scribner log scale) that was used during the year to manufacture sawn products.
[4] The Northern Star Cedar Products and Alaska Fiber facilities did not process timber in 2006. Northern Star was subdivided among three owners and Alaska Fiber sold its primary processing equipment, but reportedly has plans to purchase and install new equipment.
Source: Juneau Economic Development Council 2006, 2007

Market Demand

Demand can be thought of as the different amounts of a product buyers are willing to purchase at different prices. Demand is not a single number, but instead a series of price-quantity relationships. The same is true of supply. It is the combination of supply and demand that determines the quantity and price of goods produced and consumed. When we talk about "timber" on the Tongass we are talking about a spectrum of products that are not necessarily freely exchangeable or replaceable with one another or other sources of timber. Thus, timber includes a mix of species, each with a potentially different demand and price. Timber also includes a range of log types from high quality saw logs to utility logs for which demand and price differ markedly. Finally, the ability of timber to satisfy demand will differ according to the location of that timber relative to mills and other existing infrastructure. Under current market conditions, standing timber in the northernmost portions of the Tongass is unlikely to satisfy the demand for timber by mill operators in Ketchikan almost 500 miles away.

Accurately projecting future demand is difficult and cannot be considered an exact science. Market demand for Southeast Alaska timber and wood products depends upon numerous difficult to predict factors, including changes in technology, growth and exchange rates in key markets, changes in consumer tastes and preferences, as well as developments in other producing regions whose products compete with those of Alaska. While demand is difficult to predict, industry relies on a stable timber supply in order to conduct long-term business planning.

This section examines a number of indicators of demand for Tongass timber for the planning cycle, and discusses the methodologies, limitations, and conclusions of each. The analysis then considers the extent of the timber land base likely to be necessary to satisfy differing levels of demand.

Demand Indicators

Pacific Northwest Research Station Projections

The Forest Service has commissioned the Pacific Northwest Research Station to prepare a number of projections of demand for Tongass timber over time, including Brooks and Haynes 1990, 1994, 1997. In connection with ongoing monitoring and preparation of this EIS, the Forest Service commissioned the Pacific Northwest Research Station to prepare a new set of projections, resulting in Brackley et al. 2006a. Brackley et al. prepared a “derived demand” analysis and projected various demand figures for four potential scenarios using different assumptions about future markets and future processing facilities in Southeast Alaska. Derived demand looks at the overall end-market demand in foreign and domestic markets, and considers what portion of that demand Alaska is likely to fill. An example of end market demand in this case would be projected demand for Southeast Alaskan lumber (a final timber product) from markets in Asia.

Brackley et al.’s model is a trend-based projection of quantities. Trends in consumption (e.g., sawn wood in Japan) and trends in exports (e.g., pulp to all destinations) constitute the basic structure of the model. In preparing this analysis, Brackley et al. used information about U.S. exports to Japan, and Japanese import and consumption data, as a benchmark for the historic data since those exports represented, until recently at least, the majority of sawn-wood production from Southeast Alaska. They considered about 40 years of historic data and trends in manufactured wood products exports to Japan to project 20 years into the future and adjusted projections to address recent shifts and potential additional shifts towards the continental U.S. and other parts of the entire Pacific Rim (including North America), as an end-market for Alaska wood products. Additional information on the Brackley et al. analysis is provided in an addendum report that addresses questions and concerns raised with respect to the original analysis (Brackley and Haynes, in press).

Brackley et al.’s analysis has a number of limitations. Because it is based on trends over a long historic period, it has “smoothed out” short-term fluctuations. The timber industry is currently in a period of transition, increasing the likelihood of volatile shifts. In addition, demand cannot be considered in a vacuum. Demand will be influenced by costs of production, which in turn will be influenced by the willingness of producers to invest in improvements to efficiency. Decisions made in the Forest Plan relating to the timber base are believed likely to also have an impact on the producers willingness to invest.

Although Brackley et al. (2006a) described the following four scenarios, those are not necessarily the only possible scenarios, and considerable variation is possible within any of the scenarios. Each scenario described below assumes the foundation of the preceeding scenario. In other words, Scenario 2, for example, describes an increase in demand beyond Scenario 1 and so forth.

Scenario 1, Limited Timber Production, was an approximation of the current status of the timber industry in Southeast Alaska in 2006 with no market for lower grade logs. The recent policy change (March 2007) that resulted in the Limited Interstate Shipment Policy is expected to change this situation, with timber sale purchasers now able to export lower grade logs to the continental U.S. The current status is believed to be largely the result of supply limitations and not necessarily related to market demand.

Scenario 2, Expanded Timber Production, assumes an increase in the Alaska share of the Pacific Rim markets, but no creation of facilities to process lower grade logs. However, a veneer plant could be a portion of the demand stimulation assumed in Scenario 2, as could the Limited Interstate Shipment Policy.

Scenario 3, Medium Integrated Industry, assumes a demand stimulation in 2008 that creates demand for lower grade logs. Potential forms of demand stimulus identified by Brackley et al. (2006a) included medium density fiberboard (MDF) plants or biomass facilities. The Limited Interstate Shipment Policy could also contribute to this demand stimulus.

Scenario 4, High Integrated Industry, assumes the demand stimulus in Scenario 3 plus an additional stimulus, such as another facility coming on line in 2012.

Scenarios 3 and 4 also assume a form of demand stimulation, such as a veneer plant, that uses medium and low-grade logs. Based on these scenarios, Brackley et al. developed the projections shown in Table 3.22-6. Brackley et al.'s projected volumes for the first two scenarios include decked sawlogs at the sawmills plus a portion of cedar logs that would be exported. They do not reflect the total amount of timber that needs to be sold to produce these decked sawlog timber and cedar volumes.

Table 3.22-6
Timber Production 1983 to 2002 and Demand Projections for 2003 to 2025 (MMBF)

	Brackley et al. Scenarios			
Period[1]	**Limited Lumber Production**	**Expanded Lumber Production**	**Medium Integrated Industry[2]**	**High Integrated Industry[2]**
1983-1987	281.0	281.0	281.0	281.0
1988-1992	414.0	414.0	414.0	414.0
1993-1997	200.2	200.2	200.2	200.2
1998-2002	93.3	93.3	93.3	93.3
2003-2007	**30.0**	**33.7**	**44.4**	**44.4**
2008-2012	**34.7**	**52.0**	**169.0**	**185.8**
2013-2017	**38.7**	**75.4**	**204.4**	**299.0**
2018-2022	**43.0**	**108.1**	**204.0**	**317.0**
2022-2025	**46.7**	**142.9**	**204.4**	**360.1**

[1] The projections are for 2003 through 2025 and shown in bold in this table. The data for 1983 through 2002 are the actual volumes processed in the years shown.
[2] These projections assume an industry (one or more facilities) will be created that uses pulp chips produced by Southeast Alaska sawmills, low grade logs, and other biomass products in fiber based board, chemical, or energy facilities. Medium density fiberboard is one possible alternative identified in Brackley et al. (2006a). Chemical and energy uses are also possible.
Source: Brackley et al. 2006a, Table 3

Annual projections are presented for all four scenarios in Table 3.22-7. In addition to Brackley et al.'s estimated volume projections, this table also includes the total timber sale volume that would be needed under Scenarios 1 and 2. The total sale volumes for 2022 for each scenario are used in the long-term effects analysis in the Environmental Consequences part of this section.

Installed Capacity and the McDowell Group et al. (2004) Southeast Conference Projections

Another way to consider the potential volumes that might be demanded by the timber industry in Southeast Alaska is to look at installed mill capacity and determine how much timber must be sold and harvested to run the mills at various rates of mill capacity utilization. While we can assume mill owners want to operate their mills at an efficient level if economic timber supply is available, a limitation to this type of analysis is that it assumes there is a purchaser willing to buy the product at a price equal to or greater than the cost of production. In the long run, a mill owner cannot be expected to operate a mill at an "efficient" rate if the mill owner cannot sell the product at a profit. It should also be noted that a mill may not be able to operate indefinitely at a utilization rate far below the economically efficient rate without risking bankruptcy.

Table 3.22-7
Projected Demand for National Forest Timber from Brackley et al. (MMBF)

	Limited Lumber Production		Expanded Lumber Production		Medium Integrated Industry	High Integrated Industry
Year	Estimated Volume[1]	Total Sale Volume[2]	Estimated Volume[1]	Total Sale Volume[2]	Estimated Volume[1]	Estimated Volume[1]
2005	31	47	35	53	45	45
2006	32	48	38	57	55	55
2007	33	50	41	62	67	67
2008	33	50	44	66	139	139
2009	34	51	48	72	151	151
2010	35	53	52	78	166	166
2011	35	53	56	85	184	184
2012	36	54	60	91	204	286
2013	37	56	65	98	204	291
2014	38	57	70	106	204	295
2015	39	59	75	113	204	299
2016	39	59	81	122	204	303
2017	40	60	87	131	204	308
2018	41	62	93	140	204	312
2019	42	63	100	151	204	317
2020	43	65	108	163	204	325
2021	44	66	116	175	204	333
2022	45	68	124	187	204	342
2023	46	69	133	201	204	351
2024	47	71	143	216	204	360
2025	48	72	153	231	204	370

[1] The projections for Scenarios 1 and 2 include sawlogs, cedar export, and chip volumes available from sawmill production. They do not include low grade material or utility logs. Scenarios 3 and 4 include sawlogs, cedar exports, chip volumes, low-grade material, and utility.
[2] The total sale volume projections represent the total harvest that would be necessary to produce the estimated volume under the first two scenarios. These total volumes include the low quality material (low grade material or utility logs) not included in the demand projections. These figures assume that the initial estimated volume would comprise 66 percent of the total required harvest.
[3] The data presented in this table were used to calculate the 4-year averages summarized in Table 3.22-6. The effects analysis uses the projected demand numbers for 2022 to compare scenarios and alternatives.
Source: Appendix G, Table 2

An analysis prepared for the Southeast Conference—"Timber Markets Update and Analysis of an Integrated Southeast Alaska Forest Products Industry" (McDowell Group et al. 2004)—considered installed capacity of Southeast mills, projected a harvest volume that would allow the mills to operate at an efficient level assuming the existence of an integrated industry, and concluded that a minimum of 200 MMBF total harvest would be required.[1] However, they concluded that the most efficient use of timber from the Tongass National Forest would most likely include other added-value manufacturing, such as a veneer mill. The industry would be most efficient with at least two of each type of manufacturing facility to foster competitive bidding for materials and labor. Depending upon the types of facilities, this could require an annual harvest of 350 MMBF or more from the Tongass (McDowell Group et al. 2004; McDowell Group 2006b).

Recent Sales and Harvest Figures

Another possible way to assess timber demand is to consider sale and harvest figures in recent years. Table 3.22-8 shows annual timber sale harvest since 1994.

Use of recent harvest figures as an indicator of demand has several limitations. Since 1997, much of the timber prepared for sale has been subject to appeal and litigation activities that have postponed our ability to offer the material. In recent years, Congressional Appropriation Act provisions have prohibited the Tongass National Forest from offering timber sales that do not appraise positively using the residual-value appraisal method. Many timber sales have not appraised positively and others have been delayed through litigation; it is unclear what the actual harvest levels would have been if these constrictions on supply were not present.

Table 3.22-8
Tongass National Forest ASQ compared to Actual Harvest, 1994 to 2006 (MMBF)

Fiscal Year[1]	ASQ	Actual Harvest
1994 (End of APC contract)[2]	549	276
1995[2]	549	221
1996[2]	549	120
1997 (End of KPC contract)[2]	549	107
1998	267	120
1999	267/187[3]	146
2000 (Last KPC harvest)	187[3]	147
2001	187/267[3]	48
2002	267	34
2003	267	51
2004	267	46
2005	267	50
2006	267	43

[1] Fiscal Year: October 1 to September 30 the following year.
[2] The Allowable Sale Quantity (ASQ) for 1994 through 1997 included 450 MMBF net sawlog volume and 549 MMBF total harvest.
[3] In May 1997, the Tongass Plan was revised, with a resulting allowable sale quantity of 267 MMBF. In April 1999, a new Record of Decision was issued with a resulting allowable sale quantity of 187 MMBF. In March 2001, the 1999 ROD was vacated by the US District Court, District of Alaska and the allowable sale quantity reverted back to 267 MMBF.

[1] Southeast Conference is a regional, nonprofit corporation and the State-designated Alaska Regional Development Organization, the federally designated Economic Development District, and the federally designated Resource Conservation and Development Council for Southeast Alaska (see http://www.seconference.org/index.html).

The Tongass Forest Plan assigns Land Use Designations (LUDs) to various portions of the Forest and designates the types of activities allowable within those LUDs. Suitable land in LUDs where timber management can be considered constitutes the “timber land base” of the Forest. As part of the Forest Plan development process, the Forest Service calculates the average decadal volume that could be produced from that timber base over the rotation period, observing all of the legal requirements and standards and guidelines associated with the Plan. The figure resulting from that calculation is the Allowable Sale Quantity (ASQ). The ASQ should not be equated with the ability of the Forest Service to satisfy timber demand alone. Additional volume, for example, can be produced from wildlife habitat enhancement thinning in young-growth forest in the beach fringe and old-growth reserves. Production of this type of additional volume may be appropriate to meet objectives other than timber production provided no irreversible damage would occur and restocking was assured.

Conversely, not all suitable land is likely to be harvested. Some lands within the suitable base may not be economically feasible to harvest for example. The Forest Plan distinguishes between two types (components) of lands within the suitable base as a function of logging system implications. The two non-interchangeable components (NICs) are referred to as NIC I and NIC II lands. NIC I includes lands that can be harvested with normal logging systems; NIC II, is comprised of lands with especially high logging costs usually due to isolation or special harvesting equipment requirements. Although NIC I timber does not exhibit the problems of NIC II timber, not all NIC I timber, is necessarily economic. The proportion of NIC I lands that would render economic timber sales could increase as the timber industry becomes more integrated. In the absence of a facility that utilizes utility and lower grade logs, a timber sale must be sustained solely on the profits made from the higher grade sawlogs, even though the operator must harvest and pay for the lower grade logs.

The Limited Interstate Shipment Policy increases the likelihood that timber sales in parts of the Tongass National Forest will have a positive appraisal under current market conditions. The policy is also expected to increase the utilization of timber harvested on the Tongass, by increasing the amount of material that can be economically removed from the woods, and concurrently decreasing the amount of material that formerly had to be chipped, stored, or disposed of by the mills (Alexander et al. 2007).

Logistics in Southeast Alaska also influence where and when timber is economic to harvest. Currently the timber base is spread throughout the entire Tongass National Forest, while most of the saw mills are located in the southern portions of the Forest. The high cost of access and transportation between the timber supply and processing mills reduces the likelihood of meeting the needs of mill owners where distances are great.

The ASQ reflects the maximum allowable level of timber harvest under each alternative and assumes every acre modeled and scheduled for timber harvest will actually be harvested. The preceding paragraphs describe the considerations and constraints that make it unlikely that every acre will be scheduled for harvest.

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These groups have made estimates of the minimum timber volume required for the efficient operation of various processing facilities, as discussed later in the effects section and shown in Tables 3.22-17 and 3.22-18. The estimated minimum volume for efficient sawmill operation is approximately 66 percent of existing mill capacity (138 MMBF) based on the four largest existing sawmills in Southeast Alaska, with some allowance for smaller mills (see Table 3.22-17). The minimum estimated volume necessary to supply a veneer plant is 30 MMBF of mid-value logs, with 80 to 100 MMBF of No. 3 sawlogs and utility logs required to support an MDF or Bioenergy facility. Using these estimates a total of 248 MMBF to 268 MMBF is the minimum volume necessary to support an integrated industry. The limitations of this analysis are similar to those in the installed capacity discussion above, in that there must be an end purchaser willing to buy the product at a price equal to or greater than the cost of production.

Relationship between Demand over the Planning Cycle and Annual Demand

Section 705 (a) of the Tongass Timber Reform Act of 1990 states:

Subject to appropriations, other applicable law, and the requirements of the National Forest Management Act of 1976 (Public Law 94-558), except as provided in subsection (d) of this section, the Secretary shall, to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle.

The Tongass Timber Reform Act (TTRA) speaks of annual market demand and demand over each planning cycle (10 to 15 years into the future and beyond). The Forest Plan itself does not authorize any timber harvest. Such harvest is authorized by site-specific timber sale projects, which implement the plan. Thus, it could be said that the Plan itself does not directly meet demand for timber. Rather the Plan sets the conditions under which the Forest Service can seek to meet market demand through the cumulative sales of the annual timber sale program over the planning cycle.

The Forest Service seeks to meet market demand for Tongass timber on an annual basis by establishing annual timber sale objectives using a methodology developed by Morse (2000). This methodology uses a number of inputs including the Pacific Northwest Research Station projections, installed mill capacity, utilization rates, and market trends to determine annual sale offer levels (supply) (see Appendix G, Timber Demand). The goal of the Forest Service is to have a 3-year supply (approximately) of timber under contract to meet sale objectives. The 3-year supply approach recognizes timber cannot be harvested instantaneously and that purchasers must have some flexibility to respond to market changes. Once the 3-year level is reached, the agency builds shelf volume (sale projects with completed NEPA and field work – ready for offer) and sells additional timber as existing inventories are harvested. In this way, the agency seeks to enable the industry to respond to short term changes in markets. The ratio of contract volume to harvest peaked in 2002, at 6.8, but dropped closer to the 3-year supply objective in 2003. In 2004 and 2005 the ratio dropped to 1.7. Recent ratios of volume under contract to harvest are potentially misleading. Harvests have declined considerably over the past few years, resulting in increasing contract volume to harvest ratios through 2002 in spite of declining contract volumes. Some of the volume under contract in 2002 and 2003 was in sales cancelled in 2004 and 2005.

In 2004, Section 339 of the Department of the Interior and Related Agencies Appropriations Act for fiscal year (FY) 2004, Public Law No. 108-108, provided that the Secretary of Agriculture may cancel, with the consent of the timber purchaser, a number of timber sale contracts on the Tongass National Forest awarded between October 1 1995 and January 1 2002. A given sale could be cancelled provided that the Secretary determined, at the Secretary's sole discretion, that the sale would result in a financial loss to the purchaser, and the costs to the government of seeking a legal remedy against the purchaser would likely exceed the cost of terminating the contract. By the end of FY 2005, a total of seventeen sales (with approximately 122 MMBF) on the Tongass National Forest were cancelled. It is the intent of the Tongass National Forest to reconfigure cancelled timber sales and re-offer that portion of the volume that is economically viable.

Projecting demand over the planning cycle has a higher degree of uncertainty and depends on numerous factors that are difficult to predict, including changes in technology, growth and exchange rates in key markets, changes in consumer tastes and preferences, as well as developments in other producing regions whose products compete with those of Alaska. The difficulty in developing long-term projections for the timber industry in Southeast Alaska is further exacerbated by the current circumstances confronting the industry, which, as discussed in the preceding sections, has been in a period of transition since closure of the pulp mills in the 1990s. With this in mind, recent studies (Brackley et al. 2006a; McDowell Group et al. 2004;

McDowell Group 2006b) have considered the demand for timber based on a number of different scenarios that assume different futures for the timber industry. The identified future scenarios range from a projected longer-term demand of 47 MMBF through 360 MMBF. Based on these studies, the Forest Service identified an upper planning cycle demand of 360 MMBF.

Recreation and Tourism

The following section is divided into two subsections or parts. The first part discusses trends in recreation and tourism and related employment for Southeast Alaska as a whole. This discussion draws upon region-wide visitor numbers and related employment estimates to the extent they are available. The second part discusses the same issues with specific reference to the Tongass National Forest. Trends in visitation to Southeast Alaska and the Tongass National Forest are discussed in detail in the *Recreation and Tourism* section of this document and, as a result, are only briefly summarized in the following subsections.

Recreation and Tourism in Southeast Alaska

Trends in Visitation

The number of visitors to Southeast Alaska has grown substantially since the early 1990s. Summer visitors to Southeast Alaska more than doubled between 1993 and 2006, increasing from 502,800 in 1993 to 1,160,000 in 2006, an increase of 131 percent (McDowell Group et al. 2007). Statewide, the total number of visitors increased by 40 percent over the same period. The relatively large increase in visitation to Southeast Alaska reflects the dramatic growth in the number of cruise ship passengers visiting the region. The number of cruise ship passengers visiting Juneau, for example, more than tripled between 1993 and 2006, increasing from approximately 306,600 in 1993 to 953,000 in 2006 (Table 3.15-13 in the *Recreation and Tourism* section; Juneau Convention and Visitors Bureau 2007). The number of passengers docking at Juneau is considered representative of the total number of cruise ship passengers because most cruise ships visiting Southeast Alaska stop there.

Anecdotal evidence suggests that the number of independent visitors (i.e., non-cruise ship visitors) remained relatively constant from 1980 through 2002. Recent estimates by the Juneau Convention and Visitors Bureau suggest, for example, that the number of independent visitors to Juneau has held relatively constant at around 100,000 (Schroeder et al. 2005) over this same period. Data for Southeast Alaska as a whole indicate cruise ship visitors increased from about 64 percent of total visitors to the region in 1985 to 75 percent of the total in 2001. About 90 percent of visitors to Juneau in 2003 were estimated to be cruise ship passengers (Schroeder et al. 2005).

Employment and Contribution to the Regional Economy

Recreation and tourism-related employment is difficult to accurately quantify because visitors spend their money throughout the local economy. There is no single “tourism industry” and no direct measures of tourist-related income or employment. Components of travel and tourism activities are instead partially captured in other economic sectors, such as retail trade (e.g., grocery stores and gift shops), transportation, hotels and other lodging places, and amusement and recreation services.

There are no readily available current estimates of total recreation and tourism-related employment for Southeast Alaska. The most recent study that provided data by Alaska region (McDowell Group 1999) estimated that recreation and tourism (or in their terms vacation/pleasure visitors) supported approximately 4,154 direct jobs in Southeast Alaska in 1998, approximately 22 percent of Alaska’s total recreation and tourism-related employment. The Draft and Final SEIS used the basic approach employed in the McDowell analysis and estimated that recreation and tourism supported 4,185 and 4,278 direct jobs in Southeast Alaska in 1999 and 2001, respectively (USDA Forest Service 2002b, 2003b). Based on these estimates, recreation and tourism accounted for 7 percent and 8 percent of total employment in Southeast Alaska in 1999 and 2001, respectively. Unfortunately it is not possible to update these estimates because the baseline employment data compiled by the Alaska DOL are no longer available in the same format following the national shift from the Standard Industrial Classification (SIC) system to the North American Industrial Classification System (NAICS).

In the absence of a reliable current estimate of recreation and tourism-related employment for Southeast Alaska, employment in the leisure and hospitality sector is used as a proxy for recreation and tourism employment in 2005. Employment in this sector accounted for approximately 9 percent of total employment in Southeast Alaska in 2005 (see Table 3.22-3 for details).

While there are no current estimates of total recreation and tourism-related employment for Southeast Alaska, two studies offer some insight into the economic contribution that recreation and tourism makes to the regional economy. The first study was a survey of commercial recreation businesses that use the public lands and waters of Southeast Alaska. Conducted in 2000, this survey found that cruise ship passengers accounted for 41 percent of total clients, ranging from 22 percent of clients for businesses with fewer than 200 clients a year to 91 percent of clients for businesses with more than 10,000 clients a year (Alaska Division of Community and Business Development [DCBD] 2001). This survey also found that 86 percent of outfitter/guide businesses had annual revenues of less than $100,000 in 1999. Six firms reported revenues over $1 million, including one firm with revenues exceeding $10 million. A similar distribution is evident in terms of clients served, with the majority of firms serving less than 100 clients, a smaller number of firms serving considerably larger numbers, and one firm serving more than 100,000 clients in 1999.

Given the rapid growth in the number of cruise ship passengers visiting the region since 2000, it seems reasonable to assume that the number of clients seeking guided recreation opportunities and the number of outfitter/guides operating in the region has grown. Outfitter/guide data for the Tongass, for example, indicate a 22 percent increase from 2004 to 2005 in the number of clients served by outfitter/guides Forest-wide (see Table 3.15-18 in the *Recreation and Tourism* section).

A second study that provides important insight into the contribution of nature-based tourism to the regional economy was prepared by the Institute of Social and Economic Research at the University of Alaska Anchorage and involved field research conducted in the summers of 2005 and 2006 (Dugan et al. 2006). This study focused on a limited number of communities and sought to provide insight into revenues generated, the types of activities attracting tourists, and the flows of money through the economy. The findings of the study indicate that nature-based tourism generates substantial revenues in the region, with an estimated $250 million generated in annual direct business revenues for the companies surveyed in Sitka, Juneau, and Chichagof Island (Dugan et al. 2006). The study also found that nature-based tourism takes a number of different forms and the ratio of cruise ship passengers to independent travelers varies by location. Most nature-based activities that originate in Ketchikan, for example, fell into four general categories: flightseeing, marine charters, adventure experiences, and general sightseeing. In all cases, the majority of clients participating in these activities were cruise ship passengers. Nature-based tourism on Chichagof Island, on the other hand, included a mix of cruise ship passengers and independent travelers, depending on the location and activity involved (Dugan et al. 2006).

Recreation and Tourism on the Tongass National Forest

The following discussion focuses on existing and projected recreation use levels and related employment. The existing supply of recreation opportunities, which forms an important part of the recreation analysis presented in the environmental consequences part of this section, is discussed with respect to Recreation Opportunity Spectrum (ROS) settings and inventoried Recreation Places in the *Recreation and Tourism* section of this document.

Forest Use and Visitation

The preceding discussion indicates that there has been a substantial growth in the number of visitors to Southeast Alaska over the past decade or so.

While it is reasonable to assume that the vast majority of visitor recreation and tourism activity in the region is related to the natural environment, not all of the activity generating this employment can be directly linked to the Tongass National Forest. Many visitors experience the Tongass passively, from the deck of a cruise ship, for example, without directly using the Forest for recreation purposes. In addition, while the Tongass includes approximately 80 percent of the land area in Southeast Alaska, there are other lands that offer wildland recreation opportunities in the region, including the 3.3 million acres of National Park Service lands and recreation lands managed by the State of Alaska. Further, other popular recreation and tourism activities, such as saltwater fishing, sea kayaking, and shopping, do not take place on the Tongass.

It should, however, be noted that cruise ship companies have heavily marketed Forest-related activities in recent years and many passengers do take at least one trip to the Forest during their visit. Icefield helicopter tours and visits to the Mendenhall Glacier by cruise ship passengers have, for example, increased substantially (see Table 3.15-15 in the *Recreation and Tourism* section). Recent survey data (2005) indicate approximately 83 percent of cruise visitors to Juneau participated in at least one tour while in port. Glacier tours were the most popular type of tour in 2005, with 42 percent of cruise visitors taking this type of tour. Wildlife/marine life viewing, the Mt. Roberts Tramway, and flightseeing via helicopter were also popular (McDowell Group 2005).

With these caveats in mind it is apparent that not all of the recreation and tourism employment and economic activity in Southeast Alaska can be directly attributed to the Tongass. In addition, visitors to the region comprise only part of total recreation use on the Tongass. Residents of local communities also make extensive use of the Forest for recreation purposes.

The question of recreation use is complicated because only limited forest visitation data are presently available. There are currently two main sources of data: the results of the first Alaska National Visitor Use Monitoring (NVUM) program, which were published in 2004, and data that were collected for specific recreation places in the 1980s and early 1990s.

The final results of the first Alaska NVUM program, which involved surveys conducted over 3 years, were published in August 2004 (Kocis et al. 2004). According to the NVUM analysis there were an estimated 1.83 million national forest visits and 2.13 million site visits to the Tongass in 2003 (Kocis et al. 2004). NVUM has standardized definitions of visitor use measurement to ensure that all national forest visitor measurements are comparable. A national forest visit, as defined by the NVUM, is the entry of one person onto the Forest to participate in recreation activities for an unspecified period of time and may include multiple site visits. A site visit, as defined by the NVUM study, is the entry of one person onto a national forest site or area to participate in recreation activities for an unspecified period of time.

Prior to the NVUM program, Forest-wide recreation use statistics were last compiled for the Tongass National Forest in 1995. The basic measurement of recreational activity was the Recreation Visitor Day (RVD), which is usually obtained through the counting of use permits, visitor surveys, or observation. An RVD is 12 hours of recreation use by one individual. The measures used in the NVUM program are not directly comparable with these estimates. In addition, the NVUM estimates were developed for the entire forest, while the data collection efforts in the 1980s and early 1990s focused on identified and specific recreation places (see the *Recreation and Tourism* section of this document).

While the NVUM data are more recent, it is not possible to extrapolate future use from just one year of data, even though all indications suggest that recreation use in the region and on the Tongass has been increasing in recent years. In the absence of more recent detailed information, the following analysis uses RVD data compiled for identified recreation places from 1984 through 1995 to assess existing and future conditions. These data may not accurately reflect current levels of use on the Tongass, but they are sufficient to allow a comparison of alternatives. This comparison is based on the projected effects of the alternatives on recreation supply (in the form of ROS settings). Demand is assumed to be consistent across all the alternatives and the exact number is less important in this analysis than the overall trend.

Existing and Projected Use (RVDs)

RVD data are presented for three groups based on the Recreation Opportunity Spectrum (ROS) system.

ROS 1:
Primitive
Semi-Primitive Non-Motorized
ROS 2:
Semi-Primitive Motorized
ROS 3:
Roaded Natural, Roaded Modified, Rural and Urban

The RVD data compiled for 1984 through 1995 are divided into three groups based on the ROS system that is used to inventory and classify different recreation settings on the Forest (see Table 3.15-2 in the *Recreation and Tourism* section). These three groups consist of Primitive and Semi-Primitive Non-Motorized settings (here termed ROS 1); Semi-Primitive Motorized settings (ROS 2); and Roaded Natural, Roaded Modified, Rural, and Urban settings (ROS 3) (see Table 3.15-2). Semi-Primitive Motorized settings (here termed ROS 2) accounted for a majority of recreation use on the Tongass in 1994, with 62 percent of recorded RVDs occurring in ROS 2 settings. ROS 1 settings, as defined here, accounted for 20 percent of the use, with the remaining 18 percent of RVDs taking place in ROS 3 settings.

Historic and projected recreation use is presented in Figure 3.22-7. Future use projections are based on actual use estimates from 1984 to 1995, with a trend line (based on these data) used to project future levels of demand. Annual estimated use is presented by ROS class for 1984 through 1995 and for 2000, 2005, and 2010 in Table 3.22-9. Total RVDs are divided into ROS classes based on the shares identified for 1994, which are assumed to remain constant throughout this analysis. These shares are presented graphically in Figure 3.22-8, which also identifies the projected supply of these settings based on the Forest-wide Geographic Information System (GIS) database that was updated for this analysis (see the *Recreation and Tourism* section of this document).

A comparison of projected demand with supply by ROS class and recreation place indicates that ROS 2 (Semi-Primitive Motorized) is the only class in which demand is expected to exceed supply over the next decade.

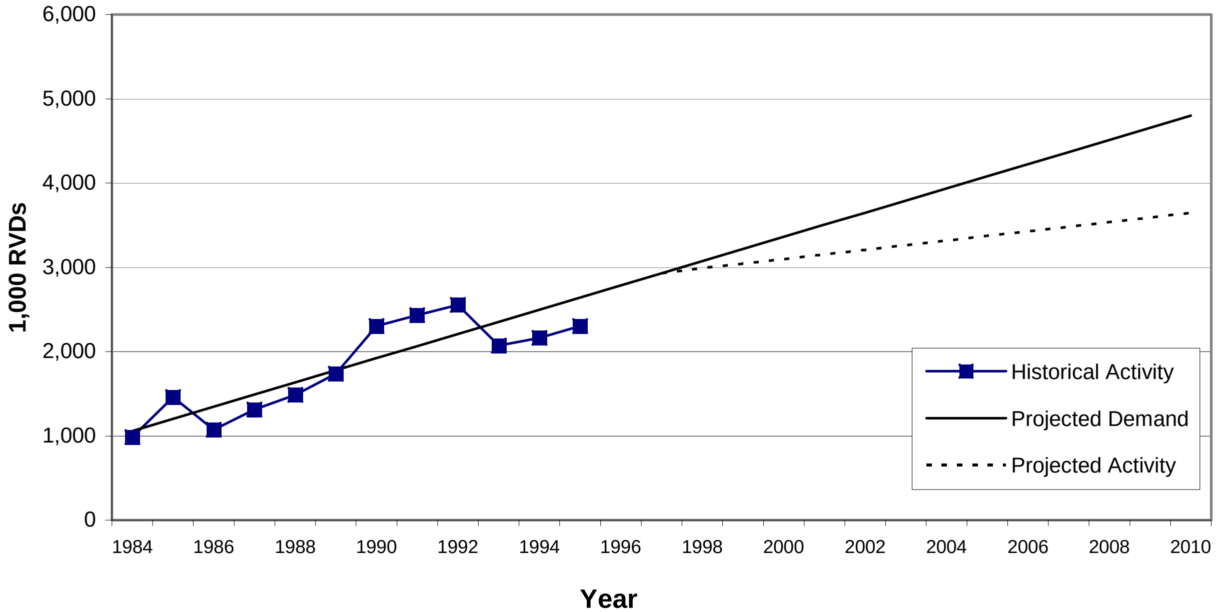
Although outfitter/guides charge clients for services that involve the Tongass National Forest, recreational use on public lands is not typically a market good. In other words, the Forest Service does not typically charge individuals to use the Forest for recreation. As a result, where supply is binding, use restrictions rather than price increases are the most likely result. This analysis assumes that RVD use within a certain ROS class will not exceed supply within that class (for this analysis, supply is equated to the current level available; alternative supply levels are evaluated in the Effects Analysis). ROS 2 is the only class in which demand exceeds supply over the next decade, with the projected number of RVDs having exceeded estimated supply in 1998. In this case, demand is assumed to be constrained by the available supply. The second part of Table 3.22-9 and the dashed line shown in Figure 3.22-7 show the effect that constraining ROS 2 in this manner would have upon projected use. This modified projection, which serves as the baseline for the effects analysis, assumes that recreation use in ROS 1 and ROS 3 settings would not be substituted for the projected unmet ROS 2 demand.

The supply of ROS settings used in this analysis is limited to specifically identified recreation places, with demand also assumed to occur in these places. There are an estimated 870,000 ROS 2 acres in identified recreation places compared to approximately 1.5 million ROS 2 acres Forest-wide (see Tables 3.15-3 and 3.15-5 in the *Recreation and Tourism* section of this document). The recreation economic analysis assumes that demand would continue to focus on ROS 2 areas in recreation places and, therefore, exceed supply in these areas. Viewed on a Forest-wide basis, ROS 2 demand would not exceed Forest-wide supply until sometime after 2010.

This approach recognizes that recreation use is not evenly distributed on the Forest, with some areas, identified here as inventoried Recreation Places, receiving much higher levels of use than others. High levels of recreation activity generally take place during the summer and correspond with cruise ship activity, increased private boating by both residents and non-residents, and a general increase in resident recreation activity. High use levels and/or limited capacity have resulted in reports of use exceeding capacity in certain areas, which generally correspond with the ROS 2 areas evaluated here. The Shoreline Outfitter/Guide EIS prepared for the north portion of the Forest, for example, identified 15 "hotspots" where there was a perception of crowding (USDA Forest Service 2002c). These areas mainly involved popular saltwater bays adjacent to the Forest and included Eliza Harbor, Gambier Bay, Greens Creek, Brothers Islands, George Island, Idaho Inlet, Mud Bay, Pinta Cove, Point Adolphus, Mallard Bay, Williams Cove, Slocum Inlet, Kelp Bay, Lake Eva Trail, and Patterson Bay. Perceptions of and actual crowding exist at other locations on the Forest, including the Anan Creek Wildlife Viewing Area and Margaret Bay near Ketchikan.

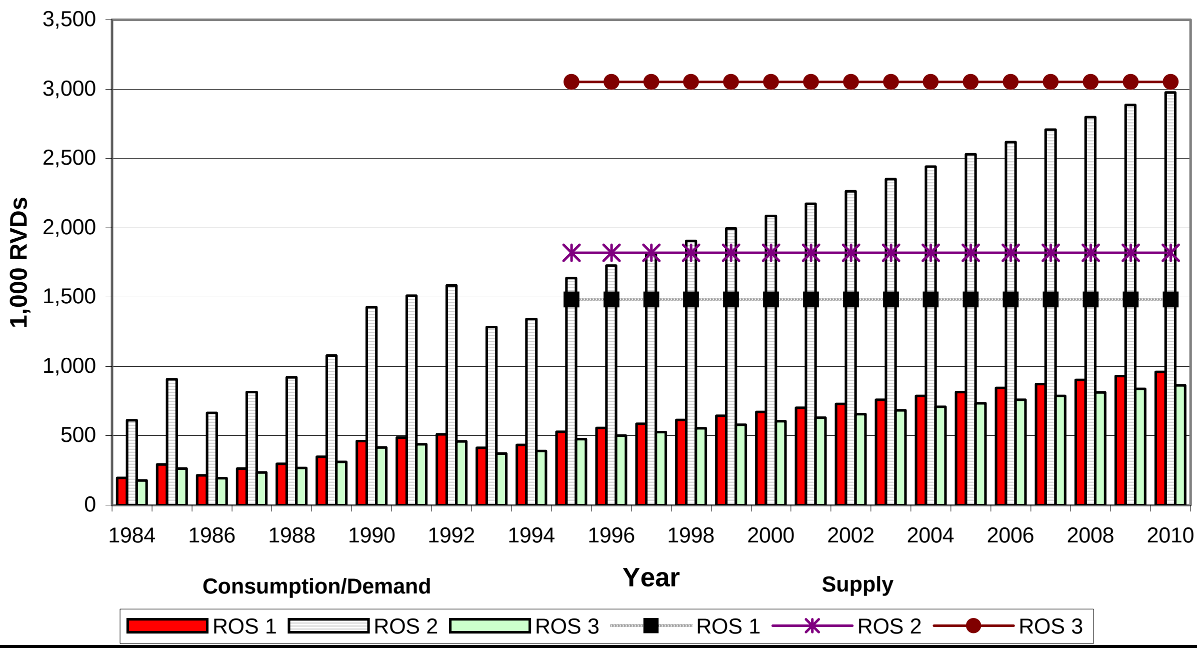
The following analysis also assumes that there would be no change in the current availability of recreational settings. This is not necessarily the case for identified recreation places or the Forest as a whole. Shoreline areas or other areas accessible by floatplane or helicopter that are presently allocated to Primitive or Semi-Primitive Non-Motorized settings (ROS 1) could be reallocated to the Semi-Primitive Motorized setting (ROS 2) in the future if patterns of use or other factors change. While these assumptions represent a simplification of underlying realities, they are necessary to produce a quantified estimate of the relation between recreation supply and demand and allow a comparison of alternatives.

Figure 3.22-7
Historical and Projected Recreational Activity on the Tongass National Forest in RVDs



Note: The dashed line represents future recreational activity constrained by the supply of ROS 2 settings.
Source: USDA Forest Service 1997a (Figure 3-23; updated using 2006 ROS supply data).

Figure 3.22-8
Historical Consumption, Projected Demand, and 2006 Supply for Recreation Activity on the Tongass National Forest by ROS Group



Employment and Earnings

The direct employment estimates presented in Table 3.22-9 are based on a job/RVD ratio of 0.00074. This ratio was developed for the 1997 Forest Plan EIS analysis based on visitor survey data and data from a regional economic model (IMPLAN) (USDA Forest Service 1997a, p. 3-460). This approach assumes that the average amount of employment generated by a single RVD is constant over time and that this number is the same for both Tongass-related recreation and the region as a whole, as well as for different types of recreation on the Tongass. While these assumptions may not accurately reflect underlying realities, they are necessary to produce a quantified estimate of the relation between recreation activity and employment.

Nonresidents were assumed to account for 44 percent of historic and projected RVDs and a commensurate share of employment for the purposes of this analysis. Total employment (direct, indirect, and induced) generated by nonresidents is presented in the last row of Table 3.22-9, entitled "Total from Nonresident." A reduction in out-of-state recreational activity due to decreased recreational opportunities (ROS settings) is assumed to result in a net economic loss to the region. Local residents, on the other hand, are assumed to spend their money elsewhere in Southeast Alaska, and no net loss in economic activity is incurred. This is not to say that this type of effect would be neutral if it were to occur. This is discussed further in the Environmental Consequences section.

Table 3.22-9
Tongass-Related Recreation and Tourism: Historic and Predicted Consumption in Recreation Visitor Days (RVDs)

	Consumption to 1995 and Projected Demand for Tongass-Related Recreation, 2000, 2005, and 2010 (1,000 RVDs)[1]														
	1984	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**2000**	**2005**	**2010**
ROS 1	197	293	215	263	297	348	461	487	511	414	433	528	672	816	960
ROS 2	612	907	665	815	922	1,077	1,428	1,509	1,584	1,284	1,342	1,638	2,084	2,530	2,976
ROS 3	178	263	193	237	268	313	415	438	460	373	390	476	605	734	864
Total	**987**	**1,463**	**1,073**	**1,315**	**1,487**	**1,738**	**2,303**	**2,435**	**2,554**	**2,071**	**2,165**	**2,642**	**3,361**	**4,080**	**4,800**

Available Recreation Opportunities RVDs by Class in 2005[2] (1,000 RVDs)		Projected Consumption of RVDs by Class (1,000 RVDs)[3]					
			1995	**2000**	**2005**	**2010**	**2015**
ROS 1	1,289	**ROS 1**	528	672	816	960	1,104
ROS 2	2,053	**ROS 2**	1,638	1,819	1,819	1,819	1,995
ROS 3	2,206	**ROS 3**	476	605	734	864	993
Total	**5,548**	**Total**	**2,642**	**3,096**	**3,369**	**3,643**	**4,092**

	Historic and Projected Employment Generated in Average Annual Employment														
	1984	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**2000**	**2005**	**2010**
Direct Employment[4]	730	1,083	794	973	1,100	1,286	1,704	1,802	1,890	1,533	1,602	1,955	2,291	2,493	2,696
From Nonresident[5]	321	476	349	428	484	566	750	793	832	674	705	860	1,008	1,097	1,186
Total from Nonresident[6]	**389**	**576**	**423**	**518**	**586**	**685**	**907**	**959**	**1,006**	**816**	**853**	**1,041**	**1,220**	**1,327**	**1,435**

[1] Figures for 1984 to 1995 are estimated from historical use data. Figures in subsequent years are estimates based on a linear projection using the 1984 to 1995 estimates of actual use (see Figure 3.22-7). The distribution of RVDs by ROS setting is based on estimates for 1994 ROS classes 1, 2, and 3 are assumed to account for 20 percent, 62 percent, and 18 percent of total RVDs, respectively.

[2] Estimated available recreation opportunities are based on the supply of ROS settings in identified recreation places on the Tongass. These estimates are for National Forest System (NFS) lands only. They do not include State or private lands in recreation places within the Tongass National Forest boundary.

[3] Projected consumption of RVDs by ROS class is based on projected demand with the consumption of ROS 2 opportunities constrained by the existing supply.

[4] Direct employment is calculated using a job/RVD ratio of 0.00074. This ratio was developed for the 1997 Forest Plan Revision Final EIS analysis (see USDA Forest Service 1997a, p. 3-460).

[5] Nonresident use is estimated to be 44 percent of total forest use. This analysis focuses upon nonresident visitors because jobs generated by nonresident expenditures on goods and services are considered comparable to an export industry that brings new money into the region, creating new wealth and development opportunities. Resident recreational activity, on the other hand, brings no new money into the region, and thereby does not expand the local job base.

[6] Total employment generated by nonresident activities is estimated using a multiplier of 1.21.

Source: USDA Forest Service 1997a (Table 3-136)

Commercial Fishing and Seafood Processing

While commercial salmon fishing represents the largest share of Southeast Alaska's fishing industry (42 percent based on ex-vessel value in 2005), halibut, crab and herring fishing combined make up a substantial proportion of the region's total catch (approximately 31 percent in 2005 on a value basis) (Alaska DOL 2007e). There is an important connection between salmon and other wildlife and fish species on the Tongass National Forest. Crab, halibut, herring, bears, eagles, and other species depend on the annual return of millions of salmon and juvenile salmon produced in the streams and lakes of these public lands. As a result, management decisions that affect salmon are known to indirectly affect other species that are commercially fished. These relationships are, however, poorly understood and difficult to quantify. The commercial fishing discussion presented in this section, therefore, focuses on the salmon fishery. Data available for the seafood processing industry, however, do not allow for an easy distinction between salmon processors and other firms. Data presented for the seafood processing sector, therefore, include the entire seafood processing industry.

Although the profitability of the seafood industry in Southeast Alaska continuously changes, it remains a major component of the regional economy. Together, the fish harvesting and seafood processing sectors accounted for approximately 3,781 direct jobs in 2005, and approximately 10 percent of regional employment (Table 3.22-3). Indirect and induced employment for the fish harvesting sector is estimated to be 525 jobs, resulting in a total of 2,806 jobs supported by this sector in 2005. The seafood processing sector in Southeast Alaska had estimated indirect and induced employment of 960 jobs and supported a total of 2,460 jobs (Table 3.22-3).[2]

Employment data compiled by the Alaska DOL indicate that the salmon fishery accounted for approximately 45 percent of commercial fishing employment (1,026 jobs) in 2005, with the other fisheries combined supporting 1,255 jobs (Alaska DOL 2007d). Other important fisheries in 2005 included halibut (567 jobs), sablefish (226 jobs), and crab (176 jobs) (Alaska DOL 2007d).

Unlike other basic sectors of Southeast Alaska's economy, components of the seafood industry are spread throughout the region with an important presence in virtually every community. Alaska's market share of the global salmon supply (estimated at 31 percent in 1990) has, however, been falling. The loss of market share is not a function of poor stocks or low supply, but a consequence of the growing acceptability of farmed fish as a source of fresh salmon and other seafoods. Southeast Alaskan fishermen have also been negatively affected by weaker Asian markets and competition from fish from eastern Russia (Schroeder et al. 2005). Seafood processing has also undergone fundamental changes in recent years with the increased use of floating fish processing facilities and a trend toward frozen rather than canned salmon. The seafood industry is discussed in more detail in the 1997 Tongass Land Management Plan Revision Final EIS (USDA Forest Service 1997a, p. 3-452 to 3-456).

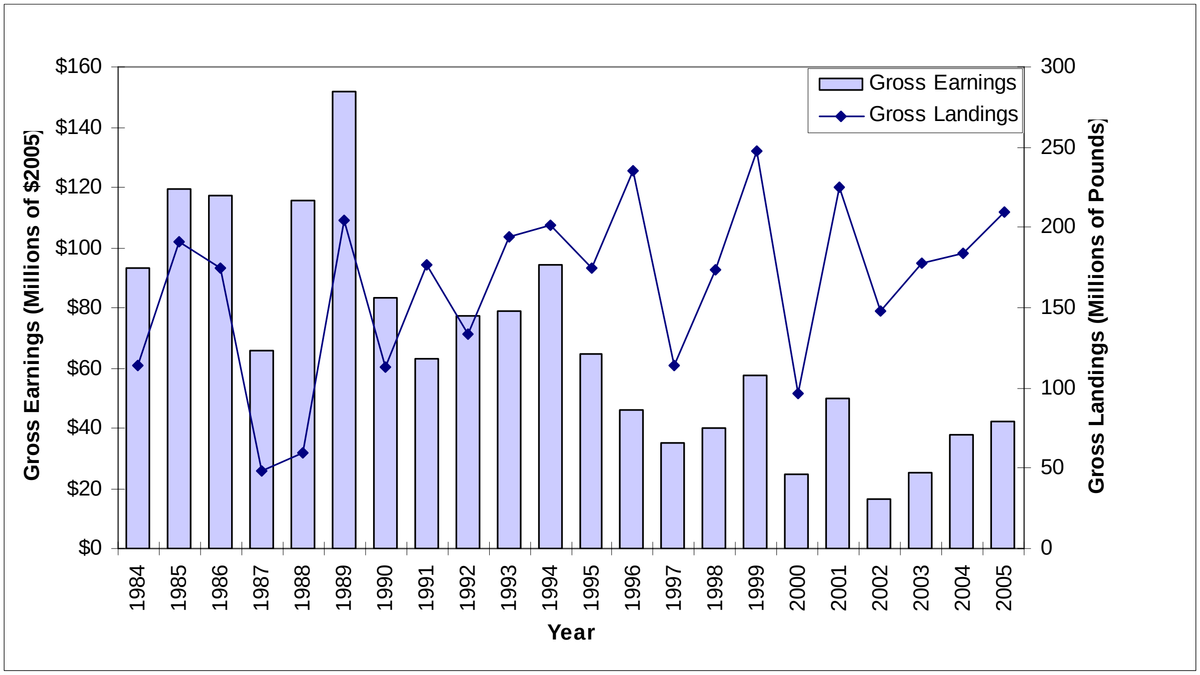
Value and volume measures of salmon harvest for Southeast Alaska are shown in Figure 3.22-8. Both measures show considerable variation from year-to-year. In contrast to revenue and catch figures, employment has remained relatively stable, but has exhibited an overall downward trend (Figure 3.22-9). Statewide, fleet participation in the Alaska salmon fisheries dropped in 2002, partly as a result of low ex-vessel prices (the prices fishermen receive for their catch), but also due to processor limitations on the number of vessels they would serve. Low prices and loss of market

[2]Note that indirect employment for the seafood processing sector includes fish harvesting. As a result, the total (direct and indirect) employment estimates for these sectors should not be added together because this would result in some salmon harvesting employment being double counted.

opportunities resulted in a notable decline in the value of limited entry permits in the salmon fisheries, declining in total value from approximately $1.25 billion in 1990 to $226 million in 2002. Wards Cove Packing Company, the eighth largest processor in Alaska, announced in December 2002 that it was terminating its Alaska salmon operations.

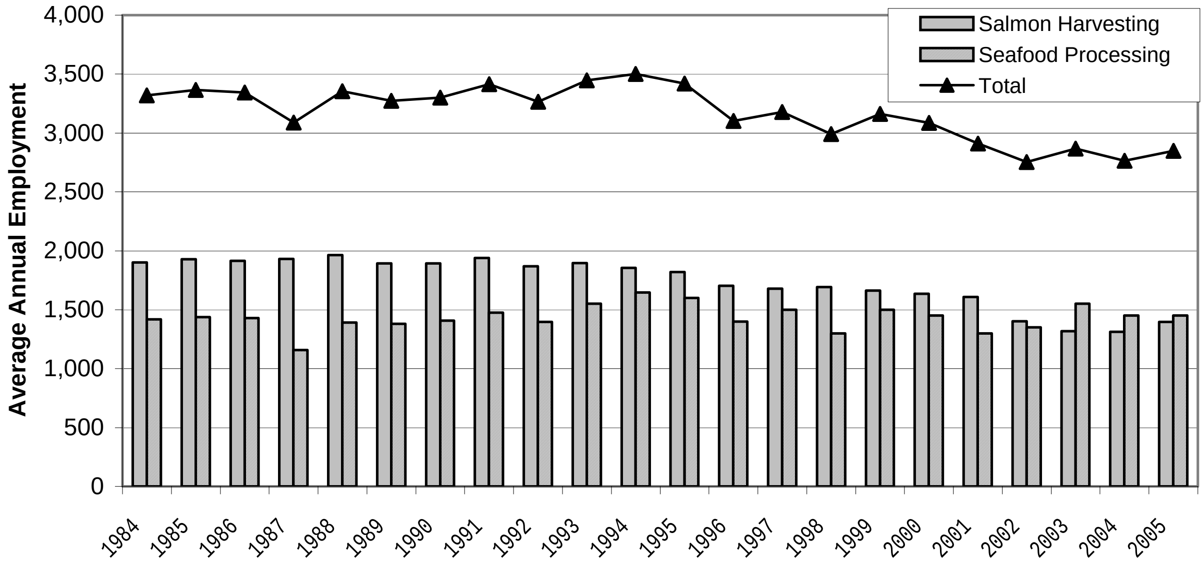
Southeast Alaska accounted for approximately 29 percent of employment in Alaska fisheries in 2004 (Patton and Robinson 2006). Fisheries employment in Southeast declined by about 9 percent from 2000 to 2003, but recovered slightly in 2004, increasing by 2.4 percent. Most of these changes were due to the decline and partial recovery in the salmon fishery, which accounted for approximately 45 percent of all Southeast harvesting employment in 2005 (Patton and Robinson 2006) (see Figure 3.22-9). The commercial fishing and seafood processing industries are generally characterized by high degrees of nonresident participation. Nonresidents accounted for approximately 34 percent of gross earnings in the fish harvesting industry in Southeast Alaska in 2005 (Alaska DOL 2007f). Nonresidents made up a higher share of the fish processing industry, accounting for approximately 67 percent of employment in this sector in Southeast Alaska in 2005 (Alaska DOL 2007g).

Figure 3.22-8
Southeast Alaska Salmon Harvest: Gross Landings and Gross Revenue, 1984 to 2005



Sources: Martin 2006; Bachman et al. 2005; ADF&G 2004; Alaska Commercial Fisheries Entry Commission 2006.

Figure 3.22-9
Direct Salmon Harvesting and Fish Processing Employment in Southeast Alaska, 1984 to 2005



1. Salmon harvesting employment totals presented in this figure were estimated based on data by Fishery and average crew sizes, time spent fishing, and preparation time for different fisheries. The employment coefficients used in this analysis are presented in Table 3-135 of the 1997 Forest Plan Revision Final EIS (USDA Forest Service 1997a).
2. Seafood processing employment for 1995 through 2005 was obtained from the Alaska DOL, who provided these data rounded to the nearest 50 employees.

Source: Alaska CFEC 2002, 2006; Alaska DOL 2001, 2006a; and USDA Forest Service 1997a (Table 3-135).

Mining and Mineral Development

Mineral exploration and mining have been a part of life in Southeast Alaska for over 120 years. Today, the mining industry is exploring new areas for potential mineral deposits and is revisiting historic mining areas using modern exploration techniques. The 1997 Forest Plan Revision Final EIS analysis noted that there are 13 identified mineral deposits on the Tongass National Forest that appeared economically viable under certain conditions. The Present Net Value of these 13 deposits was estimated at $25.6 billion (USDA Forest Service 1997a, p. 3-464). Existing and potential mining development activities identified in the 1997 Final EIS analysis included the Quartz Hill molybdenum site in Misty Fiords, the Greens Creek zinc, lead, and silver mine on Admiralty Island, and the Kensington mine north of Juneau.

In 2005, 312 workers were directly employed by the mining industry. Mining-related indirect and induced employment is estimated at 150 jobs, resulting in a total of 462 jobs supported by the mining industry in that year (Table 3.22-3). Estimated annual average employee earnings of $60,971 per year in 1995 were twice the regional average. This annual average estimate is equal to $78,043 in 2005 dollars. Based on this estimate, direct and total employee earnings in the mining sector were approximately $24.3 million and $30.4 million in 2005. Approximately 93 percent of direct mining employment was located in Juneau Borough and mainly associated with the Greens Creek Mine on Admiralty Island.

The Forest Service approved a plan of operations for the Kensington Gold Mine north of Juneau in 2005 and Coeur Alaska, Inc. subsequently began construction activities on the site. However, a lawsuit was filed against the United States Army Corps of

Engineers and the Forest Service challenging the permitted tailings disposal facility, citing violations to the Clean Water Act. The plaintiffs failed in District Court but were upheld on appeal by the 9th Circuit Court in 2007. The Forest Service anticipates the submittal of a revised plan of operations in 2008.

Natural Amenities and Quality of Life

Natural amenities and local quality of life have increasingly been recognized as important factors determining the economic prospects of many rural communities in the American West and elsewhere (Rudzitis and Johnson 2000). While local amenities and life quality do not directly generate income in the same sense as, say, a sawmill or tourist lodge, they do act to attract and keep residents. This, in turn, supports communities and their economies in several ways. First, many of these residents may earn a substantial proportion of their income from non-job related sources that are independent of local economic activity. Much of this income will then be spent locally, resulting in additional employment and income in the community. Second, residents bring with them important skills and energy that constitute valuable assets for the community. Broadly termed “human capital” by economists, these skills (and the energy with which residents apply them) can earn additional outside income as well as provide essential social resources to the community. These residents may also help attract and retain businesses that are dependent on a skilled labor force, but otherwise relatively footloose from a location standpoint.

Since it is tracked as a separate category in standard income statistics, non-wage income and its contribution to local economies is directly measurable. Investment income (dividends, interest, and rent) and transfer payments from government represent the two major categories of non-wage income. As shown in Table 3.22-10, non-job related income (i.e., transfer payments and dividends, interest, and rent) accounted for 35 percent of total income in Southeast Alaska in 2000, compared to 17 percent in 1980. Non-job related income in the state of Alaska as a whole exhibited a similar change over this period, increasing from 16 percent to 33 percent of total income. Non-job related income accounted for 31 percent of total income for the United States as a whole, but showed relatively little change over the past two decades increasing from 28 percent of total income in 1980 (Table 3.22-10).

Data compiled for 2005 indicate that the non-wage income as a share of total income has decreased from 2000 to 2005 in Southeast Alaska, Alaska as a whole and in the U.S. (Table 3.22-11). In Southeast Alaska this decrease is entirely in dividends, interest, and rent, with transfer payments increasing as a share of total income over this period. This was also the case for the U.S. as a whole. Both non-wage categories decreased in Alaska.

Table 3.22-10
Components of Per Capita Income, 2000

	Southeast Alaska			Alaska			United States		
	2000		% Change	2000		% Change	2000		% Change
	Total ($)	Percent of Total	1980-2000	Total ($)	Percent of Total	1980-2000	Total ($)	Percent of Total	1980-2000
Personal income	31,243	100	0	29,642	100	0	29,469	100	0
Earnings	20,270	65	-18	19,861	67	-18	20,287	69	-3
Transfer payments	4,793	15	9	4,801	16	10	3,793	13	1
Dividends, interest, and rent	6,180	20	9	4,980	17	7	5,389	18	2

Notes:
1. Earnings includes wages and salaries, other labor income, and proprietors' income.
2. Transfer payments consist mainly of government payments to individuals, including retirement, disability, and unemployment insurance benefit payments, income maintenance payments, and veterans benefit payments. Government payments to individuals in Alaska include Alaska Permanent Fund benefits, which are derived from oil revenues and paid to every resident.
3. 1980-2000 Change is the change in percentage share of total per capita income (e.g., earnings in Southeast Alaska in 1980 comprised 83 percent of total per capita income compared to 65 percent in 2000, a difference of 18 percent). In inflation-adjusted dollars this represented a 14 percent decrease from $23,597 to $20,270.

Sources: U.S. Department of Commerce, Bureau of Economic Analysis 2002.

Table 3.22-11
Components of Per Capita Income 2005

	Southeast Alaska		Alaska		United States	
Per Capita Income	Total ($)	Percent of Total	Total ($)	Percent of Total	Total ($)	Percent of Total
Total	36,411	100	35,564	100	34,471	100
Earnings	25,240	69	25,630	72	23,956	69
Transfer payments	5,893	16	4,762	13	5,366	16
Dividends, interest, and rent	5,278	14	5,172	15	5,149	15

See notes 1 and 2 to Table 3.22-10.
Sources: U.S. Department of Commerce, Bureau of Economic Analysis 2007a.

Transfer payments can be further broken out into various categories with social security payments and medical benefits being among the most important. Transfer payments per capita in 2005 in Southeast Alaska were slightly higher than the U.S and Alaska averages (Table 3.22-11).

“Other payments” comprised approximately 40 percent of per capita transfer payments in Southeast Alaska and Alaska in 2000, compared to less than 1 percent nationwide (Table 3.22-12). This category includes certain income categories that are directly linked to birthrights or residence in Alaska, notably annual payments from the Alaska permanent fund, which have averaged between $1,000 and $2,000 per resident in recent years, and dividends from various Alaska native corporations, which are variable but often quite substantial. Much of the growth in transfer payments in Southeast Alaska and Alaska between 1980 and 2000 was due to increases in the other payments category, which exhibited a more than five-fold increase over this period. Other payments comprised a smaller share of total Southeast Alaska transfer payments in 2005 (Table 3.22-13).

Table 3.22-12
Components of Per Capita Transfer Payments, 1980 and 2000

	Southeast Alaska			Alaska			United States		
	2000 Total ($)	2000 Percent of Total	Change 1980-2000	2000 Total ($)	2000 Percent of Total	Change 1980-2000	2000 Total ($)	2000 Percent of Total	Change 1980-2000
Retirement and disability	950	20	-8	769	16	-6	1,508	40	-6
Medical payments	1,028	21	6	1,156	24	4	1,500	40	17
Income maintenance benefits	382	8	-4	466	10	-10	377	10	-2
Unemployment insurance	200	4	-10	178	4	-11	73	2	-5
Other payments[1]	1,966	41	24	1,909	40	30	7	0	0
Miscellaneous other[2]	266	6	-7	325	7	-6	328	9	-4
Total transfer payments	**4,793**	**100**	**0**	**4,801**	**100**	**0**	**3,793**	**100**	**0**

[1] Consists largely of Bureau of Indian Affairs payments, education exchange payments, Alaska Permanent Fund dividend payments, compensation of survivors of public safety officers, compensation of victims of crime, disaster relief payments, compensation for Japanese internment, and other special payments to individuals.
[2] Miscellaneous other includes veterans benefit payments, federal education and training assistant payments (excluding veterans), payments to nonprofit institutions, and business payments to individuals.
[3] 1980-2000 Change is the change in percentage share of total per capita income (e.g., "other payments" in Southeast Alaska in 1980 comprised 17 percent of total per capita income compared to 41 percent in 2000, a difference of 24 percent). In inflation-adjusted dollars this represented a more than five-fold increase, as other payments increased from $300 per capita to $1,966.
Source: U.S. Department of Commerce, Bureau of Economic Analysis 2002.

Table 3.22-13
Components of Per Capita Transfer Payments, 2005

	Southeast Alaska		Alaska		USA	
	Total ($)	Percent of Total	Total ($)	Percent of Total	Total ($)	Percent of Total
Retirement and disability	1,280	24	1,026	20	1,839	36
Medical payments	2,107	40	2,171	42	2,205	43
Income maintenance benefits	509	10	548	11	532	10
Unemployment insurance	185	4	162	3	109	2
Other payments[1]	886	17	866	17	16	0
Miscellaneous other[2]	309	6	399	8	447	9
Total transfer payments	5,275	100	5,172	100	5,149	100

See Table 3.22-12, notes 1 and 2
Source: U.S. Department of Commerce, Bureau of Economic Analysis 2007c.

Retirees comprise the most common (but by no means the only) source of non-wage income in many rural communities (Colt 2001). In fact, this has given rise in some places to local marketing strategies specifically aimed at attracting retirees and thereby developing the local "retirement industry." The growing economic importance of retirees was not readily apparent in Southeast Alaska in Table 3.22-12 because the increase in the "other payments" category tends to overshadow other changes. However, although retirement and disability payments comprise a relatively small share of total income by national standards, they almost doubled over this period, while medical payments increased by approximately 300 percent. This is partially the result of natural aging processes, but the mean age in the study area, and Alaska as a whole, has been rising at a much faster rate than elsewhere in the United States. This, in turn, may serve as a partial indication that Alaska is becoming more attractive for people as a place to live and not merely as a place to earn money.

Retirement and disability payments and medical payments increased in Southeast Alaska in absolute terms and as a share of transfer payments between 2000 and 2005 accounting for 64 percent of Southeast Alaska transfer payments in 2004, compared to 79 percent nationwide (Table 3.22-13).

The role of “human capital” in local economies is not directly measurable, but it is undoubtedly substantial. The skills possessed by a community’s population can be essential in determining its adaptability to negative changes and its ability to take advantage of new economic opportunities. Skilled employees, for example, constitute a key resource for existing or potential employers, and local entrepreneurs can help identify and grow new business opportunities if they exist. Owing to improvements in transportation and telecommunications, other residents may be able to sell their skills in distant or “virtual” labor markets without leaving home. Equally important is the skills and energy residents can bring to local government and other community organizations. Research has indicated that effective and energetic local government supported by strong community involvement is an important ingredient in community resiliency and the ability to weather adverse economic events.

Although it is difficult to directly measure the importance of natural amenities in attracting and keeping residents, proximity to natural environments and the recreational activities they support are undeniably a benefit enjoyed by residents, especially in the more rural communities of Southeast Alaska. At the same time, the atmosphere of a community also constitutes an important amenity, and this may often be linked to more traditional forms of economic activity, such as fishing or timber. In other words, changes in the local economy such as a shift to tourism may impact local atmosphere and amenities even if the surrounding natural environment remains essentially unchanged. These impacts are often assumed to be negative as tourism leads to crowding and the loss of traditional charm, but this need not always be the case. Certain tourism establishments, such as restaurants, meeting centers or entertainment facilities, often serve local residents as well, and thus add to the amenities available to them. Finally, the size of a community has important effects on the local amenities available. If a community is too small, or too poor, for example, it may not be able to provide many of the basic social and economic amenities many residents require, local natural amenities notwithstanding.

Payments to the State

Prior to 2000, in states with national forests, 25 percent of the returns to the US Treasury from revenue producing Forest Service activities such as timber sales, were returned to each state for distribution back to counties (or in Alaska, boroughs) having acreage within a national forest. Those payments were called the “25 percent fund payments” and were dedicated by law to be used for roads and schools. In October 2000, the *Secure Rural Schools and Community Self Determination Act of 2000* was enacted to stabilize federal payments to states in response to declining federal receipts.

The legislation was authorized for implementation for fiscal years 2001 through 2007 and allowed counties and/or boroughs to choose between 25 percent of current receipts or a full payment amount based on the average of the highest three payments made to the state during the 14-year period between 1986 and 1999. Alaska boroughs and communities have elected to receive a full payment amount rather than 25 percent of receipts since enactment of this legislation. Those annual full payment amounts are primarily dedicated to roads and schools, with provisions for special project funding under certain conditions. Under the full payment approach, Forest Service payments to the State of Alaska have been based on the high 3-year historic average, rather than linked to annual Forest Service revenue, and, as a result, Alaska has received payments of approximately $9 million per year. Payments made to the state of Alaska from 1986 through 2007 are shown in Table 3.22-14.

Table 3.22-14
Federal Payments to Alaska from NFS Receipts 1986 to 2006 (Amounts in $1,000s)

Year	Payment ($000s)[1]
1986	820.2
1987[2]	0.0
1988	581.4
1989	6,892.6
1990	11,703.0
1991	11,870.3
1992	4,216.7
1993	4,847.0
1994	10,764.7
1995	9,053.9
1996	6,874.2
1997	1,377.3
1998	2,133.8
1999	2,295.3
2000	2,553.1
2001-2007[3]	9,921.7

[1] Data are adjusted for inflation using the U.S. producer price index and presented in 2004 dollars and 1,000s.
[2] Tongass receipts in Fiscal Year (FY) 1987 were negative due to Comptroller General Decision B-224730 of March 31, 1987, to retroactively implement the emergency rate redeterminations for short-term sales. Without this reduction, Tongass receipts would have been positive by $2.1 million (unadjusted for inflation). As a result of the negative receipt, no payments were made to the State of Alaska that year.
[3] Represents legislated annual payment for FY 2001 to FY 2007
Source: USDA Forest Service 1997a, 2002b.

Environmental Consequences

This section describes the potential direct, indirect, and cumulative economic effects of the seven alternatives examined in detail in the EIS. The analysis is divided into two main sections: 1) economic impact analysis, and 2) economic efficiency analysis. The Tongass National Forest budget and payments to the State are addressed in two short sections at the end. In addition, a fifth and final section summarizes the cumulative effects which are included in the overall analysis.

The impact analysis section addresses the effects of the proposed alternatives on regional employment and income. The efficiency analysis attempts to measure all of the costs and benefits to society, both future and present, of each alternative. The costs and benefits assessed in an economic efficiency analysis are not restricted to cash transactions, but also include non-market benefits such as consumer surplus. The concepts and methodologies used in each of these analyses are described in detail in the following sections. In general, it should be remembered that impact and efficiency analyses measure different things and are not directly comparable. Alternatives with positive impacts on jobs and income will not necessarily have high benefits under efficiency analysis.

The cumulative effects of the alternatives are assessed as part of the impact and efficiency analyses in the following sections. These effects are addressed in a number of ways including the following: The regional economic overview in the Affected Environment portion of this section addresses the regional economy as a whole to establish context for this analysis. Potential changes in the wood products industry are viewed in the context of ongoing changes in other sectors of this industry, particularly past and projected future trends in logging on Native corporation lands.

Effects on the recreation and tourism industry are viewed in the broader context of ongoing and possible future trends in visitation to Southeast Alaska. The effects analysis also considers the economic implications of the potential effects of the alternatives on possible future transportation and public utility projects.

Economic Impact Analysis

The Economic Impact Analysis addresses the effects of the alternatives on regional employment and income.

This section addresses the potential effects of the proposed alternatives on regional employment and income and is divided into seven main parts. The first six parts address the effects of the alternatives on the wood products industry, recreation and tourism, mining, transportation and utilities, salmon harvesting and processing, and quality of life, respectively. The final part provides a summary of the effects discussed in the preceding sections.

Wood Products and Timber Demand—Long-Term Effects

The economic impact analysis addresses the potential effects of the alternatives on the wood products sector in two ways. This section evaluates the long-term impacts of the proposed alternatives based on the four projected demand scenarios developed by Brackley et al. (2006a). The following section (Wood products—Short-Term Effects) discusses the short-term implications of the alternatives by addressing their potential effects on national forest timber sale volume under contract, as well as NEPA-cleared volume and timber volume in preparation.

The potential effects of the alternatives on the future supply of national forest timber may be evaluated based on the amount of timber available under each alternative. The ASQ is the maximum quantity of timber that may be harvested from suitable lands on the entire Forest for a 10-year period (36 CFR 219.3). It is usually expressed as an annual average. In addition to the volume harvested from suitable lands, timber harvested from unsuitable lands can also contribute to market demand needs. The Forest contains extensive areas of young-growth forest that are in the stem exclusion phase (see the *Timber* section of this EIS). Thinning these dense stands to improve wildlife habitat may result in merchantable volume. Other examples include timber that may be salvaged from unsuitable land following windthrow if these trees are in excess to dead and down wood habitat needs and timber from harvest on oversteepened slopes that is incidental to other harvest operations.

As discussed earlier, the ASQ is a ceiling and does not represent a future sale level projection or target, nor does it reflect all of the factors that may influence future sale levels. This is discussed further in the *Timber* section of this document. As noted in the Affected Environment portion of this section, the ASQ consists of two non-interchangeable components (NICs): NIC I, which includes lands that can be harvested with normal logging systems, and NIC II, which includes lands with especially high logging costs usually due to isolation or special harvesting equipment requirements. Acres included in the ASQ but not in NIC I are more costly to harvest and not likely to be cut under current market conditions with the current industry structure.

Estimated annual average ASQ and NIC I volumes are presented by alternative for the second decade following implementation in Table 3.22-15. These volumes are divided into general log class and species type based on recent estimates of the net standing volume by species and grade for the Tongass National Forest (Alexander 2006). This table also includes projected non-national forest annual harvests for Southeast Alaska, which are assumed to be 109 MMBF based on Brackley et al. (2006a). Harvest from private lands accounts for the largest share (102 MMBF) of the non-national forest harvest, with harvest from other public lands accounting for the remaining 7 MMBF. This overall estimate is lower than the volume harvested from non-national forest lands in 2004 (123 MMBF) and 2005 (147 MMBF) and lower than estimates of future non-national forest harvest developed by the McDowell Group et al. (118 MMBF) (McDowell

Group et al. 2004)[3]. Non-national forest harvest decreased from 221 MMBF in 2000 to 123 MMBF in 2005 (Figure 3.22-5). As previously noted, harvests from private lands are typically exported as logs and are not processed locally.

Table 3.22-15
Estimated Timber Supply (second decade annual average)

Alternative	1	2	3	4	5	6	7
Entire ASQ Harvested (MMBF Log Scale)							
No.1 Spruce/Hemlock[1/]	4	14	18	33	24	24	38
No. 2 Spruce/Hemlock	20	62	84	148	110	110	173
Alaska yellow-cedar	5	15	21	36	27	27	42
Western red-cedar	3	9	13	22	17	17	26
No. 3 Spruce/Hemlock	9	29	39	69	51	51	81
Utility Spruce/Hemlock	7	22	30	52	39	39	61
Total Tongass	**49**	**151**	**205**	**360**	**267**	**267**	**421**
Non-Tongass National Forest[3]	109	109	109	109	109	109	109
Total Southeast Alaska	**158**	**260**	**314**	**469**	**376**	**376**	**530**
NIC 1 Only Harvested (MMBF Log Scale)							
No.1 Spruce/Hemlock[1/]	4	13	17	28	22	21	33
No. 2 Spruce/Hemlock	20	59	77	129	98	97	152
Alaska yellow-cedar	5	14	19	31	24	24	37
Western red-cedar	3	9	12	19	15	15	23
No. 3 Spruce/Hemlock	9	27	36	60	46	45	71
Utility Spruce/Hemlock	7	21	27	46	35	34	54
Total Tongass (NIC I only)	**49**	**143**	**187**	**314**	**239**	**236**	**370**
Non-Tongass National Forest[2]	109	109	109	109	109	109	109
Total Southeast Alaska	**158**	**252**	**296**	**423**	**348**	**345**	**479**

[1] The No.1 Spruce/Hemlock category also includes peeler and select logs.
[2] The 109 MMBF consists of 102 MMBF from private lands and 7 MMBF from other public lands. Harvest from private lands is assumed to be exported in log form and not processed in Southeast Alaska. Non-Tongass harvest levels are assumed constant across alternatives and time periods.
NIC I=Non-Interchangeable Component I. NIC I includes lands that can be harvested with normal logging systems.

The following discussion is divided into two main sections. The first section addresses the potential effects of the alternatives on the timber industry. The second section discusses the potential effects the alternatives would have on timber-related employment and income in Southeast Alaska.

Effects on the Timber Industry

The following sections evaluate the alternatives with respect to: a) the Pacific Northwest Research Station demand projections (Brackley et al. 2006a), and b) current production levels, installed capacity, and the minimum volumes required by various processing facilities.

Demand Indicators

Pacific Northwest Research Station Projections

The Affected Environment part of this section provides an overview of current conditions for the Southeast Alaska wood products industry, outlines the current status of the industry, and discusses projected demand, as identified by Brackley et al. (2006a) (see Table 3.22-6). One key difference between the demand projections prepared by Brackley et al. and those used in past Tongass National Forest planning efforts (Brooks and Haynes 1990, 1994, 1997) is that the Brackley et al. (2006a) publication presents four specifically designed scenarios, as opposed to three general

[3] McDowell Group (2006b) clarified and provided some updated information on their 2004 study and noted that they now understand that respective annual harvests from private and state lands are likely to be closer to 50 MMBF and 10 to 13 MMBF into the future, respectively.

assumptions of long-term demand. In addition, Brackley et al. (2006a) estimated demand in two scenarios for decked logs and a portion of cedar exports only, not total harvest, as done in previous projections (see the Affected Environment part of this discussion).

The four scenarios are generally described as limited lumber, expanded lumber, medium integrated industry, and high integrated industry. A key issue in these scenarios is the use of low-quality material (low-grade and utility logs). The limited and expanded lumber scenarios both assume that this material will be left in the Forest, sent directly to sawmill chippers, shipped to the lower 48 states, or exported. The local wood products industry is assumed to consist primarily of sawmills that process higher value material and it is assumed that the economic disposition of lower value material (No. 3 sawlogs and utility logs) will continue to be a challenge. The two integrated industry scenarios, in contrast, assume the addition of one or more facilities that will process this low-quality material. Facilities that could be developed to process lower quality material include veneer, medium density fiberboard (MDF), and bioenergy facilities among others. The four different scenarios result in total derived demand projections that range for the year 2022 from 68 MMBF under Scenario 1 (Limited Lumber Production) to 342 MMBF under Scenario 4 (High Integrated Industry) (Table 3.22-7).

These scenarios provide a good basis for discussion of where the industry currently is, and provide insight into what that industry could look like in the future given various assumptions about industry investment and end markets. Of course many factors would be involved to shape what the actual industry looks like in the future. The "seek to provide a supply of timber from the Tongass National Forest" language of the TTRA indicates the Forest should consider a full range of possibilities. The four scenarios evaluated by Brackley et al. are useful in this context, especially as the Deciding Official works to balance the land base available to provide timber along with all other resource values and needs. These four scenarios are hypothetical and presented here to illustrate the type of developments that might take place in cases where different volumes are made available for harvest. An implicit assumption of all four scenarios is that an economically viable and stable timber supply is available from multiple sources in Southeast Alaska, including the Tongass National Forest. The transition from one scenario to the next involves new private investment and market development. A key factor in attracting new investment is whether or not a supply of timber "shelf volume" is available for purchase.

The four scenarios provide one series of benchmarks that the proposed alternatives may be measured against. Recognizing that the Southeast Alaska wood products industry has essentially been in a period of transition since the APC and KPC pulp mills closed in the 1990s, the alternatives evaluated in this document also consider alternate futures for the industry, with Alternatives 1 through 4 designed to correspond with Brackley et al.'s Scenarios 1 through 4, while also responding to other concerns. Alternative 5, No Action, is the current Forest Plan (1997 ROD, as amended). Alternative 6, Proposed Action, is also based on the existing plan, but includes adjustments based on information generated during the recent 5 Year Plan Review and other minor clarifications and updates. Alternative 7 assumes that all wood processed in Southeast Alaska would come from the Tongass National Forest.

Scenario 1 – Limited Lumber Production. This scenario approximates the status of the timber industry in Southeast Alaska at the time that the Brackley et al. study was completed. Transition of the industry from the pulp mill era, which involved a much more integrated industry, toward an industry that is centered around the manufacture and supply of a different suite of products has been slow. Uncertainty about a stable supply of timber from the Tongass is believed to have contributed to the timeframe of this transition.

Total derived demand is projected to be 68 MMBF in 2022 under this scenario (Table 3.22-7). It is likely that this volume would be primarily logs from more economical (NIC I) lands. Existing mills would continue to have insufficient timber to operate efficiently. The lower value logs sold in federal, state, and private timber harvest projects would continue to be left in the woods, exported, or chipped and sold when favorable markets conditions exist.

> Alternative 1 with a maximum annual average harvest level of 49 MMBF could not provide sufficient volume to meet this scenario as currently modeled.
>
> Alternatives 2, 3, 4, 5, 6, and 7 could all provide sufficient volume to meet this scenario during the next 10 to 15 years.

Scenario 2 – Expanded Lumber Production. This scenario also projects only higher value logs are processed, with limited new investments in the existing mills in Southeast Alaska. The scenario assumes that there will be sufficient sawlog wood supply, primarily from federal and state timber lands, to efficiently operate the existing mills in Southeast Alaska. No new mills will be installed to utilize the lower value logs from any lands in Southeast and this material could be left in the woods, exported, or chipped and sold when favorable market conditions exist..

Total derived demand is projected to be 187 MMBF in 2022 under this scenario (Table 3.22-7). As in Scenario 1, it is likely that this volume would be primarily higher value logs from the more economical (NIC I) lands.

> Alternatives 1 and 2 with maximum annual average harvest levels of 49 MMBF and 151 MMBF, respectively, could not provide sufficient volume to meet this scenario.
>
> Alternatives 3, 4, 5, 6, and 7 could all provide sufficient NIC I volume to meet this scenario.

Scenario 3 – Medium Integrated Industry. This scenario builds on Scenario 2 and would establish processing capacity to fully utilize sawlogs and low grade and utility logs from federal and state timber sales. Under this scenario the current sawlog milling capacity would operate efficiently and new processing capacity would be developed to utilize the material that has been left in the woods or exported. Some material from other land ownerships has the potential to be used by local mills. Low-grade logs would be used to produce chemicals, energy, or engineered wood products.

Total derived demand is projected to be 204 MMBF in 2022 under this scenario (Table 3.22-7). It is likely that this volume would come from both the more economical (NIC I) lands and the less economical (NIC II) lands.

> Alternatives 1 and 2 with maximum annual average harvest levels of 49 MMBF and 151 MMBF, respectively, could not provide sufficient volume to meet this scenario.
>
> Alternatives 3, 4, 5, 6, and 7 could provide sufficient volume to meet this scenario.

Scenario 4 – High Integrated Industry. This scenario builds on Scenario 3 and provides an estimate of the upper market level for the foreseeable future. In order for this situation to be realized, new investments in processing capacity would need to be made and additional market shares established.

Total derived demand is projected to be 342 MMBF in 2022 under this scenario (Table 3.22-7). It is likely that this volume would come from both the more economical (NIC I) lands and the less economical (NIC II) lands. Note that Brackley et al. (2006a) indicate that it would likely take several years to fully achieve Scenario 4.

Alternatives 1, 2, 3, 5 and 6 with maximum annual average harvest levels of 49 MMBF, 151 MMBF, 205 MMBF, 267 MMBF, and 267 MMBF respectively, could not provide sufficient volume to meet this scenario.

Alternatives 4 and 7 could provide sufficient volume to meet this scenario.

The ability of the seven alternatives to supply enough timber to satisfy the projected demand for timber under each scenario is summarized in Table 3.22-16.

Table 3.22-16
Ability of the Alternatives to meet the Timber Demand Scenarios in 2022

	Alternative[1]						
	1	2	3	4	5	6	7
Scenario 1	No	Yes	Yes	Yes	Yes	Yes	Yes
Scenario 2	No	No	Yes	Yes	Yes	Yes	Yes
Scenario 3	No	No	Yes	Yes	Yes	Yes	Yes
Scenario 4	No	No	No	Yes	No	No	Yes

1. While an alternative may be technically able to meet a given demand scenario, the ability to do so in the short-term is highly dependant on budgets, resolution of current litigation and success in implementing new projects. It takes several years to initiate and complete a new analysis and implement the decision through sale layout and contract award.

Current Production Levels, Installed Capacity, and Minimum Volumes Required by Various Processing Facilities

The following sections evaluate the potential effects of the alternatives using three sets of evaluation criteria: current production levels, installed capacity, and the minimum volumes required to operate by various processing facilities. Current (2005) production levels and active and total installed capacity are shown by facility in Table 3.22-5.

The minimum timber volumes required by various processing facilities are identified in Table 3.22-17. These minimum estimated volumes are compared with the estimated annual ASQ for the second decade following Plan implementation for each alternative in Figure 3.22-11. As shown in Table 3.22-18, the different types of potential facilities would use different types of logs, although in most cases different types of logs may be used by more than one type of facility. Both sawmills and a veneer plant would, for example, be able to process No. 2 spruce and hemlock sawlogs (Table 3.22-18). In addition, different facilities would be able to process more than one type of log. A veneer plant may, for example, process No. 2 spruce and hemlock sawlogs, No. 3 spruce and hemlock sawlogs, and cedar (Table 3.22-18). These points should be kept in mind when viewing the simplified comparison presented in Figure 3.22-11.

Table 3.22-17
Minimum Timber Volumes Required by Various Processing Facilities

Facility	Volume (MMBF)
Sawmills[1]	138
Veneer Plant[2]	30
MDF or Bioenergy[2]	80 to 100

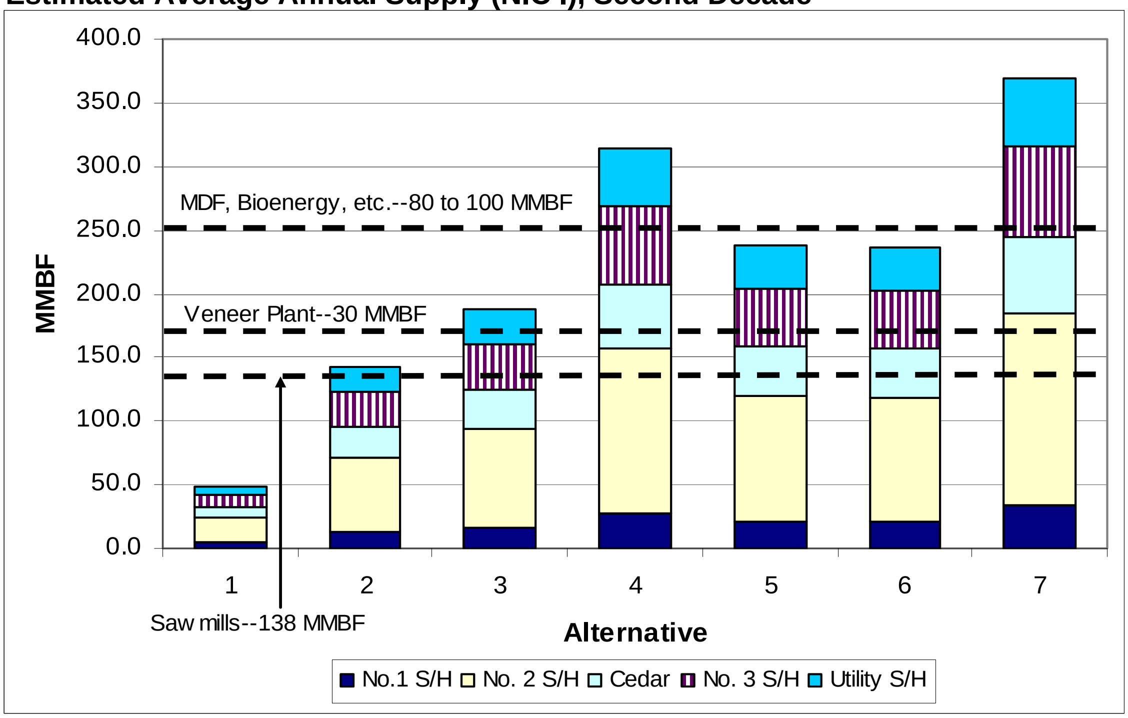
[1] The estimated sawmill volume is approximately 66 percent of existing mill capacity based on the four largest existing sawmills, with some allowance for smaller sales. It is not 66 percent of the estimated mill capacity shown in Table 3.22-5.
[2] These volumes are the minimum required to operate the identified types of facilities.
Source: Estimates developed by the Forest Service based on McDowell Group et al (2004), Brackley et al. (2006b), and the Juneau Economic Development Council (2006) with updates by Southeast Alaska sawmills.

Table 3.22-18
Log Utilization by Facility

Log Grade/Species	Percent of Average Harvest	Facility Type
Peeler/Select/No.1 Spruce/Hemlock	9	Sawmill
No. 2 Spruce/Hemlock	41	Sawmill, veneer
Alaska yellow-cedar	10	Sawmill, veneer
Western red-cedar	6	Sawmill, veneer
No. 3 Spruce/Hemlock	19	Veneer, MDF, Bioenergy
Utility Spruce/Hemlock	15	MDF, Bioenergy
Total	**100**	**NA**

Source: Alexander 2006

Figure 3.22-11
Minimum Timber Volumes Required by Various Processing Facilities and Estimated Average Annual Supply (NIC I), Second Decade



Notes:
S/H = Spruce/Hemlock
1. No. 1 S/H includes Peeler, Select, and No.1 spruce and hemlock sawlogs.
2. The minimum timber volumes required by various processing facilities are shown in Table 3.22-17. Log utilization by facility is shown in Table 3.22-18.
3. Estimated supply by alternative is based on the projected ASQ and average timber sale composition in terms of species and log grades (see Table 3.22-15).

Table 3.22-19
Projected Second Decade NIC I Volumes and Active and Total Installed Capacity

	Alternative						
	1	2	3	4	5	6	7
Log Grade/Species	**Projected NIC I (MMBF Log Scale)**						
Higher Value[1]	24	72	94	157	119	118	185
Cedar[2]	8	23	30	51	39	38	60
Lower Value[3]	9	27	36	60	46	45	71
Utility	7	21	27	46	35	34	54
Total	**49**	**143**	**187**	**314**	**239**	**236**	**370**
Capacity	**Percent of 2006 Active and Total Installed Capacity**						
Active Installed Capacity[4]	9%	27%	36%	60%	46%	45%	71%
Total Installed Capacity[5]	7%	20%	26%	43%	33%	33%	51%

Notes:
1/Higher value consists of No.1 and No.2 Spruce/Hemlock (see Table 3.22-15)
2/Cedar includes Alaska yellow-cedar and Western red-cedar (see Table 3.22-15)
3/Lower value includes No. 3 Spruce/Hemlock (Table 3.22-15)
4/Active installed capacity was 261 MMBF in 2005 (Table 3.22-5)
5/Total installed capacity was estimated at 361 MMBF in 2006 (see Table 3.22-5, Note 1)

Alternative 1—The maximum annual average timber harvest under Alternative 1 would be approximately 49.3 MMBF per year in the second decade, with a NIC I component of approximately 48.8 MMBF. This harvest level could be met in the first year if this alternative was selected and the timber volume presently under litigation was made available for harvest. As of September 2007, there was 43.5 MMBF under active litigation, with an additional 165 MMBF withdrawn under the 2007 Natural Resources Defense Council settlement until completion of this forest planning process.

Based on the typical log mix for the Tongass National Forest, the NIC I volume would include approximately 24 MMBF of higher-value spruce and hemlock logs (peeler/select, No. 1, and No. 2), 8 MMBF of cedar logs, and 16 MMBF of lower-value spruce and hemlock sawlogs (No. 3 and utility) (Table 3.22-19). This volume would not be sufficient to support the existing Southeast Alaska sawmills operating at their recent production levels (32.1 MMBF in 2006). Further, the Southeast Alaska sawmill industry is currently operating at less than 14 percent of the active mill capacity and less than 10 percent of total installed capacity (Table 3.22-19).

Viewed in terms of the minimum timber volumes required by various processing facilities, this volume would be insufficient to meet the estimated sawmill requirement of 138 MMBF of high value timber (Table 3.22-17). The available supply of higher-quality material (including cedar) would account for about 32 MMBF of the total harvest under this alternative (Table 3.22-15). There would be sufficient volume to support a veneer plant (30 MMBF) if 14 MMBF or more of No. 2 spruce/hemlock sawlogs were processed by this type of plant, rather than the existing sawmills. The projected supply of No. 3 spruce/hemlock sawlogs (9 MMBF) and utility logs (7 MMBF) would not be sufficient to support a chip related facility, such as a MDF plant.

This alternative would not meet the potential upper planning cycle demand of 360 MMBF.

Alternative 2—The maximum annual average harvest level under Alternative 2 would be approximately 151 MMBF per year in the second decade, with a NIC I component of approximately 143 MMBF. Based on the typical log mix for the Tongass, the NIC I volume would consist of approximately 72 MMBF of higher-value logs, 23 MMBF of cedar logs, and 48 MMBF of lower-value sawlogs and utility logs (Table 3.22-19).

This volume would be sufficient to support the existing Southeast Alaska sawmills operating at their current production levels (32.1 MMBF in 2006). The estimated higher-value component under this alternative (72 MMBF) would allow regional sawmills to operate at approximately 27 percent of the active installed processing capacity and 20 percent of total installed production capacity in 2006 (Table 3.22-19).

Viewed in terms of the minimum timber volumes required by various processing facilities, this volume would be insufficient to meet the estimated sawmill requirement of 138 MMBF of high value timber. However, if all the sawlogs were to go to existing sawmills, these mills would operate at a higher rate than they are at present, and assuming their ability to use the lower grade sawlogs more efficiently, approximately 100 MMBF would be available for processing under this alternative. Improved efficiency could result from investments in existing equipment or new capacity. If the existing sawmills were not to operate at this level and processed only higher grade sawlogs, there would be sufficient volume to support a veneer plant.

This alternative would not meet the potential upper planning cycle demand of 360 MMBF.

Alternative 3—The maximum annual average harvest level under Alternative 3 would be approximately 205 MMBF per year in the second decade, with a NIC I component of approximately 187 MMBF

Based on the typical log mix for the Tongass, the NIC I volume would consist of approximately 94 MMBF of higher-value logs, 30 MMBF of cedar logs, and 63 MMBF of lower-value sawlogs and utility logs (Table 3.22-19). This volume would be sufficient to support the existing Southeast Alaska sawmills operating at their current production levels (32.1 MMBF in 2005). The estimated higher-value component of the ASQ under this alternative (94 MMBF) would allow regional sawmills to operate at approximately 36 percent of the active installed processing capacity and 26 percent of total installed production capacity calculated in 2006 (Table 3.22-19).

Viewed in terms of the minimum timber volumes required by various processing facilities, this volume would not have enough high grade sawlogs to meet the estimated sawmill requirement of 138 MMBF of high value timber. However, similar to Alternative 2, if all sawlogs were to go to the existing sawmills they would operate at a higher rate and use lower grade sawlogs more efficiently. There would also be enough volume to support a veneer plant and export the remainder; support two veneer mills; or operate an MDF or similar facility. Over the long-term, a relatively stable level of harvest around the 185 MMBF range would be expected to encourage the development of a moderate level of integration for the local industry.

This alternative would not meet the potential upper planning cycle demand of 360 MMBF.

Alternative 4—The maximum annual average harvest level under Alternative 4 would be approximately 360 MMBF per year in the second decade, with a NIC I component of approximately 294 MMBF. This is the second highest projected volume in any of the alternatives. Alternative 7 has the highest.

Based on the typical log mix for the Tongass, the NIC I volume would consist of approximately 157 MMBF of higher-value logs, 51 MMBF of cedar logs, and 106 MMBF of lower-value sawlogs and utility logs (Table 3.22-19). The estimated higher-value component would allow regional sawmills to operate at approximately 60 percent of active installed processing capacity and 43 percent of total installed production capacity calculated in 2006 (Table 3.22-19).

Viewed in terms of the minimum timber volumes required by various processing facilities, this volume would be sufficient to meet the estimated sawmill requirement of 138 MMBF of high value timber and the estimated veneer plant requirement of 30

MMBF. There would also be available cedar to either run through the existing sawmills or support a new mill that specializes in cedar. In addition, the available supply of low grade sawlogs and utility logs would be sufficient to support a chip related facility, such as an MDF plant.

As industry becomes more integrated, it is possible that the veneer plant and chip related operations would expand operations to efficiently take advantage of this excess material. There could also be additional new investment in sawmills in the region, with, for example, investment in new facilities closer to sources of raw materials, which would reduce transportation costs. The amount of cedar harvested may continue to exceed the local capacity to process it, but investments in production of high end wood products may reduce the amount that is surplus.

This alternative would not meet the potential upper planning cycle demand of 360 MMBF.

Alternative 5, No Action and Alternative 6, Proposed Action—The maximum annual average harvest levels under Alternative 5 and 6 would be approximately 267 MMBF under either alternative, with respective NIC I components of approximately 239 MMBF and 236 MMBF, respectively. These alternatives are midway between Alternatives 3 and 4 in terms of projected volume.

Based on the typical log mix for the Tongass, the volume for these alternatives would be comprised of approximately 119 MMBF of higher-value logs, 39 MMBF of cedar logs, and 81 MMBF of lower-value sawlogs and utility logs (Table 3.22-19). The estimated higher-value component would allow regional sawmills to operate at approximately 45 percent of the active installed processing capacity and 33 percent of total installed production capacity calculated in 2006 (Table 3.22-19).

Based on the existing active installed sawmill processing capacity, these alternatives would almost provide sufficient higher-value timber supply for existing sawmills to operate at or near full capacity. There would be sufficient timber to operate the existing sawmills at or near full capacity if they were also able to process cedar. The total projected NIC I volume under these alternatives would not be quite sufficient to support a fully integrated industry. There would be sufficient volume to support one or more veneer plants or an MDF or other chip-related operation, but not both.

These alternatives would not meet the potential upper planning cycle demand of 360 MMBF.

Alternative 7—The maximum annual average harvest level under Alternative 7 would be approximately 421 MMBF per year in the second decade, with a NIC I component of approximately 370 MMBF. This is the highest projected volume under any of the alternatives.

Based on the typical log mix for the Tongass, the NIC I volume would be comprised of approximately 185 MMBF of higher-value logs, 60 MMBF of cedar logs, and 125 MMBF of lower-value sawlogs and utility logs (Table 3.22-19). The estimated higher-value component represents approximately 71 percent of the active installed processing capacity and 51 percent of total installed production capacity in 2006 (Table 3.22-19).

Viewed in terms of the minimum timber volumes required by various processing facilities, Alternative 7 would be sufficient to meet the estimated sawmill requirement of 138 MMBF of high value timber and the estimated veneer plant requirement of 30 MMBF. There would also be cedar available to run through the existing sawmills or support a new mill that specializes in cedar. In addition, the available supply of low grade sawlogs and utility logs would be sufficient to support one or more chip related facilities, such as an MDF plant.

The potential effects under this alternative would be similar to those described for Alternative 4 above. Although there would be more volume available under Alternative 7 than under Alternative 4, the general trend would be expected to be the same and is based on the assumption that a reliable supply of timber would allow the development of an integrated industry and encourage the development of new facilities and the utilization of existing facilities. This alternative also assumes that all wood processed in Southeast Alaska would come from the Tongass National Forest. As with Alternative 4, the highly integrated nature of the timber industry that could be supported by this level of projected harvest could involve the entry of more businesses and/or facilities in Southeast Alaska. As industry becomes more integrated, it is possible that the veneer plant and chip related operations would expand operations to efficiently take advantage of this excess material. There could also be additional new investment in sawmills in the region, as discussed with respect to Alternative 4.

This alternative would meet the potential upper planning cycle demand of 360 MMBF.

Discussion

How the timber industry would respond to a stable supply of timber under any of the alternatives described above is speculative. The projected scenarios are based on the assumption that as stable volumes increase, the industry will develop in an integrated fashion, with operations and production that utilize materials that are inefficient or excess to one another's production needs. An integrated industry could also promote the establishment of other businesses that provide both direct and indirect support services, such as lumber and/or specialty wood product grading and certification. Coordinated or consolidated marketing of Alaskan wood products could be another example of integrated operations.

Several developments hold promise for the timber industry in Southeast Alaska regardless of which harvest level stabilizes. A wood-burning boiler is being installed by the community of Craig to heat school buildings and a recreation facility, reducing energy costs by utilizing waste wood. Several other communities have shown interest in this type of system. Investments in dry kilns and planers in several facilities suggest an increase in production of high value wood products. Wood technology and testing has helped secure a set of Alaska lumber grades for Alaska species. Hemlock, for example, with the Alaska lumber grade can now compete directly with Douglas fir construction grade lumber. To take best advantage of this, the lumber needs to be dried, planed and graded. In Alaska alone, the construction lumber market consumes approximately 120 MMBF per year.

Once positioned, Southeast Alaskan facilities could tap into that high end market, which is currently supplied by material imported from the lower 48 states. Other examples include development of specialty and finished wood products from hemlock and development of dried, sawn, and finished house kits. Products such as glue laminated materials are being tested and show promise. Specialty products made of yellow-cedar are currently marketed internationally. Collective marketing of local wood products could have a positive impact on sales of locally produced material. With a stable supply of material, it might be possible for the local wood industry to regain market share in world wide wood product markets, as well as continue to develop niche markets that take advantage of the high quality and uniqueness of Alaska woods.

Employment and Income

Projected levels of employment and income are presented by alternative in Table 3.22-20. These estimates are based on the annual average NIC I component of the ASQ. Direct employment is calculated using a coefficient of 3.31 jobs/MMBF for sawmill employment and 2.31 jobs/MMBF for logging employment (Alexander 2007). These coefficients are based on average levels of forest-related employment per unit of net sawlogs harvested on the Tongass for the 2000 to 2005 period. This time period excludes volume from long-term contracts and the employment volatility of the late 1990s, and is, therefore, representative of current conditions. Total employment is calculated using regional multipliers estimated using IMPLAN. (See note 6 in Table 3.22-20 for an explanation of the difference between the various multipliers).

The estimates presented in Table 3.22-20 assume the entire NIC I component for the first decade would be harvested. They also assume a linear relationship between harvest and employment levels, with a one percent change in harvest resulting in a one percent change in employment. In reality, changes in volume will have a lagged response in employment, but this assumed linear relationship is an approximation that can be used to compare alternatives. Estimated changes in sawmill and logging employment are presented in job-years, which represent the equivalent of one year's employment. This potential employment would not necessarily occur all in one year and estimated job totals do not directly translate into estimated numbers of affected workers.

The logging employment totals identified in Table 3.22-20 also include jobs associated with non-Tongass National Forest harvest activities. Non-Tongass harvest in Southeast Alaska is assumed to be 109 MMBF for all alternatives and, with the exception of the approximate 7 MMBF harvested from state lands, is assumed for the purposes of this analysis to be exported in unprocessed form (Brackley et al. 2006a). As noted in a preceding section, this estimate is lower than the volume harvested from non-national forest lands in 2004 (123 MMBF) and 2005 (147 MMBF), and lower than estimates of future non-national forest harvest developed by the McDowell Group et al. (118 MMBF) (McDowell Group et al. 2004).[4]

Assuming the entire NIC I component were harvested over the next decade, average annual direct wood products employment would range from 494 annualized jobs under Alternative 1 to 1,922 jobs under Alternative 7. Approximately 226 of these annualized jobs would be associated with non-Tongass harvest under each alternative. Average annual total employment (direct, indirect, and induced) would range from 970 jobs under Alternative 1 to 3,829 jobs under Alternative 7. The potential effects on direct and total income are also summarized by alternative in Table 3.22-20.

The impact of the recent policy change (March 2007), referred to as the Limited Interstate Shipment Policy, on wood products-related employment at the Forest level will most likely be positive. The policy is expected to increase the likelihood that timber sales on the Tongass will have a positive appraisal and is expected to increase the utilization of timber harvested on the Tongass and improve the economics of timber sales by providing a market for smaller diameter and low grade material that cannot be processed profitably by sawmills in Southeast Alaska at present (Alexander et al. 2007).

Under Alternatives 1 and 2, only a portion of the NFS timber harvested would be processed in Southeast Alaska sawmills because there is a limited market for utility

[4]As noted above, the McDowell Group (2006b) have since adjusted their annual estimate for private and state lands to 60 to 63 MMBF.

logs and lower value sawlogs. The higher volume alternatives are, however, based on the assumption that as sale volumes increase and perceptions of risk decrease, the industry will develop in an integrated fashion, with different operations using materials that are inefficient or excess to one another's production needs. If this were to occur the percent of the harvest that would be processed locally would likely be higher than current levels (66 percent). As a result, the employment estimates presented in Table 3.22-20 should be viewed as minimum employment levels that likely underestimate the amount of sawmill (or other processing facility) employment that would occur at higher harvest levels.

Table 3.22-20
Projected Timber Industry Employment at Maximum Allowable Timber Harvest Levels (First Decade, Annual Average)

		Alternative						
	2005	1	2	3	4	5	6	7
Actual (2005) and Projected NIC I Volume (MMBF)[1]								
Tongass National Forest	43	49	144	186	272	239	238	367
Total Southeast Alaska Harvest[2]	197	158	253	295	381	348	347	476
Employment (Average Annual)								
Direct Employment[3]								
Logging[4]	351	365	583	680	880	803	801	1,098
Sawmills[5]	148	129	336	428	616	544	542	823
Total	**499**	**494**	**919**	**1,108**	**1,496**	**1,346**	**1,343**	**1,922**
Total Employment (Direct, Indirect, Induced)[6]								
Logging	674	700	1,120	1,306	1,689	1,541	1,538	2,109
Sawmills	309	270	702	894	1,288	1,136	1,132	1,720
Total	**983**	**970**	**1,822**	**2,200**	**2,977**	**2,677**	**2,670**	**3,829**
Income (million 2005 $)								
Direct Income[7]								
Logging	14.8	15.4	24.6	28.7	37.2	33.9	33.8	46.4
Sawmills	4.7	4.1	10.6	13.6	19.5	17.2	17.2	26.1
Total	**19.5**	**19.5**	**35.3**	**42.3**	**56.7**	**51.1**	**51.0**	**72.5**
Total Income (Direct, Indirect, Induced)[6]								
Logging	20.6	21.4	34.3	40.0	51.7	47.1	47.0	64.5
Sawmills	7.1	6.2	16.1	20.5	29.5	26.0	25.9	39.4
Total	**27.7**	**27.6**	**50.3**	**60.4**	**81.2**	**73.2**	**73.0**	**103.9**

[1] It is important to note that the NIC I levels by alternative that form the basis of these employment and income estimates are not projected harvest levels. Rather, they represent the maximum NIC I volumes that could be harvested under each alternative.
[2] Total Southeast Alaska harvest includes Tongass, private (Native corporation), and state harvests. Private and State harvests are assumed to remain constant at 109 MMBF under all alternatives (Brackley et al. 2006a).
[3] Logging and sawmill job/MMBF ratios, 2.31 jobs/MMBF and 3.31 jobs/MMBF, respectively, are based on 2000 to 2005 average levels of employment per MMBF of net sawlog volume harvested (Alexander 2007).
[4] Logging employment is calculated by multiplying total Southeast Alaska harvest (including non-Tongass harvest) by 2.31 jobs/MMBF. Note: these estimates are based on current industry structure and assumed behavior.
[5] Sawmill employment is calculated based on the estimated sawlog share of harvest on the Tongass (66 percent) (Alexander 2006). Non-Tongass harvest, with the exception of about 7 MMBF harvested from state lands, is assumed to be exported in unprocessed form. Note: these estimates are based on current industry structure and assumed behavior.
[6] Total employment and income multipliers are from the 1998 IMPLAN model (see Table 3.22-4). Note that the estimate of direct employment embedded in the IMPLAN number will not be the same as direct employment calculated using actual Southeast Alaska logging and sawmilling data. You cannot subtract the direct employment estimates from the total employment numbers to get indirect and induced employment.
[7] Direct income is estimated using the annual average wage for the Alaska Forestry and Logging ($42,257) and Wood Products Manufacturing ($31,690) sectors from 2001 to 2005 (Alexander 2007).

Wood Products and Timber Demand—Short-Term Effects

In order to provide a stable timber sale program and provide a continued flow of timber to regional timber processors, the Forest Service employs a "buffer stock" approach to timber sale planning. The resulting timber sale program is complex and requires that the Forest Service manage four "pools" of timber volume, commonly referred to as the "timber pipeline." These pools of timber volume include: volume under contract, NEPA-cleared volume, timber volume in preparation, and timber volume identified in the Forest Service's 5-year Plan. The "timber pipeline" and its constituent parts are discussed in more detail in the *Timber* section of this EIS.

Timber sales can take from 3 to 5 years to complete. Sales offered by the Forest Service vary in size to meet the needs of different purchasers and in preparation time as a function of the sale offering size. Uncertainty and delays may be introduced through appeals and litigation. The buffer stock approach and the variable length of the timber sale process generally make it difficult to draw a direct relationship between particular sales and regional timber demand. It is, however, apparent that under current conditions a reduction in the timber volume under contract (i.e., the volume included in timber sales that have been purchased, but not logged or only partially logged) would affect regional timber operators, with related effects to regional employment and income. The affected volumes could be replaced or substituted in part or fully, but this would take time and reductions in the volume under contract would have direct and relatively immediate effects upon the affected operators.

The following discussion addresses the potential effects of the alternatives on three key components of the "timber pipeline": volume under contract, NEPA-cleared volume (i.e., sales that have approved NEPA documents but have not yet been sold), and timber volume in preparation (i.e., proposed sales that are currently being evaluated under the NEPA process).

Volume Under Contract

As noted above, volume under contract refers to the volume included in timber sales that have been purchased, but not logged or only partially logged. Volume under contract is, therefore, essentially a measure of inventory that changes on a regular basis, increasing as timber is sold and added to the total and decreasing when sales are actually harvested. The following discussion illustrates the potential effects of the alternatives on volume under contract with reference to data from August 2006. It should be noted that while these data provide an indication of potential impacts, the actual impacts would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales were cancelled as part of the decision.

The Forest Service had approximately 104 MMBF in uncut volume under contract in August 2006. The majority of this volume (92 percent) was located in Ranger Districts on the south end of the Forest, with the Ketchikan and Wrangell ranger districts accounting for 41 percent and 25 percent of the total, respectively. This volume was under contract with five purchasers, including Pacific Log and Lumber (41 percent of the total), Viking Lumber Company (25 percent), and Alcan Forest Products (23 percent). Note that the corresponding volume in July 2007 was 102 MMBF (USDA Forest Service 2007e).

Review of the proposed alternatives indicated that 52 percent of the volume under contract in August 2006 could be affected under Alternative 1, which would maintain all Inventoried Roadless Areas on the Tongass in a natural condition and not permit timber harvest in these areas. The volume currently under contract would not be affected under any of the other alternatives.

Existing volumes under contract likely represent the majority of the short-term timber supply for the affected purchasers and reductions in the existing volume under contract would be difficult to make up from other areas in the near future. Reductions in the volume under contract could, therefore, potentially affect both sawmill and logging employment. Using the logging and sawmill job/MMBF ratios employed for the preceding long-term effects analysis (2.31 jobs/MMBF and 3.31 jobs/MMBF, respectively) and assuming the entire volume would be harvested and approximately

50 percent of the total would be processed locally, the potentially affected volume of 54 MMBF would support approximately 214 job-years.

NEPA-Cleared Volume

The Forest Service had approximately 454 MMBF in the NEPA-cleared volume pool in August 2006. It should be noted that not all this volume is considered economic under current market conditions. Review of the proposed alternatives indicated that approximately 56 percent and 44 percent of this volume could be affected under Alternatives 1 and 2, respectively. These data are intended to illustrate the potential effects. As noted with respect to the volume under contract, actual impacts would depend on the NEPA-cleared volume when the decision is implemented. The NEPA-cleared volume in September 2007 was 309 MMBF (USDA Forest Service 2007f).

Timber Volume in Preparation

The third component of the timber supply is the timber volume in preparation. The Forest Service had approximately 536 MMBF in preparation in September 2006 spread across 17 separate projects. Under Alternative 1 approximately 56 percent of the proposed total would not be available for harvest. Alternatives 2 and 3 would each affect 7 percent of the proposed total. As noted above, these data are intended to illustrate the potential effects. Actual impacts would depend on the timber volume in preparation when the decision is implemented. The Forest Service had approximately 384 MMBF in preparation in September 2007 (USDA Forest Service 2007f).

Recreation and Tourism

The following analysis addresses recreation and tourism over the decade following implementation. Recreation supply is subject to cumulative impacts with the effects of timber harvest activities on recreation places accumulating over time and increasing impacts felt in later decades.

Supply

The general methodology for deriving projected levels of recreation and tourism employment is described in detail in the Affected Environment part of this section. Three types of recreation opportunity settings (ROS 1, ROS 2, and ROS 3) are used in the economic analysis. Timber harvest and other activities result in a reclassification of certain acres from one ROS group to another. Road construction, for example, will generally cause a given area to be reclassified as ROS 3 (Roaded Natural, Roaded Modified, and Rural). The availability for use of ROS 3 designations also depends on the connection between proposed road networks and ferry landings or local communities. Had these acres been classified as ROS 1 (or ROS 2) previously, the result would be a net reduction of ROS 1 (or ROS 2) and an increase in ROS 3. Depending on the relative demand for different ROS groups, the result could be an increase, a decrease, or no change in recreation and tourism activity. If, in the current example, demand for ROS 1 exceeds supply and ROS 3 settings are in surplus, then the net result would be a decrease in recreational activity. If, however, supply exceeds demand for both ROS classes, the net impact on recreation and tourism activity is assumed for the purposes of this analysis to be zero.

Each ROS group has a maximum capacity based on the type of experience expected within the setting. ROS 1 has the lowest capacity per acre because it provides primitive recreation opportunities that require that users not be within sight or sound of other parties. While ROS 2 has a higher capacity per acre than ROS 1, users in this setting expect to see only a few other parties during their experience. ROS 3 has the highest capacity and users in this setting may expect to interact frequently with others. Timber harvest activity could, therefore, result in an increase in recreation capacity measured in terms of RVDs, because areas classified as ROS 1 or ROS 2 would be converted to ROS 3.

Demand

Future demand for recreational activity on the Tongass National Forest was predicted using a linear projection of total RVDs (see Figure 3.22-7). Historical patterns of RVD use by ROS class were then used to predict future recreation and tourism demand by ROS class. Using this methodology, estimated demand for ROS 2 class RVDs (Semi-Primitive Motorized) exceeded estimated supply of ROS 2 settings in 1998. Differences in projected levels of recreation use between alternatives are small because ROS 2 is the only setting where demand exceeds supply in the first decade of this analysis and effects related to harvest activity have had little time to accumulate. As discussed in the Affected Environment section, the finding that demand exceeds supply is based on the supply of ROS 2 opportunities in specifically identified recreation places only and assumes there would be no change in the current availability of recreational settings. These assumptions do not accurately reflect underlying supply realities but are necessary to allow a quantitative comparison of the alternatives.

Consumption

Projected supply and consumption are presented in RVDs by alternative for the next decade in Table 3.22-21.

Table 3.22-21
Recreation/Tourism Supply, Demand, and Consumption (First Decade, Annual Average)

		Alternative						
	2015	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Supply (1,000 RVDs)								
ROS1	1,245	1,289	1,282	1,269	1,227	1,245	1,252	1,223
ROS2	1,995	2,018	2,007	2,000	1,972	1,995	1,994	1,966
ROS3	2,616	2,262	2,335	2,435	2,779	2,616	2,566	2,819
Total	**5,856**	**5,569**	**5,623**	**5,705**	**5,978**	**5,856**	**5,812**	**6,009**
Demand (1,000 RVDs)								
ROS1	1,104							
ROS2	3,422							
ROS3	993							
Total	**5,519**							
Projected Consumption (1,000 RVDs)								
ROS1	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104
ROS2	1,995	2,018	2,007	2,000	1,972	1,995	1,994	1,966
ROS3	993	993	993	993	993	993	993	993
Total	**4,092**	**4,115**	**4,104**	**4,097**	**4,069**	**4,092**	**4,091**	**4,064**

Employment and Income

Projected average annual recreation and tourism-related employment and income is presented by alternative in Table 3.22-22. Direct employment was calculated using a job/RVD ratio of 0.00074, which was developed for the 1997 Forest Plan Revision Final EIS (see the Affected Environment subsection of this section). The direct and total employment rows, and the corresponding rows under income, include both resident and nonresident Tongass-related recreation.

The rows that address nonresident recreation include nonresident Tongass-related employment, as well as an estimate for non-Tongass-related, nonresident recreation and tourism in Southeast Alaska. Nonresident recreational activities were assumed to account for 44 percent of direct employment. Direct nonresident employment also

Table 3.22-22
Recreation/Tourism Related Employment and Income (First Decade, Annual Average)

	Alternative							
	2015	**1**	**2**	**3**	**4**	**5**	**6**	**7**
	Employment (Jobs)							
	Resident and Nonresident Tongass-Related Recreation Employment							
Direct Employment[1]	3,028	3,045	3,037	3,032	3,011	3,028	3,027	3,007
Total Employment[2]	3,664	3,685	3,675	3,669	3,643	3,664	3,663	3,639
	Nonresident Tongass-Related and Non-Tongass-Related Employment							
Nonresident Recreation-Related Direct Employment[3]	4,319	4,327	4,323	4,321	4,312	4,319	4,319	4,310
Total Nonresident Recreation-Related Employment	5,226	5,235	5,231	5,228	5,217	5,226	5,226	5,215
	Income (Million 2005)							
	Resident and Nonresident Tongass-Related Recreation Income							
Direct Income[4]	53.9	54.2	54.1	54.0	53.6	53.9	53.9	53.5
Total Income[5]	71.2	71.6	71.4	71.3	70.8	71.2	71.1	70.7
	Nonresident Tongass-Related and Non-Tongass-Related Income							
Nonresident Recreation-Related Direct Income	76.9	77.0	77.0	76.9	76.8	76.9	76.9	76.7
Total Nonresident Recreation-Related Income	101.5	101.7	101.6	101.5	101.3	101.5	101.5	101.3

[1] Direct employment was estimated using a job/RVD ratio of 0.00074 (average annual) and includes both resident and nonresident Tongass-related employment.
[2] Total (direct, indirect, and induced) employment estimates were calculated using a 1.21 employment multiplier (see Table 3.22-4).
[3] Nonresident recreation-related employment was calculated using the assumption that 44 percent of ROS 1, 2, and 3 RVDs are consumed by nonresidents. This estimate also includes non-Tongass-related recreation and tourism employment, which is assumed to remain constant across all of the alternatives. The non-Tongass employment was estimated based on total direct employment in the leisure and hospitality sector in 2005. This component was estimated to increase by 20 percent between 2005 and 2015, which is equivalent to less than half the increase in growth of Juneau cruise ship passenger volumes between 2000 and 2005.
[4] Direct income is estimated based on the 2004 statewide average annual salary for the Leisure and Hospitality sector ($17,220) adjusted for inflation to $17,803 in 2005 dollars and includes both resident and nonresident Tongass-related incomet.
[5] Total (direct, indirect, and induced) income estimates were calculated using a 1.32 income multiplier (see Table 3.22-4).

includes an estimate of the jobs associated with non-Tongass recreation and tourism activities pursued by nonresidents. This category is intended to represent the jobs associated with recreation and tourism activities that do not physically take place on the Tongass National Forest. These types of activities include viewing scenery from cruise ships (see Table 3.22-22, note 3).

The distinction between resident- and nonresident-related employment is important because jobs generated by nonresident expenditures on goods and services are considered comparable to an export industry that brings new money into the region. Expenditures by local residents, on the other hand, represent a recirculation of money that is already present in the regional economy and are, therefore, not typically identified as “new” money. However, if residents are substituting local recreation for non-local recreation then their money can be considered to be money that would otherwise not be present in the local economy. The extent to which this is the case can only be identified by surveying local residents and asking detailed questions about their substitution decisions with respect to Tongass-based recreation (Rudzitis and Johnson 2000). This type of information is not available for the Tongass and, more importantly, inclusion of resident recreation-related employment in the final summary table would have little effect on these results, which show very little difference across the alternatives under either scenario.

Mining

While it is not possible to project the potential effects of the proposed alternatives on mining employment or income, allocating areas to non-development or development LUDs could affect mining activities in the future. None of the alternatives would allocate areas to Recommended Wilderness or LUD II. However, alternatives that would increase the roaded portion of the Forest, such as Alternatives 7 and 4, may facilitate mining exploration and development more that those that retain Roadless areas (especially Alternatives 1, 2, and 3). Alternatives 5 and 6 would be intermediate, representing little or no change from allocations under the current Forest Plan. The effect on future mining employment and income would depend on whether the potentially affected locatable deposits are economically viable in the future.

Transportation and Utilities

Residents of Southeast Alaska are dependent on air and water transportation for travel between most communities, rather than roads or rail. There are limited road connections between the region and the continental road system and between communities. Several possibilities exist for State Highways that could connect some Southeast Alaska communities to the continental road system, as well as possibilities for new internal corridors.

The State of Alaska has proposed corridors for transmission lines and/or undersea cables to link many Southeast Alaska communities to British Columbia. An intertie corridor, connecting the Swan Lake project (near Carroll Inlet) with the Tyee project (on the Bradfield Canal) has been permitted and with construction initiated in 2002. A number of other potential interties could include powerlines between a number of different communities, including some of the smaller and more remote communities, such as Kake and Meyers Chuck.

None of the alternatives would affect regional transportation opportunities or power transmission line opportunities. This is discussed in further detail in the *Transportation and Utilities* section of this document.

Salmon Harvesting and Processing

There is not expected to be any significant change to the commercial fishing or fish processing industries over the next decade as a result of national forest activities. As noted in the Affected Environment discussion, much of the future of the fishing industry in Southeast Alaska is expected to depend on occurrences outside of the Tongass National Forest such as hatchery production, off-shore harvest levels and changes in ocean conditions. In addition, a large segment of the commercial fishing industry operates under a limited entry harvest system. New permit holders are not usually added to the market during high fish harvest years, nor are they removed during periods of low harvest. The result in either case is the same number of commercial fishers catching either more or less fish.

The 1997 Final EIS noted that the amount of acreage of timber harvest was at most less than 20,000 acres per year, representing approximately 0.5 percent of the total remaining productive old growth (or 5 percent over the next decade) and less than 0.02 percent of the entire Forest. That EIS concluded that this was not expected to result in a significant change to commercial fishing employment. Under the proposed alternatives, the estimated harvest would range from less than 2,000 to approximately 16,000 acres per year (see Table 3.13-9 in the *Timber* section). This level of harvest, which is under the maximum proposed in the 1997 EIS, in conjunction with the Riparian Management Standards and Guidelines established in the current Forest Plan and included in the updated Forest Plan prepared for the action alternatives (Volume II in this EIS), is not expected to have a significant effect on commercial fisheries employment over the next 10 years.

Natural Amenities and Quality of Life

As discussed in the Affected Environment portion of this section, natural amenities and local quality of life have increasingly been recognized as important factors that serve to attract and retain residents. It is, however, very difficult to determine the effect of the different alternatives on local amenities and, further, on the economic activity that these amenities are believed to indirectly generate. In most cases and localities the impacts of the action alternatives relative to the No-Action Alternative on amenities are not expected to be significant enough in themselves to result in measurable changes in economic activity.

This conclusion is based on the Forest Plan standards and guidelines that are designed to protect and/or mitigate negative effects to natural resources on the Tongass, as well as the relatively small proportion of the Forest that would be disturbed under any of the proposed alternatives. The importance of the standards and guidelines are discussed with respect to quality of life and other difficult to quantify values below in the part of this Economic Efficiency analysis that discusses Ecosystem Services. Potential harvest activities under the proposed alternatives would affect a relatively small proportion of the Tongass and would be unlikely to affect the predominantly wild and undeveloped nature of the region and the role it presently plays in attracting visitors and residents.

Summary of Impacts

Projected annual average employment and income levels are summarized for the next 10 years in Table 3.22-23. In terms of direct employment in the wood products and recreation and tourism industries, the alternatives range from 4,820 jobs under Alternative 1 to 6,231 jobs under Alternative 7 (Table 3.22-23). Most of the difference between these two values (1,411 jobs) is caused by differences in timber-related employment. Recreation and tourism employment shows much less variation across the alternatives, with a difference between high and low employment levels of less than 20 direct jobs. Direct earnings follow a similar pattern, as do total employment and earnings.

The employment and income estimates for the wood products sector assume the entire NIC I volume projected for each alternative for the first decade following implementation would be harvested. This outcome is dependent on the scenarios developed for each alternative, which assume for the more timber-intensive alternatives that as stable volumes get higher, the industry will develop in an integrated fashion. Recreation and tourism employment and income estimates are for nonresident, recreation and tourism activity only.

Potential direct employment effects are displayed in Table 3.22-24, which shows the projected change in employment by sector as a percent of current totals. Projected recreation and tourism employment is expected to increase by approximately 20 percent from 2005 levels under all of the alternatives. The majority of this projected increase is due to the projected change in non-Tongass, recreation and tourism-related employment, which does not vary by alternative in this analysis. Projected changes in wood products employment from 2005 levels range from a decrease of approximately 1 percent under Alternative 1 to a 285 percent increase under Alternative 7. These increases are relatively large because they assume that the entire NIC I component of the projected ASQ would be harvested under each alternative. This outcome is dependent on multiple factors beyond the Forest Service’s control, as discussed in the Wood Products, Long-Term Effects section.

None of the alternatives are expected to affect regional transportation or power transmission line development opportunities.

Table 3.22-23
Projected Annual Average Employment and Income Effects by Alternative (First Decade, Annual Average)

		Alternative						
	2005	1	2	3	4	5	6	7
Direct Employment and Income								
Employment (Jobs)								
Wood Products	499	494	919	1,108	1,496	1,346	1,343	1,922
Recreation/Tourism	3,586	4,327	4,323	4,321	4,312	4,319	4,319	4,310
Total	**4,085**	**4,820**	**5,242**	**5,429**	**5,808**	**5,665**	**5,661**	**6,231**
Earnings (Million 2000$)								
Wood Products	19.5	19.5	35.3	42.3	56.7	51.1	51.0	72.5
Recreation/Tourism	63.8	77.0	77.0	76.9	76.8	76.9	76.9	76.7
Total	**83.4**	**96.5**	**112.3**	**119.2**	**133.5**	**128.0**	**127.9**	**149.2**
Total Employment and Income								
Employment (Jobs)								
Wood Products	983	970	1,822	2,200	2,977	2,677	2,670	3,829
Recreation/Tourism	4,339	5,235	5,231	5,228	5,217	5,226	5,226	5,215
Total	**5,322**	**6,205**	**7,053**	**7,429**	**8,194**	**7,903**	**7,896**	**9,044**
Earnings (Million 2000$)								
Wood Products	27.7	27.6	50.3	60.4	81.2	73.2	73.0	103.9
Recreation/Tourism	84.3	101.7	101.6	101.5	101.3	101.5	101.5	101.3
Total	**112.0**	**129.3**	**151.9**	**162.0**	**182.5**	**174.7**	**174.5**	**205.2**

Notes:
1. Recreation/tourism employment and income estimates are for nonresident, recreation and tourism-related employment only.
Sources: Tables 3.22-20 and 3.22-22.

Table 3.22-24
Projected Change in Direct Employment by Sector as a Percent of Current Totals

		Alternative						
Sector	**2004**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Wood Products	499	-1	84	122	200	170	169	285
Recreation/Tourism	3,586	21	21	20	20	20	20	20

Source: Table 3.22-23.

Economic Efficiency Analysis

Introduction

The Present Net Value of a given alternative is the discounted sum of all benefits minus the discounted sum of all costs associated with that

The 1982 planning regulations (36 CFR 219) require that land and resource management plans for National Forest System (NFS) lands "provide for multiple use and sustained yield of goods and services from the NFS in a way that maximizes long term net public benefits in an environmentally sound manner" [36 CFR 219.1 (a)]. These regulations define the term net public benefits as "the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not." The definition continues: "(n)et public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index" (36 CFR 219.3).

Net public benefits are evaluated in this EIS through an economic efficiency analysis, which is one type of measure the Forest Service Manual (FSM) encourages the economic and social analyses for Forest Service resource plans to provide (FSM 1970.61). Economic efficiency analysis seeks to measure the costs and benefits to society associated with each alternative and summarize them in the form of a present net value (PNV). PNV figures are calculated by subtracting costs from benefits to yield a net value. Future values (i.e., costs and benefits incurred and received in the future) are discounted using an appropriate discount rate to obtain a present value. The PNV of a given alternative is the discounted sum of all benefits minus the discounted sum of all costs associated with that alternative. Following Forest Service standard procedures, a 4 percent real discount rate is used in the following analysis.

The 1982 planning regulations direct that analysis of the estimated effects of alternatives include, among other things "the expected real-dollar value (discounted when appropriate) of all outputs attributable to each alternative to the extent that monetary values can be assigned to nonmarket goods and services, using quantitative and qualitative criteria when monetary values may not reasonably be assigned" [36 CFR 219.12 (g) (3) (ii)]. Potential forest management outputs that could be affected by the various Forest Plan alternatives include those generated from commodity production, the value experienced by recreationists and other users of the Forest, the "non-use" values held by those who value the existence of the Forest resource even if they do not use it, and the value of various services (ecosystem services) provided by the Forest, such as water resource enhancement, that are not directly traded in any economic market place.

Economists face several challenges when they attempt to summarize the values of various goods and services produced by Forest management. First, while economists generally follow a typology of values that includes both use and non-use values there are concerns about the tendency of many economists to use monetary values for both types. Most economists acknowledge that monetary measures while convenient and easily communicated, are weak approximations of social values. Difficulties exist in trying to assign values to beliefs (sometimes called held values) and other forms of social values. Second, since no markets exist for many ecosystem goods and services economists have to rely on non market valuation techniques such as willingness-to-pay (WTP) approaches. The mix of market and non-market values poses theoretical problems by mixing both marginal and average values depending on the processes used to establish the values. Third, any estimate of value is temporally specific, and this complicates summation processes and relative comparisons.

Comments on the Draft EIS

Comments on the economic efficiency analysis presented in the Draft EIS were concerned with two main aspects of the analysis: 1) the absence of non-market values, other than recreation and tourism, and 2) the misleading comparison of actual timber costs and revenues with estimated recreation and tourism consumer surplus values, which were estimated using WTP values. These issues are briefly summarized below and discussed in more detail in Appendix H, Comments and Responses.

Non-Market Values

The Draft EIS provided a brief overview of comments received on the 2002 Draft SEIS that expressed concern that the economic efficiency analysis presented in that document did not assign monetary values to all the goods and services provided by the Tongass National Forest. Several organizations commenting on the 2006 Draft EIS made the same or very similar comments on the Draft EIS analysis. Concerns were expressed that the analysis presented in the Draft EIS did not assign monetary values to uses, such as commercial fishing and subsistence, or quantify potential effects to non-use values, ecosystem services, and quality of life or off-site benefits in monetary terms. Several comments argued that by failing to assign monetary values to non-market goods and services—such as fish and wildlife habitat, water purification and regulation, carbon sequestration, genetic material, long-term forest productivity, and quality of life—the Forest Service has essentially assigned these goods and services a value of zero and discounted them relative to commodity production.

Given the complexity of forest ecosystems and the elusive nature of many of the values associated with them, accurately accounting for all of these values in a single PNV measure is not feasible at this time. This, as explained in the Draft EIS, is by no means intended to imply that the Forest Service believes the other types of values mentioned above are unimportant. Many of the other sections in this document, in fact, present substantial amounts of information and analysis relative to the resources supporting these other values. Decision-makers will consider the economic values presented in this section within the context of the information presented elsewhere in this document, much of which cannot readily be translated into economic terms.

Misleading Comparison

Others providing comments on the Draft EIS expressed concern about the analysis summarized in Table 3.22-29 of the Draft EIS, which they believed provided a misleading comparison between timber and recreation and tourism. The table presented a PNV that consisted of projected timber revenues and costs to the Forest Service and recreation and tourism consumer surplus benefits that were estimated based on WTP estimates. Concerns were expressed about the overall validity of WTP methodologies and comments suggested that including consumer surplus estimates to value recreation and projected revenues and costs for timber resulted in a misleading comparison between these sectors. Others were concerned that the analysis was unbalanced because it did not include Forest Service costs for recreation, only user benefits.

Revised Economic Efficiency Analysis

The following analysis has been revised to include estimated Tongass National Forest costs and revenues for the NFS budget items based on costs and revenues from 2005 and 2006. In addition, we have separated the estimated costs and revenues from the recreation and tourism consumer surplus to emphasize the difference between these types of measures.

The following analysis assumes that any alternative would be fully implemented in the first year of the planning period, and future values were discounted at four percent. Table 3.22-25 displays these cost and benefits followed by more detailed explanations of their derivation. The potential effects of the proposed alternatives on salmon harvesting and processing, subsistence, and non-use and ecosystem service values are assessed qualitatively.

Timber

The timber benefits presented in Table 3.22-25 are the present value of expected Forest Service revenues from the timber sale program. Future timber sale revenues were estimated for the 160-year planning period using projected harvest volumes for each alternative. These volumes were calculated based on the estimated NIC I volumes by alternative. The analysis in the Draft EIS used an average rate of $11.69/MBF, which was the average value per MBF harvested on the Tongass in 2005/2006. We have revised this analysis and the estimated timber benefits identified in Table 3.22-25 are instead based on the minimum prices or “base rates” established for timber species on the Tongass National Forest. The base rate is the minimum value that must be bid for timber to be sold or cut.

The timber benefit estimates presented in Table 3.22-25 were calculated by developing an average base rate value per MBF based on the average timber sale composition (by species) and current base rates (see Table 3.22-25, note 1). The resulting estimates are, therefore, the minimum revenues or benefits that would be generated over the period of analysis (160 years). These estimates are also based on the assumption that all the NIC I volume identified under each alternative would sell and this may not necessarily be the case.

Table 3.22-25
Economic Efficiency Analysis (million 2006$)

	Alternative						
	1	2	3	4	5	6	7
Benefits							
Revenues							
Timber Revenue[1]	9	26	34	55	44	44	68
Recreation Revenue[2]	54	54	54	54	54	54	54
Land Use Revenue[3]	7	7	7	7	7	7	7
Power[3]	1	1	1	1	1	1	1
Minerals[3]	1	1	1	1	1	1	1
Consumer Surplus							
Recreation/Tourism Consumer Surplus[4]	7,637	7,640	7,643	7,610	7,645	7,645	7,599
Costs[5]							
Timber Variable Costs[6]	128	376	489	787	625	620	967
Inventory & Monitoring[7]	67	67	67	67	67	67	67
Land Management[8]	75	75	75	75	75	75	75
Minerals and Geology[7]	32	32	32	32	32	32	32
Recreation/ Heritage/ Wilderness Mgmt[7]	111	111	111	111	111	111	111
Vegetation, Watershed, Wildlife & Fisheries Habitat[8]	184	184	184	184	184	184	184
Present Net Value	**7,112**	**6,884**	**6,782**	**6,472**	**6,657**	**6,662**	**6,294**

Note: Cost and benefit streams extended over a 160-year analysis period and discounted at 4% per year.

[1] Based on the average base rate per MBF using the average timber sale composition and the following current base rates: Sitka Spruce—$12, Western Hemlock—$2, Western Red Cedar—$12, Alaskan Yellow Cedar—$20.

[2] Recreation revenue was estimated based on the average recreation revenues received in 2005 and 2006. Revenue categories included in this total are: Recreation, Recreation User Fees, Recreation Fee Collection, and Recreation Site Fees (USDA Forest Service 2006d, 2007g). These revenues are assumed for the purposes of this analysis to remain at current levels and constant across all alternatives.

[3] Land use, power, and minerals revenues were estimated based on average revenues received in 2005 and 2006. These revenues are assumed for the purposes of this analysis to remain at current levels and constant across all alternatives.

[4] Unlike timber or minerals, recreation and tourism is not directly traded in the market place and recreationists on the Tongass generally pay for only a small portion of the total benefits they receive from the Forest. In other words, the recreation revenue category above does not capture the full value of the experience to recreationists. Economists have developed techniques to try and estimate the amount that recreationists would be willing-to-pay for a Recreation experience above and beyond what they actually pay. This is discussed further in the following section under recreation. It is important to understand that the recreation/tourism consumer surplus values shown here assign a monetary value to the share of the recreation good that is not traded in the market place and, as a result, are not directly comparable with actual revenues paid to the Forest Service.

[5] The following cost items include the major NFS cost items based on actual costs for 2005 and 2006 (USDA Forest Service 2006d, 2007g). They do not include other costs that are classified under Capital Improvement, Fire, Miscellaneous Funds, or Other. The cost categories included in this summary were approximately $31,000 in 2005 and 2006, accounting for approximately 37 percent and 44 percent of total costs in 2005 and 2006, respectively. This is discussed further in the following section under Management Costs.

[6] Based on per MBF planning and support charges: $41 for NEPA preparation; $23 for sale preparation; $9 for sale administration; and $28 for engineering support.

[7] Inventory & Monitoring, Minerals and Geology, and Recreation/ Heritage/ Wilderness Mgmt costs were estimated based on average costs in 2005 and 2006. These costs are assumed for the purposes of this analysis to remain at current levels and constant across all alternatives.

[8] Land Management and Vegetation, Watershed, Wildlife & Fisheries Habitat costs were estimated based on average costs in 2005 and 2006. Cost categories included in these totals are Land Management Planning and Land Ownership Management (Land Management) and Vegetation & Watershed Management and Wildlife & Fisheries Habitat Mgmt (Vegetation, Watershed, Wildlife & Fisheries Habitat). These costs are assumed for the purposes of this analysis to remain at current levels and constant across all alternatives.

The Spectrum model analysis—used to identify the ASQ for each alternative—suggests that under current market conditions stumpage values for some stands would be negative (see Appendix B for more detail on this model). In other words, the estimated costs of harvesting and transporting the timber exceed the current value of the timber at the mill (the pond log value) and, as a result, volume from these stands would be unlikely to sell. While the Spectrum model analysis suggests that there would be sufficient economic timber to provide projected NIC I volumes (should there be demand) in the short-term under current market conditions, market prices would need to improve over the long-term for stands that would be potentially harvested in later decades to sell.

Timber variable costs are also presented for each alternative in Table 3.22-25. These costs are estimated based on a flat rate of $101/MBF and assume the identified NIC I volumes for each alternative would be sold. This flat rate includes NEPA preparation ($41/MBF), sale preparation ($23/MBF), sale administration ($9/MBF), and engineering support ($28/MBF), and includes timber sale-related road construction costs, among others. This average cost per MBF ($101/MBF) exceeds the average base rate value per MBF ($7.12/MBF) used to estimate timber benefits to the government for this analysis. As noted above, the average base rate is the minimum value that must be bid for a timber sale to go forward. The average value for 2005/2006 was $11.69 per MBF. The 2003 SEIS identified an average value of $36.17 per MBF harvested on the Tongass from 1997 to 2001 (USDA Forest Service 2003b). Recent sales on Alaska State lands have generated an average return of $49.54 per MBF for sales totaling 54 MMBF (Slenkamp 2007).

Industry revenues and profits are omitted from the calculation. This is because efficiency analysis commonly assumes perfect competition in the private sector. This implies, in turn, that competing purchasers of federal timber will bid up the price of stumpage to the point where all economic profits (i.e., profits over and above a competitive rate of return to capital) are dissipated.

It is important to note that the PNV calculation for timber does not assign monetary values to perceived local benefits associated with timber-related employment and salaries and related economic activity, as well as other perceived benefits associated with capital investment in roads and log transfer facilities. Employment and income are addressed in the preceding economic impact assessment.

As previously noted, it is also important to recognize that the NIC I component is not a future sale level projection or target. Rather, it represents the maximum volume that could be harvested with normal logging systems.

Recreation and Tourism

The analysis presented in Table 3.22-25 provides two sets of values for recreation benefits: 1) recreation revenues and costs paid to the Forest Service, and 2) recreation and tourism benefits to the consumer, identified in Table 3.22-25 as recreation and tourism consumer surplus.

Recreation Revenues and Costs

Recreation revenues and costs were estimated based on the average receipts paid to the Forest Service in 2005 and 2006. The values used for the analysis were based on the average values for those two years. Forest Service revenue categories included in this total are the general recreation category, recreation user fees, recreation fee collection, and recreation site fees. Recreation cost categories are shown in Table 3.22-25 as part of the Recreation/Heritage/Wilderness budget line item. This budget item was about $4.3 million in 2005 and $4.6 million in 2006. In addition to these budget item costs, other recreation-related costs incurred in 2005 and/or 2006 and not included in this cost category are trail improvement and maintenance costs, outfitter/guide program management costs, recreation site maintenance and operation, and recreation fee collection costs. These costs are included elsewhere in the Forest Service's accounting system (e.g., capital improvement, miscellaneous funds, and other) and varied substantially between 2005 and 2006, the years used to establish the baseline used here.

Recreation revenues and costs are included in this analysis to address concerns about misleading comparisons and also provide an indication of the relative management costs and revenues associated with different Forest resources. Budget figures from 2006 are also summarized in Table 3.22-28.

Recreation and Tourism Consumer Surplus

Unlike timber, recreation and tourism is, for the most part, not directly traded in the market place. Recreational users of the Tongass National Forest generally pay for only a small proportion of the total benefits they receive from the Forest. Consumer surplus, or willingness-to-pay, is the value of a recreation activity beyond what must be paid to enjoy it. Total economic use value is the cost to participate plus consumer surplus. This type of approach is very different to those used to estimate the other benefits and costs summarized in Table 3.22-25.

The consumer surplus estimates presented in Table 3.22-25 are derived from 1988 survey data. For general recreational activity, this figure is estimated at $33.00 (2005$) per RVD, and for recreational fishing the estimate is approximately $1,025.27 per RVD (2005$). Using the proportion of 1994 total RVDs comprised by recreational fishing use, a weighted average of $69.13 per RVD was derived. This figure represents the average amount a Tongass National Forest recreational user would be willing to pay for a day's recreation over and above expenses already incurred. These net willingness-to-pay figures are from the 1997 Forest Plan Revision Final EIS adjusted for inflation (USDA Forest Service 1997a, p. 3-503).

Future recreation and tourism use on the Tongass was estimated using techniques described in the Affected Environment portion of this section and further detailed in the recreation and tourism impact analysis presented above. Projected future value was derived by multiplying total RVD use by the average net WTP estimate of $69.13. These values were then discounted using the standard 4 percent rate, and the resulting estimates are shown in the second row of Table 3.22-25. Recreation and tourism consumer surplus estimates are much higher than the other benefits and costs addressed in Table 3.22-25, but are relatively constant across the alternatives. The finding that these values are relatively constant across alternatives is consistent with the expected outcome of the Forest Plan, which seeks to protect high value and high use recreation areas under all alternatives, while the high values reflect the wide range of unique recreation opportunities on the Tongass National Forest.

There is the potential for substantial error in these value estimates, and decision makers and the public should avoid a mistaken sense of precision when considering them. Various aspects of recreation and tourism-related value, for example, were impossible to measure or estimate for this analysis. All RVDs have been treated as equivalent, but it is likely that net WTP varies for different recreation experiences and associated ROS classes. Likewise, the net WTP value for a given recreation experience will vary according to a host of factors which may be impacted differently under the different alternatives. By using a constant dollar per RVD estimate, this takes only quantity into account and ignores quality. This quality can take many forms, but must include aesthetic considerations, personal attachments (in the case of local residents who habitually frequent the same "favorite places"), availability of fish and game, the effects of crowding, and ease of access. Moreover, these quality considerations will extend beyond recreational use directly occurring on the Tongass National Forest to include cruise ship passengers and others who have come to the region to mainly experience its beauty and wild character.

Management Costs

The Forest Service incurs various costs in the management of the national forests. Some of these can be directly attributed to a specific management activity or objective, but many others cannot. Likewise, some costs will vary depending upon specific activities stipulated in the Forest Plan. Others, however, are essentially fixed operating costs that will likely not vary for different alternatives.

The timber variable costs presented in Table 3.22-25 are based on average costs (dollars per MBF) resulting from planning and administration activities in conjunction with recent timber sale projects on the Tongass National Forest. Costs are also presented for the following NFS program costs: Inventory and Monitoring; Minerals and Geology; Recreation, Heritage, and Wilderness Management; Land Management Planning and Land Ownership Management; Vegetation and Watershed Management; and Wildlife and Fisheries Habitat Management. The costs assigned to these categories are estimated based on the average 2005/2006 costs for these cost categories and are assumed to remain constant across all alternatives. The choice of alternatives would undoubtedly affect these fixed operating costs, but we are unable to predict how they would be affected.

Additional costs may be imposed on organizations or individuals outside of the Forest Service. These costs are commonly termed “negative externalities” by economists. The current analysis makes no attempt to assign dollar values for the negative externalities that may be associated with the alternatives. Instead, the Forest Service addresses these by providing as much information as possible about the physical and ecological impacts of the alternatives, and using this information in the public participation process associated with the Plan.

Salmon Harvesting and Processing

With the exception of Alternatives 4 and 7, the effects of the alternatives on fish resources are expected to be at or below the level predicted for Alternative 11 in the 1997 Forest Plan Revision Final EIS (USDA Forest Service 1997a, pages 3-46 through 3-73). Alternative 4 is expected to have similar effects to Alternative 6 in the 1997 Forest Plan Final EIS. The effects of Alternative 7 are expected to be similar but less than those projected under Alternative 2 in the 1997 Forest Plan Final EIS. Effects are expected to be lower than those projected under the 1997 Alternative 2 because Alternative 7 includes improved riparian protections. The analysis of effects on fish habitat included in the 1997 Forest Plan Final EIS is incorporated into this EIS by reference. This is also the case with the commercial fishing portion of the economic efficiency analysis presented in the 1997 Final EIS (page 3-504). This section of the 1997 Final EIS explains why PNV estimates were not prepared for the economic efficiency analysis presented in the Final EIS and these reasons also apply here. In addition, there has been a reduction in commercial harvest dependence on natural fish production from the Tongass in recent years.

The absence of quantified salmon harvesting and processing benefits in Table 3.22-25 should not be taken as an indication that this resource is not valued or that current and future management decisions are made without careful consideration of the potential impacts to these values. Potential impacts to fish are discussed in the *Fish* section of this EIS.

Mining

Estimates of mining PNV are also omitted from this analysis because it is not possible to quantify the potential effects of the alternatives on future mining activities.

Subsistence

Subsistence activities have significant economic, as well as cultural and spiritual value for many Southeast Alaska residents. However, there are a number of difficulties involved in trying to quantify these values in monetary terms. A 2001 study that attempted to quantify the economic importance of Alaska’s ecosystems used three different standard methods to estimate the statewide net economic benefits associated with subsistence (Colt 2001). This study concluded: “(i)n summary, it remains quite difficult to measure the net economic value of subsistence in economic terms. Using standard techniques, one can come up with estimates that range from zero (using a $4.00/lb replacement value less the cost of cash and labor input) to more than $1.7 billion (upper bound on net willingness to accept compensation for lost subsistence opportunities)” (Colt 2001; 37). Assigning an accurate economic value to subsistence is one significant problem in trying to calculate a PNV for subsistence. A second major problem involves quantifying the potential effects of the alternatives in terms of pounds of subsistence harvest foregone. This type of information is not available, as discussed in the *Subsistence* section of this document.

It is important to recognize that while it is not possible to assign subsistence a net economic value for the economic efficiency analysis, this does not mean that the potential effects of the alternatives on subsistence are not important. These potential effects are addressed programmatically in the *Subsistence* section of this document. They are also discussed on a community basis in the *Subregional Overview and Communities* section. The analysis presented in the *Subsistence* section assesses the potential effects of the alternatives in terms of abundance and distribution, access, and competition.

Non-use Values and Ecosystem Services

This section discusses non-use and ecosystem service values. Definitions of ecosystem services can be broad, including both use and non-use values. The following discussion uses a more narrow definition that applies to the group of services that is sometimes referred to as "life-support services." This definition excludes non-use and quality of life values, which are discussed separately below, as well as recreation use.

Non-use Values

Non-use values represent the value that individuals assign to a resource independent of their use of that resource. Non-use values include existence, option, and bequest values.

Economists have argued that recreation use represents only a portion of the economic value of natural areas. There are also non-use values associated with natural areas. Non-use values represent the value that individuals assign to a resource independent of their use of that resource. These types of values, which include existence, option, and bequest values, are usually measured via surveys that ask people how much they would be willing to pay to preserve a particular area. These values represent the value that individuals obtain from knowing that an area or resource exists, knowing that it would be available to visit in the future should they choose to do so, and knowing that it would be left for future generations to inherit.

While the non-use values associated with the Tongass National Forest as a whole are no doubt considerable, they are extremely difficult to accurately measure, particularly on a per acre basis. The results from surveys in other areas do provide some insight to potential non-use values that might be associated with the proposed alternatives. The findings of a number of recent studies are summarized in Table 3.22-26. These studies attempt to quantify the non-use values associated with wilderness and other types of natural areas in Alaska and other areas. WTP values are typically calculated on a per household basis and then expanded to a broader population. A critical issue here becomes identifying the extent of the survey area. Summing these types of values per household across large areas generates very high values. This issue is evident in the different geographical extent of the areas surveyed in the studies summarized in Table 3.22-26.

Examining the results of two of the studies summarized in Table 3.22-26 (Walsh et al. 1984 and Pope and Jones 1990), Loomis (2000) noted two trends that are relevant to this discussion. First, WTP per household increases with an increase in the number of acres proposed for wilderness protection, but at a decreasing rate. Second, existence, option, and bequest values in both cases represented about half the total value of wilderness. There are no new wilderness areas proposed under any of the alternatives, but these findings may also apply to areas preserved in a natural condition.

The results of the studies summarized in Table 3.22-26 suggest that the non-use values associated with maintaining areas on the Tongass in a natural condition are likely to be high, especially given the national importance of the Tongass. These values would likely increase with the number of acres, but at a lower rate. In terms of the proposed alternatives, the value per household is likely to be highest for Alternatives 1, 2, 3, 5 and 6, 4, and 7 in that order.

Table 3.22-26
Summary of Willingness-to-Pay Estimates of Existence Values

Author (Date)	Study Location	Description of Resource	Description of Commodity	Annual Willingness-to-Pay (2000$)[1]
Carson et al. 1992	Alaska: Prince William Sound	Prince William Sound coast and waters	WTP for spill prevention plan	$3.13 per U.S. household per year ($32.31 one-time)
Goldsmith and Hill 1998	Alaska: Bristol Bay Wildlife Refuges	13.2-million-acre wildlife refuges made up of three separate refuges	WTP for preserving wildlife habitat in Bristol Bay.	$26.05 to $52.11 per household U.S.
Walsh, et al. 1984	Colorado	1.2-million-acre designated wilderness area (2% of total state acreage) made up of 13 separate areas.	WTP to preserve existing wilderness areas in Colorado -- 1.2 million acres -- 10 million acres	 $23.07 per Colorado household $52.75 (1984$) per Colorado household
Reid et al. 1993	British Columbia	Current Wilderness in British Columbia.	WTP for doubling wilderness in British Columbia WTP for tripling wilderness in British Columbia	$11.80 per B.C. household ($118.02 one-time) $15.02 per B.C. household ($150.21 one-time)
Pope and Jones 1990	Utah	Bureau of Land Management land (BLM)	WTP for designation of BLM land in Utah million acres as wilderness. --2.7 million acres --16.2 million acres	 $69.50 per household $121.49 per household
Loomis 2000[2]	Western U.S outside Alaska	National Forest Roadless areas in Western U.S.	WTP to preserve roadless lands in the west	$6.72 per acre

[1] Values were adjusted to 2000 dollars using the Anchorage CPI for Alaska values and the U.S. CPI for all other areas.
[2] Estimated by Loomis using benefit-transfer approach from Walsh et al. (1984) and Pope and Jones (1990).
Sources: Colt 2001; Loomis 2000.

The summary of recent studies presented in Table 3.22-26 is meant to provide some indication of the results of other studies, only. While there is a general consensus that non-use values of this type exist and federal policy includes approval of such techniques, the methodologies for measuring the size of these values are both controversial and difficult to apply in a consistent fashion.

A recent study prepared by The Wilderness Society (Phillips and Silverman 2007), for example, used the values from the three of the studies shown in Table 3.22-25 (Carson et al., Goldsmith and Hill, and Loomis) to estimate annual passive use values of “wildlands” on the Tongass and Chugach National Forests that ranged from $6.8 million to $387.9 million. They then divided the difference to get an average annual passive value of $196.2 million. This analysis suggests that there is a passive use value associated with the Tongass National Forest, but the wide possible range identified for this value (with the high estimate [$387.9 million] 57 times as large as the low estimate [$6.8 million]) underlines the difficulty in estimating this type of value using a benefit transfer approach. This study is discussed in more detail in Appendix H.

Ecosystem Services

Ecosystem services are those services and benefits provided by healthy ecosystems. Definitions of ecosystem services can be broad, including both use and non-use values. A number of different definitions and groupings have been identified (Colt 2001; Costanza et al. 1997; Krieger 2001; Morton 2000). These include the typology developed by the Millennium Ecosystem Assessment (2005), which is featured on the Forest Service's Ecosystem Services web site (http://www.fs.fed.us/ecosystemservices/) and identifies four general categories of ecosystem services: provisioning, regulating, cultural, and supporting. This typology is also highlighted in Chapter 2 of this EIS. The Forest Service's Pacific Northwest Research Station recently issued a technical report that attempts to define an economics research program to describe and evaluate ecosystem services (Kline 2006).

Some definitions of ecosystem services include consumptive uses—such as logging, fishing, and hunting—that can be considered market goods, as well as non-use or passive use values. The values associated with these types of market goods and non-use values are discussed in the preceding sections. Other types of ecosystem services provide what might be considered long-term life support benefits to society as a whole. Examples of these types of benefits that pertain to forests include watershed services, soil stabilization and erosion control, improved air quality, climate regulation and carbon sequestration, and biological diversity (Krieger 2001).

Some economists have expressed concerns that ecosystem service values are not adequately considered in decision-making processes because they are not valued on a par with goods and services that are traded in commercial markets. A number of methods have been used to assign monetary values to these types of services. These methods include travel cost, hedonic pricing, and defensive expenditure approaches that use observed behavior to estimate values, as well as contingent valuation approaches that ask people what they would be willing to pay for an ecosystem service.

Costanza et al. (1997) estimated the total value of the services provided by the world's ecosystems ranges from $16 trillion to $54 trillion per year, with an average value of $33 trillion. Costanza et al.'s estimate involved the review and synthesis of a wide variety of existing studies and included estimates of recreation and cultural values, as well as more life-support-related services. Many of the studies used in their synthesis were based directly or indirectly on estimates of WTP. Colt (2001) applied Costanza et al.'s values to Alaska and estimated that the ecosystem values associated with the state's lands and waters ranged from $1.2 billion to $1.6 billion. Colt's estimate only included the components of Costanza et al.'s analysis that he considered to relate directly to life support services.

Phillips and Silverman (2007) applied the global values adopted by Colt (2001) to the Tongass National Forest and estimated that the annual ecosystem value of 15.7 million acres of the Tongass is $293.7 million. This analysis involved applying dollar per acre values for various ecosystem services, such as gas regulation, climate regulation, disturbance regulation, soil formation, and nutrient cycling, to five different forest biomes. Colt (2001, 42) notes that while the Costanza et al. estimates that form the basis of this analysis represent an important first step, they are "extremely primitive." Colt (2001, 43-44) also noted two obvious sources of bias with his analysis, which also apply to Phillips and Silverman's (2007) analysis. First, the average values per acre estimated by Costanza et al. and applied here are global averages derived from studies of population places and may have limited applicability to Alaska. Second, the data Colt adopted from Costanza et al., which Phillips and Silverman also use, does not address all "life support system" services and in this respect excludes categories of ecosystem services, such as wildlife habitat.

The results of Phillips and Silverman's (2007) analysis suggests there are ecosystem service values associated with the Tongass National Forest and these values are, as the resource-by-resource analyses presented in the other sections of this EIS suggest, undoubtedly high. These estimates are not, however, suitable for a detailed comparison of alternatives at the Forest level.

The uncertainty surrounding the accuracy of these estimates is compounded by the difficulty involved in accurately quantifying the effects of the alternatives on physical and biological resources in unit values. As Kline (2006, 15) notes, even if we were to accept this overall estimate as a reasonable benchmark for the total existing value of Tongass-related ecosystem services, "total ecosystem values provide little guidance to policy or management decisions unless these decisions can be expressed as marginal or incremental changes in ecosystem services." With respect to wetlands, which make up 91 percent of the annual ecosystems services value estimated by Phillips and Silverman, for example, the impacts are evaluated in this EIS in terms of potential risk based on projected road building and acres identified as suitable for harvest. Impacts are not quantified in terms of acres lost or acres of wetland function impaired.

However, as noted earlier, the fact that no monetary value is assigned to ecosystem services in this document does not lessen their importance in the decision making process. A large proportion of this document is devoted to assessing impacts to the Forest resource that cannot be readily expressed in monetary terms.

It should also be noted that ongoing initiatives in Southeast Alaska to develop ecosystem services markets such as the Fuels for Schools program, thinning of second growth for wildlife habitat improvement, and implementation of practices and technologies to reduce the carbon 'footprint' of Forest Service operations will con tinue under all of the alternatives.

It is important to recognize when evaluating the potential effects of the alternatives on non-commodity forest values, such as non-use values, ecosystem services, and quality of life issues, that there are a number of options available and in place to protect these values and resources. Under the current Forest Plan, LUDs specify ways of managing an area of land and the resources it contains. LUDs may emphasize certain resources, such as remote recreation or old-growth wildlife habitat, or combinations of resources, such as providing scenic quality in combination with timber harvesting. Each LUD has a detailed management prescription, which includes standards and guidelines.

Under the current Forest Plan, there are 19 LUDs that range from Wilderness to Timber Production, in terms of the level of development permitted. While each LUD has a different purpose and management emphasis, they may be generally grouped into four categories based on the kind of effects they potentially create. These four categories are wilderness, natural setting, moderate development, and intensive development. Timber management and other types of development are only allowed in the moderate and intensive development LUDs. Not all lands allocated to development LUDs are available for timber production. Under the current Forest Plan (Alternative 5), 3.6 million acres or 21 percent of the Forest is allocated to development LUDs. Approximately 687,000 acres of this area, or 4 percent of the Forest, suitable and scheduled for timber production (Table 3.22-27). This total includes both productive old growth and young-growth acreage. Under Alternative 1, the most restrictive alternative from a development perspective, 5 percent of the Forest would be allocated to development LUDs, with approximately 144,000 acres estimated to be suitable for timber production.

Table 3.22-27
Land Use Designations and Mapped Suitable Lands by Alternative (1,000s Acres)

LUD Group/Alternative	1	2	3	4	5	6	7
Wilderness and Natural Monument	5,916	5,916	5,916	5,916	5,916	5,916	5,916
Mostly Natural Setting	10,019	8,928	8,054	6,130	7,252	7,400	5,808
Moderate Development	279	577	830	1,503	1,096	1,064	1,653
Intensive Development	560	1,353	1,974	3,225	2,510	2,394	3,396
Total	**16,774**	**16,774**	**16,774**	**16,774**	**16,774**	**16,774**	**16,774**
Percent of Forest in Development LUDs	7	12	18	28	22	21	30
Scheduled Suitable Lands[1]							
Thousands of Acres	144	394	514	892	687	664	1,070
Percent of Total	1	2	3	5	4	4	6

[1] Scheduled suitable acres appropriate for harvest occur in moderate and intensive development LUDs only.

Under the current Forest Plan, timber management activities are governed by a large number of rules and regulations designed to protect or mitigate negative impacts to resources. These standards and guidelines, presented in Chapter 4 of the current Forest Plan, address the following resource areas and apply to Alternative 5, the No-Action Alternative, in this EIS:

- Air
- Beach and Estuary Fringe
- Facilities
- Fire
- Fish
- Forest Health
- Heritage Resources
- Karst and Caves
- Lands
- Minerals and Geology
- Recreation and Tourism
- Riparian
- Rural Community Assistance
- Scenery
- Soil and Water
- Subsistence
- Threatened, Endangered, & Sensitive Species
- Timber
- Trails
- Transportation
- Wetlands
- Wildlife

A number of changes to the Forest Plan text are being proposed under the action alternatives, based on the Forest Plan 5-Year Plan Review and Forest Service staff recommendations. Most changes were incorporated into the Proposed Forest Plan (Land and Resource Management Plan), which accompanied the Draft EIS. These changes were modified and updated for the Final EIS and the major changes being proposed are summarized in Chapter 2. The Final Proposed Forest Plan forms the basis for Alternatives 1, 2, 3, and 6. A summary of the major differences between the Final Proposed Forest Plan and the current Forest Plan are summarized below.

Management Prescriptions

- Edits and clarifications were made regarding karst management programs, sacred site protection, minerals and geology, off-highway vehicle use, scenery management, and other areas for most LUD prescriptions
- Substantial edits and clarifications were made to the Wilderness and Wilderness National Monument LUD prescriptions

Forest-wide Standards and Guidelines

- Clarifications and edits were made to the standards and guidelines regarding steep slopes and soil stability, Class III and IV streams, karst and cave resources, minerals and geology, recreation and tourism, scenery, off-highway vehicle use, road storage and decommissioning, and other resources.

- New sections were added to Chapter 4 on Invasive Species and Plants, and new standards and guidelines on sacred site protection.
- Conversion of the goshawk foraging habitat and the marten habitat standards and guidelines in the Wildlife section to a Forest-wide legacy standard and guideline in the *Wildlife* section.
- Revision of the goshawk nesting habitat standard and guideline in the *Wildlife* section.
- The requirement to conduct inventories to determine the presence of nesting goshawks for proposed goshawks that affect goshawk habitat is included in the Final Proposed Forest Plan.

Alternatives 4 and 7 also follow the Final Proposed Forest Plan, with some exceptions including the following:

- The Beach and Estuary Fringe buffer is changed to 500 feet along the beach fringe and 1,000 feet around estuaries under Alternative 7
- Neither the goshawk foraging habitat, the marten habitat, nor the new Legacy Standards and Guidelines would be implemented
- The goshawk nesting standard and guideline would not be implemented

As a result, the levels of resource protection are expected to be lower in these areas under Alternatives 4 and 7. In addition, the Old-Growth Habitat LUD and its management prescription is not used under Alternative 7, resulting in a reduction in protection for old-growth habitat.

Although data availability and specificity continue to be a challenge to refining the scale at which ecosystem service provision is assessed and valued, measurement, modeling, and valuation of ecosystem service efforts are increasing rapidly in scope, resolution, and ability to reflect system complexities. In addition, markets for ecosystem services are a topic of growing interest within the Forest Service, its partners and stakeholder groups. A prominent challenge to establishment of ecosystem service markets is the understanding of the current provision of ecosystem services as a baseline, against which progress (termed by economists as additionality) can be measured. A second challenge is to understand in a forward-looking manner the potential direct and indirect benefits of emerging market opportunities related to ecosystem services. Ongoing initiatives in Southeast Alaska illustrate some of the potential in this regard and include the Fuels for Schools programs, thinning of second growth for habitat, and implementation of practice and technologies to reduce the carbon ‘footprint’ of Forest Service operations, among other examples.

Natural Amenities and Quality of Life

As discussed in the Affected Environment portion of this section, natural amenities and local quality of life have increasingly been recognized as important factors that serve to attract and retain residents. It is, however, very difficult to determine the effect of the different alternatives on local amenities and, further, on the economic activity that these amenities are believed to indirectly generate. In most cases and localities the impacts of the action alternatives relative to the no-action alternative on amenities are not expected to be significant enough in themselves to result in measurable changes in economic activity.

Tongass National Forest Budget

The Forest Service budget is appropriated through Congress on a yearly basis. National forest budget requests are considered as part of total budget requests submitted to the United States Congress by the executive branch each year, with Congress having final say. The relevant portions of the Tongass National Forest budget are summarized for 2007 in Table 3.22-28. In general, funding for the Tongass National Forest has followed a downward trend in recent years. The Fiscal Year (FY) 2007 budget allocation was, for example, approximately $46 million (Table 3.22-28) compared to approximately $72 million in 2001 (see Table 3.22-26 in the 2003 SEIS [USDA Forest Service 2003b]). This overall decline in funding means that an increase in overall funding would be required relative to 2007 levels to fully implement the Forest Plan under all of the alternatives, including Alternative 5, No Action.

Variations in the level of timber harvest would affect the cost of operating the related programs including the following budget items, which include all the resource support, like wildlife biologists, necessary for timber harvesting.

The budget items that would be affected by variations in timber harvest volumes are as follows:

NFPN – Land Management Planning
NFIM – Inventory and Monitoring
CMRD – Roads Capital Improvements & Maintenance
NFTM – Timber Management
NFVW – Vegetation and Watershed Management

The amounts required to adequately fund these budget items would vary by alternative based on the estimated level of timber harvest. Projected budget requirements would be higher for these items under Alternatives 4, 5, 6, and 7, with Alternative 1 requiring the lowest amount of funding for timber management related activities. As the preceding discussion suggests, budget shortfalls are likely in the future, especially for the more timber-intensive alternatives.

Table 3.22-28
Fiscal Year 2007 Budget Allocation by Resource Item

Fund Code	Budget Line Item		Allocation
	National Forest System		
NFPN	Land Management Planning	$	1,306,700
NFIM	Inventory and Monitoring		1,945,500
NFRW	Recreation/Heritage/Wilderness		4,240,600
NFWF	Wildlife and Fish Habitat Management		3,570,100
NFTM	Timber Management		12,699,300
NFVW	Vegetation and Watershed Management		2,430,400
NFMG	Minerals		1,017,800
NFLM	Landownership Management		1,625,700
NFLE	Law Enforcement		
	Total	$	28,836,100
	Wildland Fire Management		
WFPR	Fire Preparedness	$	890,700
WFHF	Hazardous Fuels		
WFSU	Fire Operations		
	Total	$	890,700
	Capital Improvement & Misc.		
CMFC	Facilities Capital Improvements and Maintenance	$	2,752,600
CMRD	Roads Capital Improvements and Maintenance		12,179,400
CMTL	Trails, Capital Improvements and Maintenance		1,412,200
	Total		16,344,200
Total		**$**	**46,071,000**

Note: This table only summarizes those portions of the 2007 Tongass National Forest allocation that pertain to this analysis.
Source: USDA Forest Service 2007h.

Payments to the State

As noted in the Affected Environment discussion, the *Secure Rural Schools* legislation expired in 2006 with the last payments under this authorization made in December 2006. However, payments under this legislation were extended for 2007 as part of the Iraq Accountability Appropriations Act of 2007, which was signed into law on May 25, 2007 (USDA Forest Service 2007i).

Cumulative Effects

This section considers the incremental effects of the alternatives when added to other past, present, and reasonably foreseeable actions. The effects of past and present actions on the economic and social environment are included in the Affected Environment portion of this section, which discusses the regional economy, as well as providing a subregional overview, and assessing potential impacts at the community level. These sections summarize current employment levels and other key aspects of natural resource-based industries, and also assess recent trends.

The effects analyses presented in the preceding sections also take into consideration reasonably foreseeable actions. The impact analyses that address the wood products industry include, for example, projected future harvest levels for other land ownerships in Southeast Alaska. The effects of past and present harvest actions on other land ownerships are also implicitly incorporated into this analysis because they influence projected future levels of timber harvest. The influence of other factors not directly related to the Tongass, such as the major shifts in the markets served by Alaskan sawmills over the past decade, are also considered as part of the analysis.

The continued growth in the number of cruise ship passengers visiting the region is one of the major trends in recreation in Southeast Alaska. The effects of the alternatives are considered in conjunction with this trend because it underpins current and future recreation demand on the Tongass. In addition, the recreation and tourism economic impact analysis includes estimated non-Tongass-related recreation employment, as well as the potential effects of the alternatives on the supply of recreation opportunities on the Tongass.

Other reasonably foreseeable future actions include an expected growth in recreation and tourism businesses based on the continued growth in the cruise ship industry, as well as the development of additional fishing and other lodges. This type of development would facilitate additional recreation and tourism in the region and on the Forest. Human settlement expansion is expected to occur around the region's larger cities, such as Juneau and Ketchikan, with residential expansion also expected as a result of state land auctions. These developments would likely result in increased demand for a range of recreation activities, with some developments favoring developed recreation opportunities, and others more dependent on undeveloped lands.

Reasonably foreseeable actions on NFS lands include the projected levels of future timber harvest and development that are used in the preceding analysis to assess the potential impacts of the alternatives on the regional and local economies. These projected activities were also used to assess the potential impacts of the alternatives on the supply of recreation opportunities and recreation use and demand.

Other reasonably foreseeable actions include transportation and utility developments proposed by the State of Alaska. These proposals are summarized in the *Transportation and Utilities* section of this document. A total of 1,523 miles of roads are projected to be constructed on non-NFS lands in Southeast Alaska over the life of the Plan (100+ years) under each of the alternatives (see Table 3.12-3 in the *Transportation and Utilities* section). Most of the projected non-NFS roads are forest roads that would be developed for timber harvest, but the total miles also include roads likely to be built to serve communities, such as the Juneau access road on the east side of Lynn Canal. This road, and other road corridors covered by Public Law 109-59, would, if approved under NEPA and funded, connect additional areas in Southeast Alaska to the continental highway system and improve transportation between communities. They would also improve access for recreation use and in some cases would likely facilitate new types of use.

It is not possible at this time to predict exactly which roads would be developed or their likely impact on future recreation patterns and associated employment. None of the alternatives are expected to affect this type of future road development, which would be expected to go forward regardless of the selected alternative. The overall cumulative effect of new regional road corridors viewed in conjunction with the proposed Forest Plan alternatives would be a trend toward more developed recreation opportunities that would be relatively high under Alternative 7 and relatively low under Alternative 1. Planned timber harvest activities on adjacent private and Native Corporation lands would also result in a cumulative trend toward more developed recreation opportunities that would be most pronounced under Alternative 7 and least pronounced under Alternative 1.

Mining activities are expected to expand at existing sites, including Greens Creek on Admiralty Island and Berners Bay north of Juneau, with an increase in mining exploration and new development anticipated. Continued mining at existing sites and ongoing exploration efforts would likely support existing levels of mining employment and income. This employment and income would increase if there were an increase in exploration and development.

Regional energy and transmission projects are also expected to occur, including the Swan-Tyee transmission line and the Juneau-Hoonah transmission line. These projects are expected to improve and expand local and regional electrical service and reliability.

Subregional Overview and Communities

Introduction

The preceding section of this document addressed the potential impacts of the proposed alternatives upon the regional economy as a whole. Potential impacts would not, however, be viewed similarly by all boroughs or communities in Southeast Alaska or distributed equally among them. It is, therefore, important to consider the potential effects at a more detailed geographic scale. The following section is divided into two parts. The first part, entitled Subregional Overview, addresses the economic and social composition of the boroughs and census areas (CAs) that comprise Southeast Alaska, as well as providing summary data at the community group level. This discussion provides an important perspective on the likely distribution of the potential effects identified in the regional economy analysis, as well as setting the stage for the second part of this section, which discusses the potential effects of the alternatives on each of Southeast Alaska's 32 communities.

Subregional Overview

Addressing potential effects at the subregional level can be difficult because the types of data available at the state or regional level are often not available for smaller localities. In addition to problems arising from inadequate data, the lack of detailed information on the exact location of expected harvests and on the competitive position of individual firms makes it impossible to know which jobs or firms may be affected under a given alternative. Any attempt to provide numerical estimates of long-term impacts at the community level would be prone to error, and give a false sense of accuracy and certainty. As a result, the following analysis presents a more detailed picture of the current situation and past trends at the Borough/CA and community group levels, but does not attempt to quantify potential impacts by alternative.

Economic developments are discussed in the following sections using data compiled at the borough/CA level, as well as employment data compiled by the Alaska Department of Labor (Alaska DOL) at the community group level. Community groups are sub-areas of boroughs and CAs developed by the Alaska DOL. Some of the community groups consist of one community; others include several communities (see Table 3.23-6). Information at the community group level provides a more detailed picture of local employment patterns than is usually available.

Southeast Alaska Boroughs and Census Areas

There are large differences in the economic structure and development of the boroughs and CAs (referred to as the "boroughs" in the following discussion) that comprise Southeast Alaska. A common problem encountered in the analysis of the Southeast Alaska economy is that, owing to its relative size, Juneau dominates statistics at the regional level. As a result, regional trends in population, employment, or income tend to closely represent developments in Juneau and often do not reflect changes in other boroughs. By analyzing certain economic statistics at the borough level, differences in economic structure and trends that are obscured at the regional level, are more apparent. The following sections discuss population, employment, and income trends at the borough level.

Population

The population of Alaska grew during the 1980s and 1990s increasing from about 402,000 in 1980 to approximately 627,000 in 2000, an increase of 56 percent. Southeast Alaska's population increased by 36 percent over the same time period. Increases at the borough level ranged from 8 percent for Wrangell-Petersburg to

57 percent and 61 percent for Juneau and Prince of Wales-Outer Ketchikan, respectively, with Juneau accounting for about 55 percent of Southeast Alaska's population growth over this period. Population increases were larger in the 1980s than in the 1990s in all cases, and population in the Northern Complex, Wrangell-Petersburg, and Prince of Wales-Outer Ketchikan actually declined between 1990 and 2000 (Table 3.23-1).

Table 3.23-1
Borough/Census Area Population, 1990, 2000, and 2006

				1990 to 2000		2000 to 2006	
Borough/Census Area/ Region	**1990**	**2000**	**2006**	**Absolute Change**	**Percent Change**	**Absolute Change**	**Percent Change**
Northern Boroughs							
Haines Borough	2,117	2,392	2,241	275	13	-151	-6
Juneau Borough	26,751	30,711	30,650	3,960	15	-61	0
Sitka Borough	8,588	8,835	8,833	247	3	-2	0
Northern Complex[1]	4,404	4,244	3,654	-160	-4	-590	-14
Southern Boroughs							
Ketchikan Gateway Borough	13,828	14,059	13,174	242	2	-885	-6
Prince of Wales-Outer Ketchikan CA	6,278	6,157	5,477	-132	-2	-680	-11
Wrangell-Petersburg CA	7,042	6,684	6,024	-358	-5	-660	-10
Southeast Alaska	**69,009**	**73,082**	**70,053**	**4,073**	**7**	-3,029	-4
Alaska	550,043	626,931	670,053	76,889	14	43,122	7

CA=Census Area
[1] 1990 data are for the Skagway-Yakutat-Angoon Census Area. 2000 data combine the Skagway-Hoonah-Angoon Census Area and Yakutat Borough. Yakutat Borough was incorporated in 1992.
Source: Alaska DOL 2001a, 2007a; U.S. Census Bureau 1995.

Alaska has continued to grow since 2000 with total population increasing by 7 percent between 2000 and 2006. Southeast Alaska, in contrast, lost population over this period, with the total population decreasing by an estimated 3,029 people or about 4 percent. All of the boroughs have lost population since 2000, with the largest absolute decrease (-885 people) occurring in Ketchikan Gateway Borough. Juneau and Sitka experienced relatively modest decreases in population from 2000 to 2006, less than 0.5 percent in both cases (Table 3.23-1).

Components of regional population change for 2000 through 2006 indicate that all of the boroughs in Southeast Alaska experienced natural increase (more births than deaths) over this period (U.S. Census Bureau 2006). All of the boroughs also experienced net out-migration (more people leaving than moving in) and in all cases the net loss of population through out-migration exceeded the net gain through natural increase. Juneau City and Borough experienced the largest absolute net out-migration over this period.

Alaska DOL released new statewide population projections in 2007 (Alaska DOL 2007h). These projections extend from 2010 through 2030, with low, middle, and high estimates available at the borough level at 5 year intervals. The general trend from 2006 to 2030 is for some degree of population growth for all Alaska regions, with the exception of Southeast Alaska. The boroughs with the greatest levels of annualized projected population decrease from 2006 to 2030 are both located in Southeast Alaska. Skagway-Hoonah-Angoon CA and Haines borough are projected to see annual decreases in population of 1.8 percent and 1.5 percent over this period, respectively (Alaska DOL 2007h).

Population in Alaska as a whole is projected to increase between 2006 and 2030 under all three sets of estimates, with anticipated increases ranging from 9 percent to 42 percent. Population estimates for Southeast Alaska anticipate a 19 percent decrease (low), a 7 percent decrease (middle), or a 5 percent increase (high) over the same time period. Population is expected to decrease in all Southeast Alaskan boroughs under the low set of projections, for all the boroughs except Juneau (+5 percent) under the middle set, and all boroughs except Juneau (+19 percent), Sitka (+11 percent), and Yakutat (+3 percent) under the high set (Alaska DOL 2007h).

Employment

Total full- and part-time employment is presented by borough for 1990 and 2000 in Table 3.23-2. These data compiled by the U.S. Department of Commerce, Bureau of Economic Analysis include proprietors and self-employed workers. These data indicate that overall employment in Southeast Alaska increased by approximately 11 percent during the 1990s, with population increasing by 6 percent over the same period (Table 3.23-1). Employment increased in all boroughs with the exception of Ketchikan Gateway, which experienced a net loss of 529 jobs or 4.9 percent of total employment over this period. Total employment in Juneau increased by 4,036 jobs or 22 percent. Employment in Haines also saw a relatively large gain, increasing by 31 percent or 520 jobs.

Table 3.23-2
Borough/Census Area Employment, 1990 and 2000

	Total Employment[1]		Wood Products[2,3]			Lodging, Rest. & Rec[2,3,4]		
	2000	1990-2000 Change (%)	2000	1990-2000 Change (%)	% Local Total	2000	1990-2000 Change (%)	% Local Total
Northern Boroughs								
Haines Borough	2,174	31.4	0	-100.0	0.0	214	112.4	21.6
Juneau Borough	22,046	22.4	68	NA	0.4	1,873	60.5	11.0
Sitka Borough	6,385	3.0	1	-100.0	0.0	371	2.7	5.2
Northern Complex[5]	3,093	4.4	183	-43.7	9.0	319	52.3	15.7
Southern Boroughs								
Ketchikan Gateway Borough	10,239	-4.9	383	-73.2	9.4	698	3.6	17.1
Prince of Wales-Outer Ketchikan CA	2,951	5.3	281	-59.9	15.1	226	57.2	12.1
Wrangell-Petersburg CA	4,734	9.3	158	-64.3	6.0	161	-22.3	6.1
Southeast Alaska	**51,622**	**10.5**	**1,074**	**-69.3**	**3.0**	**3,862**	**35.0**	**10.8**

[1] These data, compiled from U.S. Department of Commerce, Bureau of Economic Analysis (BEA) data and are for full and part-time employment, including proprietors and self-employed.
[2] These data, compiled from Alaska DOL (NAWS) data (Alaska DOL 2006c) and the 1997 Forest Plan Revision Final EIS, do not include proprietors and self-employed workers. Bureau of Economic Analysis data, the source for the total employment column, is not available at this level of disaggregation.
[3] The percent of local total is benchmarked against total NAWS employment, which excludes proprietors and self-employed, not the Bureau of Economic Analysis numbers shown in the left column.
[4] Lodging, Restaurants, and Recreational and Entertainment Services. This measure does not directly reflect recreation and tourism-related employment but is included as an indicator of trends and relative concentration of recreation and tourism-dependent jobs. The numbers presented here do not include proprietors or the self-employed and, therefore, are likely underestimates as proprietors and self-employed workers tend to comprise a large share of total employment in these sectors.
[5] Aggregate of Skagway-Hoonah-Angoon Census Area and Yakutat Borough.
Source: Alaska DOL 2006c; U.S. Department of Commerce, Bureau of Economic Analysis 2002; USDA Forest Service 1997a (Table 3-154).

Employment in wood products and lodging, restaurants, and recreational and entertainment services is also summarized by borough in Table 3.23-2. These data compiled by the Alaska DOL are for covered employment only. Covered employment data include workers covered by State or federal unemployment insurance laws programs. Covered employment does not include proprietors or self-employed workers. As a result, the numbers presented in Table 3.23-2 are likely underestimates. This is particularly the case with lodging, restaurants, and recreational and entertainment services because proprietors and self-employed workers tend to comprise a large share of total employment in these sectors. U.S. Department of Commerce, Bureau of Economic Analysis data, which include proprietors and self-employed workers, are not available at this level of disaggregation.

Employment in the wood products sector declined in all boroughs during the 1990s, with the largest absolute loss (1,046 jobs) occurring in Ketchikan Gateway. Losses ranged from a low of 44 percent of 1990 wood products employment in Northern Complex to 100 percent in Sitka and Haines. The wood products sector accounted for 433 and 141 jobs in Sitka and Haines in 1990, respectively. These sharp declines in employment in part reflect the years selected for comparison. Wood products employment, which has followed cyclical trends over the past two decades, peaked in 1990 (see Figure 3.22-6 in the *Economic and Social Environment* section). A comparison between 1985 and 1999, for example, would show a less dramatic decline. Comparing two points in time also has the effect of suggesting a linear trend that may not be the case. Wood products employment in Wrangell-Petersburg CA, for example, declined by 64 percent between 1990 and 2000, but actually increased by about 88 percent between 1995 and 2000.

That said, APC and KPC ceased their Southeast Alaska operations in the 1990s and mill closures in Ketchikan, Sitka, and Wrangell had dramatic effects on these communities because they eliminated their main source of private sector year round employment. In addition, the seasonal but well-paid logging activities in Prince of Wales-Outer Ketchikan, Wrangell-Petersburg, and Skagway-Hoonah-Angoon were reduced over this period (Gilbertson 2004). As a result, by 2000 wood products accounted for a relatively small share of total employment in most boroughs. Wood products did, however, continue to comprise a relatively large share of employment in Prince of Wales-Outer Ketchikan (15.1 percent), Ketchikan Gateway (9.4 percent), and Northern Complex (9.0 percent) (Table 3.23-2).

In contrast to wood products employment, employment in lodging, restaurants and recreation-related services demonstrated strong gains between 1990 and 2000. The contrast between losses in wood products employment and gains in lodging, restaurants and recreation-related employment is consistent with overall trends discussed in the *Economic and Social Environment* section, but there is considerable variation across boroughs. Employment in this category in Haines, for example, more than doubled, with lodging, restaurants and recreation-related services accounting for 22 percent of total employment in 2000. The Wrangell-Petersburg CA, on the other hand, saw a substantial decrease (22 percent) in employment in this category, which represented just 6 percent of total employment in 2000. Certain boroughs (and, by extension, the communities that they encompass) have benefited more from the expansion of the tourist-related economy than others.

Employment data for 2000 and 2005 are summarized in Table 3.23-3 and indicate that while statewide employment increased by 9.8 percent over this period, employment in Southeast Alaska stayed relatively constant increasing by just 0.7 percent or 333 jobs. Employment in Juneau declined over this period, with 1,041 fewer jobs in 2005 than in 2000. Employment stayed relatively constant in Haines (-19 jobs) and increased in all the other boroughs, with the largest absolute increase occurring in Sitka (777 jobs) (Table 3.23-3).

Covered employment data compiled by Alaska DOL for 2005 are also presented in Table 3.23-3 and shown graphically in Figure 3.23-1. These data are not directly comparable with those presented in Table 3.23-2 because of the change from the SIC to NAICS measurement systems employed by federal and state agencies in 2001. Comparison of these data does, however, suggest that wood products has continued to decline as a share of total employment in all Southeast Alaska boroughs since 2000 (see Tables 3.23-2 and 3.23-3). Employment in the leisure and hospitality sector accounted for about 10 percent of total Southeast Alaska covered employment in 2005, ranging from 6.6 percent of total employment in Wrangell-Petersburg to 18.9 percent in Yakutat (Table 3.23-3).

Table 3.23-3 and Figure 3.23-1 highlight the distinction between northern and southern boroughs. With the exception of Skagway-Hoonah-Angoon, there was no wood products employment in the northern boroughs in 2005. Nearly all of the covered forestry and logging and wood products manufacturing employment in Southeast Alaska (96 percent) is concentrated in the southern boroughs. Leisure and hospitality employment, by contrast, generally shows higher concentrations in the north, with northern boroughs accounting for 70 percent of total regional employment in this category.

Table 3.23-3
Borough/Census Area Employment, 2000 and 2005

	Total Employment[1]		2005 Employment by Sector: Forestry and Logging[2,3]		Wood Products[2,3]		Leisure and Hospitality[2,3,4]	
	2005 Employ-ment	2000-2005 Change (%)	Employ-ment	Percent of Total	Employ-ment	Percent of Total	Employ-ment	Percent of Total
Northern Boroughs								
Haines Borough	2,469	-0.9	0	0.0	0	0.0	168	16.0
Juneau Borough	20,536	-5.2	0	0.0	0	0.0	1,545	8.8
Sitka Borough	6,928	11.8	0	0.0	0	0.0	503	11.4
Skagway-Hoonah-Angoon CA	2,552	1.0	13	0.8	7	0.4	241	15.4
Yakutat Borough	712	22.5	0	0.0	0	0.0	63	18.9
Southern Boroughs								
Ketchikan Gateway Borough	10,370	1.8	95	1.4	55	0.8	741	10.7
Prince of Wales-Outer Ketchikan CA	2,984	4.5	161	7.9	43	2.1	155	7.6
Wrangell-Petersburg CA	4,637	2.8	82	3.2	0	0	170	6.6
Southeast Alaska	**51,188**	**0.7**	**351**	**1.0**	**105**	**0.3**	**3,586**	**9.8**
Alaska	437,010	9.8	486	0.2	364	0.1	31,000	10.1

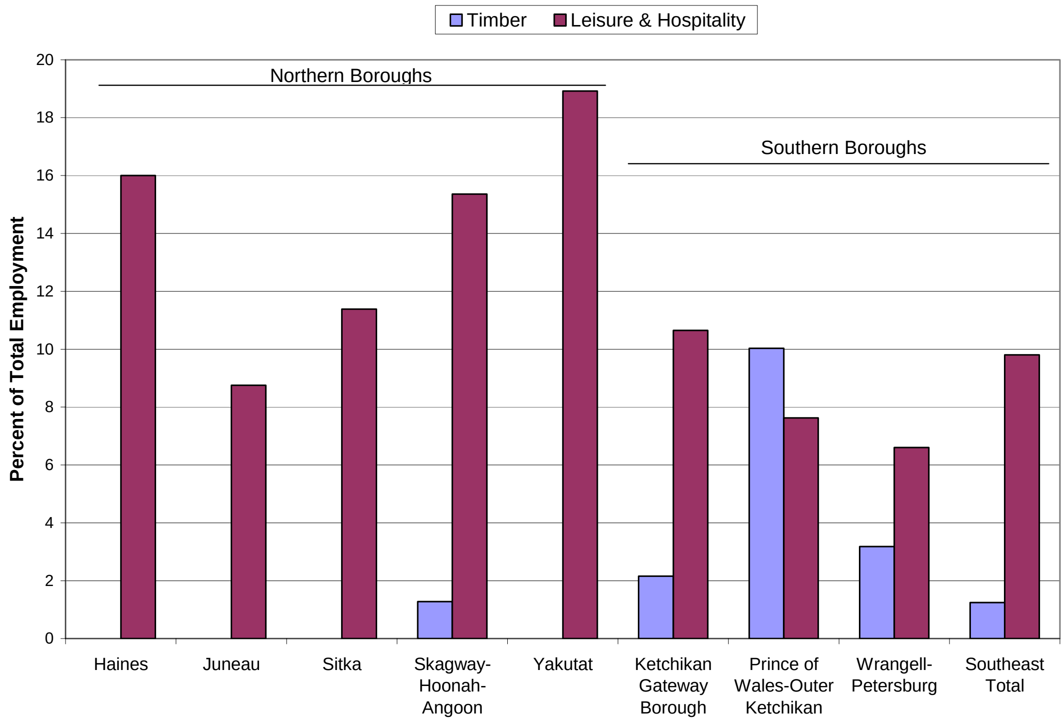
[1] These data, compiled from U.S. Department of Commerce, Bureau of Economic Analysis (BEA) data and are for full and part-time employment, including proprietors and self-employed.
[2] These data, compiled from Alaska DOL (NAWS) data (Alaska DOL 2006b), do not include proprietors and self-employed workers. Bureau of Economic Analysis data, the source for the total employment column, is not available at this level of disaggregation.
[3] The percent of local total is benchmarked against total NAWS employment, which excludes proprietors and self-employed, not the Bureau of Economic Analysis numbers shown in the left column.
[4] Leisure and hospitality does not directly reflect recreation and tourism-related employment but is included as an indicator of the relative concentration of recreation and tourism-dependent jobs. This sector includes the Arts, Entertainment, and Recreation and Accommodation and Food Services sectors. The numbers presented here do not include proprietors and self-employed and, therefore, are likely underestimates as proprietors and self-employed workers tend to comprise a large share of total employment in these sectors.
Source: Alaska DOL 2006b; U.S. Department of Commerce, Bureau of Economic Analysis 2006b

Income

Average real per capita income in Southeast Alaska (expressed in constant 2005 dollars) increased by 4 percent between 1996 and 2005. The change from 1996 to 2005 varied by borough, ranging from a decrease of 1 percent in Juneau to relatively large increases in the smaller northern boroughs (Haines [16 percent], Skagway-Hoonah-Angoon [20 percent], Yakutat [18 percent]). Average real per capita income increased in Alaska (11 percent) and nationwide (15 percent) over this period

The absolute level of per capita income is considerably lower for Prince of Wales-Outer Ketchikan, indicating that in 2005, on average, residents at this area received 36 percent less income than the regional average. Per capita incomes are above the regional average in Ketchikan (111 percent), Haines (110 percent), and Juneau (106 percent) (Table 3.23-4).

Figure 3.23-1
Wood Products and Lodging, Restaurant, and Recreation Services Share of Total Employment by Borough, 2005 (Percent)



Notes:
NAWS=Non-agricultural wage and salary employment. Excludes proprietors and self-employed.
See notes to Table 3.23-3.
1. Timber includes both forestry and logging and wood products manufacturing employment.
Source: Alaska DOL 2006b (see Table 3.23-3)

Table 3.23-4
Per Capita Income, 1996 to 2005

	1996	2005	1996 to 2005 Absolute Change	1996 to 2005 Percent Change	Share of Regional Average (2005)
Northern Boroughs					
Haines Borough	34,725	40,185	5,460	16%	110%
Juneau Borough	39,122	38,702	-420	-1%	106%
Sitka Borough	31,124	33,115	1,991	6%	91%
Skagway-Hoonah-Angoon CA	28,459	34,265	5,806	20%	94%
Yakutat Borough	28,467	33,716	5,249	18%	93%
Southern Boroughs					
Ketchikan Gateway Borough	38,678	40,291	1,613	4%	111%
Prince of Wales-OK CA	22,053	23,305	1,252	6%	64%
Wrangell-Petersburg CA	29,269	33,446	4,177	14%	92%
Southeast Alaska	34,848	36,411	1,563	4%	100%
Alaska	31,998	35,564	3,566	11%	98%
USA	29,977	34,471	4,494	15%	95%

Note:
1. Per capita income figures for 1996 are adjusted for inflation and presented here in 2005 dollars.
Source: U.S. Department of Commerce, Bureau of Economic Analysis 2007a.

Dividends, interest, and rent decreased as a share of total income from 1996 to 2005 in Alaska, the U.S as a whole, and all Southeast Alaska boroughs (Table 3.23-5). Transfer payments increased as a relative share of employment over the same period in all Southeast Alaska boroughs, as well as in Alaska as a whole and nationwide. Increases in Southeast Alaska ranged from 1.4 percent in Sitka to 6.8 percent in Yakutat Borough.

Table 3.23-5
Components of Personal Income, 1996 to 2005 (percent of total)

	Earnings		Dividends, Interest, and Rent		Transfer Payments	
	2005	1996-2005 Change	2005	1996-2005 Change	2005	1996-2005 Change
Northern Boroughs						
Haines Borough	64.6	2.4	18.0	-4.6	17.5	2.2
Juneau Borough	72.0	2.5	16.3	-4.3	11.7	1.8
Sitka Borough	67.7	4.8	17.9	-6.2	14.5	1.4
Skagway-Hoonah-Angoon CA	64.9	-0.3	16.0	-3.6	19.2	3.9
Yakutat Borough	61.8	-2.4	16.3	-4.4	21.9	6.8
Southern Boroughs						
Ketchikan Gateway Borough	69.3	-1.3	15.6	-1.6	15.0	2.9
Prince of Wales-OK CA	64.0	-3.9	13.1	-2.0	22.9	5.9
Wrangell-Petersburg CA	64.9	1.8	15.8	-4.2	19.3	2.4
Southeast Alaska	69.3	1.3	16.2	-3.7	14.5	2.4
Alaska	72.1	2.7	13.4	-4.0	14.5	1.3
USA	69.5	2.4	15.6	-3.2	14.9	0.7

Notes:
1. Earnings includes wages and salaries, other labor income, and proprietors' income.
2. Transfer payments consist mainly of government payments to individuals, including retirement, disability, and unemployment insurance benefit payments, income maintenance payments, and veterans benefit payments. Government payments to individuals in Alaska include Alaska Permanent Fund benefits, which are derived from oil revenues and paid to every resident.
3. Percent of total income.

Source: U.S. Department of Commerce, Bureau of Economic Analysis 2007a.

Earnings as a share of personal income increased from 1995 to 2004 in Southeast Alaska (0.5 percent), Alaska (1.7 percent), and the U.S as a whole (2.3 percent) (Table 3.23-5). Earnings decreased as a share of total income in all the southern boroughs, with the largest decrease (-7.7 percent) occurring in Prince of Wales-Outer Ketchikan, as well as Skagway-Hoonah-Angoon and Yakutat. Earnings increased as a share of total income in Haines, Juneau, and Sitka.

Alaska DOL Community Groups

In this portion of the document, the employment data provided by Alaska DOL is analyzed using the community groups defined by that agency—the most detailed level available for this data. At this level of disaggregation there is a much greater potential for substantial errors in the data. Changes in reporting jurisdictions or industry definitions, for example, may result in large and abrupt changes in reported employment for a given community or industry with no underlying change in actual employment patterns. It is also important to remember that Alaska DOL community groups are not necessarily synonymous with actual communities. The individual communities included in each community group are identified in Table 3.23-6. The following discussion focuses on the wood products and recreation and tourism industries. Data are presented for 1990 and 1999, which is the most recent year that data are available in this format.

Table 3.23-6
Alaska DOL Community Groups Defined

Boroughs and Census Areas	Community Groups	Communities/Places
City & Borough of Juneau	Juneau	Auke Bay, Berners Bay, Douglas, Dupont, Fritz Cove, Hawk Inlet, **Juneau**, Lemon Creek, Lena Cove, Lynn Canal, Mendenhall Valley, North Douglas, Salmon Creek, Snettisham, Switzer Creek, Taku Harbor, Taku Lodge, Tee Harbor, Thane, and West Juneau.
Ketchikan Gateway Borough	Ketchikan	Carlanna, Charcoal Point, Clover Pass, Herring Cove, **Ketchikan**, Mountain Point, Mud Bay, North Tongass Highway, Peninsula Point, Pennock Island, Point Higgins, Refuge Cove, **Saxman**, Shoreline Drive, Thomas Basin, Totem Bight, Upper Nickeyville, Wacker, and Ward Cove.
	Revillagigedo	Fire Cove, Gedney Pass, George Inlet, Gravina Island, Guard Island, Hassler Pass, Loring, Neets Bay, Princess Bay, Shoal Cove, and Twin Peaks.
Haines Borough	Haines	Eldred Rock, Excursion Inlet, **Haines**, Letnikof Cove, Moose Valley, Mosquito Lake, Pleasant Camp, Porcupine, Port Chilkoot, and Saint James Bay.
Sitka Borough	Baranof	Baranof, Big Port Walker, Chatham, Corner Bay, False Island, Lake Eva, Little Port Walter, Port Armstrong, Port Conclusion, Rodman Bay, Saook Bay, Todd, and Warm Spring Bay.
	Sitka	Biorka Island, Chichagof, Cobol, Deep Bay, Goddard, Halibut Point, Jamestown Bay, Japonski Island (Mt. Edgecumbe), Katlian Bay, Klag Bay, Nakwasina Cove, Redfish Cape, Saint John Baptist Bay, Schulze Cove, **Sitka**, and Sitka Logging Camp.
Yakutat Borough	Yakutat	Situk and **Yakutat**
Angoon-Hoonah-Skagway Census Area	Chatham Strait	**Angoon**, Catherine Island, Cube Cove, Hanus Bay, **Tenakee Springs**, Tyee, and Whitewater Bay.
	Gustavus	Bartlett Cove, Cape Spencer, and **Gustavus** (Strawberry Point).
	North Chichagof	**Elfin Cove**, Gull Cove, **Hoonah**, Idaho Inlet, Lisianski, **Pelican**, Port Althorp, Port Frederick, and Yakobi Island.
	Stephens Passage	Cape Fanshaw, Five Fingers, Freshwater, Bay, Funter Bay, Hobart Bay, Point Retreat, Port Houghton, Sawyers Landing, Sumdum, and Windham Bay.
	Skagway	Clifton, and **Skagway**.
Prince of Wales-Outer Ketchikan	Central Prince of Wales	**Craig**, **Hollis**, and **Klawock**.
	Southeast Prince of Wales	Bokan Mountain, Campbell, Dall Island, Dora Bay, Kendrick Bay, Klakas Inlet, Rose Inlet, Twelvemile Arm, View Cove and Waterfall.
	Hydaburg	**Hydaburg**
	North Prince of Wales	Cape Pole, Coal Bay, **Coffman Cove**, **Edna Bay**, El Capitan, **Kasaan**, Labouchere Bay, Little Naukati Bay, **Naukati Bay**, Noyes Island, **Point Baker**, Port Alice, **Port Protection**, Ratz Harbor, Red Bay, Salt Chuck, Shakan, Steamboat Bay, **Thorne Bay**, Thorne Island, Tokeen, Warren Cove, and **Whale Pass**.
	Metlakatla	Annette, Mary Island, and **Metlakatla**.
	Hyder	Hidden Inlet, **Hyder**, Smeaton Bay, Tongass, and Tree Point
	Cleveland Pen.	Bell Island, **Meyers Chuck**, Union Bay and Yes Bay.
Wrangell Petersburg Census Area	Kake	**Kake**.
	Kuiu Island	Alvin Bay, Cape Decision, Coronation Island, Duncan Canal, Fairway Island, Hamilton Bay, Kah Sheets Bay, **Port Alexander**, Rowan Bay, Saginaw Bay, Security Bay, Tebenkof Bay, and Washington Bay.
	Petersburg	Kupreanof, Mitkof Island, **Petersburg**, Scow Bay, and Vank Island.
	Thomas Bay	Thomas Bay.
	Wrangell City	**Wrangell**.
	Wrangell Island	Bradfield River, Burnette Inlet, Deer Island, Ernest Sound, Etolin Island, Kakwan Point, Roosevelt Harbor, Saint John Harbor, Tyler Logging Camp, and Zarembo Island.

Notes:
1. Some of these community groups have been renamed to more clearly represent the communities/places included.
2. The listing of communities/places included in each community group identifies named places in these areas. Some of these places are presently uninhabited.
3. Communities identified in bold are discussed in the Communities section of this document.

Source: USDA Forest Service 1997a (Table 3-155).

The following tables and figures provide some insight into which areas are more likely to be affected by the alternatives, as well as those that are likely to have been affected by changes in the economy since 1990.

Employment information, presented by community group in Table 3.23-7, shows an extremely high variation in the rate of job creation (or loss) experienced by the different community groups. The highest positive or negative changes are, not surprisingly, concentrated in those groups with the smallest total employment numbers. This highlights an important aspect of community level impacts—the most severe impacts (relative to total local employment) are often experienced in smaller communities, where even small job losses may be large relative to total employment.

Smaller communities also often exhibit higher concentrations of employment in a single industry, such as logging camps or resorts and fishing lodges.

Table 3.23-7
Employment by Community Group, 1990 to 1999

	Wage & Salary[1]		Wood Products[2]			Lodging, Rest., & Rec.[3]		
Community Group	1999 Jobs	1990-1999 Change (%)	1999 Jobs	1990-1999 Change (%)	% of Local Total	1999 Jobs	1990-1999 Change (%)	% of Local Total
Borough								
Haines	865	- 3	0	- 100	0	192	+ 90	22
City and Borough of Juneau								
Juneau	16,284	15	55	--	0	1,783	52	11
Ketchikan Gateway Borough								
Ketchikan City	7,014	- 10	404	- 72	6	682	1	10
Revillagigedo	31	--	0	--	0	0	--	0
Subtotal	**7,045**	**- 11**	**404**	**- 72**	**6**	**682**	**1**	**10**
Northern Complex								
Chatham Strait	223	- 33	40	- 55	18	22	17	10
Gustavus Island	189	53	0	--	0	75	27	40
North Chichagof	411	- 31	99	- 29	24	33	11	8
Skagway	578	14	0	--	0	147	101	25
Stephens Passage	14	- 96	0	- 100	0	0	--	0
Yakutat	381	92	13	- 65	3	74	164	19
Subtotal	**1,795**	**- 16**	**152**	**- 53**	**8**	**352**	**68**	**20**
Prince of Wales/Outer Ketchikan								
Central Prince of Wales	1,051	8	116	- 63	11	140	--	13
Cleveland Peninsula	195	786	180	--	92	14	- 37	7
Hydaburg	75	- 3	1	--	1	0	--	0
Hyder	54	73	0	--	0	4	- 61	7
Metlakatla	472	- 20	40	- 65	9	0	- 100	0
North Prince of Wales	361	- 29	83	- 69	23	28	368	8
Southeast Prince of Wales	50	528	0	--	0	42	--	84
Subtotal	**2,258**	**2**	**420**	**- 40**	**19**	**228**	**406**	**10**
Sitka Borough								
Baranof	13	- 75	1	- 98	8	0	--	0
Sitka	4,000	- 1	0	- 100	0	415	15	10
Subtotal	**4,014**	**- 2**	**1**	**- 100**	**0**	**415**	**15**	**10**
Wrangell-Petersburg Census Area								
Kake	257	- 10	53	- 57	21	0	--	0
Kuiu Island	13	- 85	0	- 100	0	0	--	0
Petersburg	1,395	0	5	- 93	0	109	- 16	8
Wrangell City	823	- 7	70	- 57	9	70	- 9	9
Subtotal	**2,488**	**- 6**	**128**	**- 70**	**5**	**179**	**- 14**	**7**
Southeast Alaska Total	**34,748**	**2**	**1,160**	**- 67**	**3**	**3,830**	**38**	**11**

[1] Full and part-time average annual employment. Self-employed people and proprietors are not included in this data-set.
[2] Wood products includes both mill and logging employment.
[3] Lodging, Restaurants and Recreational and Entertainment Services. This measure does not directly reflect recreation and tourism-related employment, but is included as an indicator of trends and relative concentration of recreation and tourism-dependent employment.
Source: Alaska DOL 2002.

Communities

Community is a concept with multiple dimensions and definitions. Basic definitions of community include: 1) a geographic/political entity, such as a town or village; 2) a network of people with shared values, world views, or identities (sometimes called a community of meaning), such as an ethnic or racial group (e.g., Native Alaskans) or an occupational group (e.g., loggers); 3) a working social system; 4) a rural social landscape, which would include the first three definitions in a rural setting; 5) a community of interest, or people with a common stake, profession, interest, activity, or set of values, who may live far apart (e.g., anglers, environmentalists, off-road-vehicle operators).

This section uses the geographic/political community—towns and villages—as its basis for several reasons. There are relatively few communities in Southeast Alaska, they are typically isolated geographically, most are recognized as being unique, and data are more commonly available at this level (although some local economic data is compiled by the State for groups of communities). Geographic/political communities represent an aggregate of individuals and it is important to remember that residents within the same community may be affected differently by the same action. Potential effects that do not appear that significant when viewed at a community level may be very significant for the individuals that are directly affected.

Community Assessments

The 1997 Forest Plan EIS included discussions of 32 Southeast Alaska communities with a state land selection base. These discussions provided brief descriptions of each community, including aspects of their histories, population trends, economic bases, and the subsistence resources used by each community. Each community discussion also included a summary of the public comments and testimony received by the Forest Service on the 1990 Draft EIS, 1991 SDEIS, and the 1996 Revised Supplement. Much of the baseline community information provided in those discussions was taken from the Alaska Department of Community and Regional Affairs (Alaska DCRA) *Community Profiles* (1996) and 1990 U.S. Census data. Subsistence information was mainly based on the findings of the 1989 Tongass Resource Use Cooperative Survey (TRUCS). Updated summary data are presented by community in Table 3.23-8. These data suggest that these communities are diverse in terms of population, income, and subsistence use. There is also a good deal of variation within many of the communities, as reflected by the range of public comments received during preparation of the 1997 Forest Plan EIS and the 2003 SEIS (USDA Forest Service 1997a; 2003b).

This document provides brief updates of the affected environment sections of the community discussions, where applicable. The reader is referred to the 1997 Tongass Forest Plan EIS for more detailed information on community history, economic base, and subsistence resources. The 1987 TRUCS data used in the 1997 Forest Plan EIS discussions is still the most current consistent source of subsistence information available. Updated information from the ADF&G, Subsistence Community Profile Database is provided in the following discussions, where available.

Data from the 2000 Census has been incorporated in the community discussions, as appropriate. This includes estimates of the number of people who work in differrent industries. These estimates are generally extrapolated from a sample of each community's population with the sample size varying by community. In cases where the community is small, the extrapolation may not be exact but should in most cases provide a general indication of distribution of employment. Employment data are available by community group for 1990, 1995, and 1999 in the planning record for this EIS.

The effects of the alternatives considered in the 1997 Forest Plan EIS were evaluated in terms of community use area effects. Community use areas depict the approximate extent of each community's day-to-day use area. Potential community effects were also estimated with the help of a Socioeconomic Panel and Subsistence Workshop, which were convened to assess the potential effects of the planning alternatives for the 1997 Forest Plan EIS. The Socioeconomic Panel assessed these potential effects in terms of timber employment, tourism/recreation employment, mining employment, economic structure/diversity, community stability, quality of life, recreation opportunities, and access to traditional lifestyles. The Subsistence Workshop involved a group of subsistence specialists who met to offer professional judgement regarding the potential effects of planning alternatives on 30 selected subsistence communities (Juneau and Ketchikan do not meet the federal definition of subsistence community). In addition, the Sitka black-tailed deer habitat capability model output was analyzed for the Wildlife Analysis Areas (WAAs) where each community obtained approximately 75 percent of their average annual deer harvest. This analysis is discussed further in the 1997 Forest Plan EIS. An updated deer habitat capability model-based analysis is used here and is presented in the Wildlife section.

The analysis presented here draws upon these information sources to assess the effects of the seven alternatives under consideration by community. Each community discussion includes a map of that community's use area, as defined by the 1997 Forest Plan EIS. These maps are accompanied by tables that provide summary information on the LUDs and suitable acres in each community use area by alternative. The community use area maps and tables are intended to help community residents (and other readers) gain a better understanding of what management direction is proposed for their immediate surroundings under each alternative.

The summary tables for each alternative compare the acres allocated to types of LUD group by alternative. Variations in the amount of National Forest System land allocated to the different LUD groups under each alternative show what land use opportunities would be available during the next 10 to 15 years within each community use area. The variations in how many suitable acres are programmed for timber management under each alternative provide additional information indicating how much of the local forest environment (that is allocated to LUDs in the Moderate and Intensive Development LUD groups) could potentially be harvested over rotation-length time frames. The tables also present summary information on total suitable acres by alternative, which indicate how much of the community use area's forest land remains available for possible future harvesting. Whether any timber harvesting would actually take place on the suitable lands within the community use area over the next decade would depend on the timber sales that are actually carried out during plan implementation. All proposed timber sales would be evaluated on a project-specific basis in accordance with NEPA.

Table 3.23-8
Southeast Alaska Community Statistics

	Population			2000 Median Household Income	Percent of Households Below Poverty Line in 2000	Percent of Labor Force Unemployed in 2000	Subsistence Use (lbs per capita)[1]
	2006	Percent Change 2000 to 2006	Percent Native in 2000				
Angoon	482	-16	82	29,861	27	13	349
Coffman Cove	162	-19	3	43,750	7	10	276
Craig	1,105	-21	22	45,298	8	9	232
Edna Bay	41	-16	0	44,583	15	0	373
Elfin Cove	25	-22	0	33,750	0	23	263
Gustavus	441	3	44	34,766	10	14	241
Haines	1,492	-18	15	39,926	6	14	196
Hollis	156	12	5	43,750	6	3	169
Hoonah	829	-4	61	39,028	14	21	518
Hydaburg	352	-8	85	31,625	21	31	384
Hyder	92	-5	0	11,719	44	47	345
Juneau	30,650	0	11	62,034	4	5	NA
Kake	536	-25	67	39,643	13	25	179
Kasaan	59	51	38	43,500	0	20	452
Ketchikan	7,662	-3	18	45,802	5	8	NA
Klawock	776	-9	51	35,000	14	16	320
Metlakatla	1,377	-5	82	43,516	8	21	70
Meyers Chuck	11	-48	0	64,375	0	0	414
Naukati Bay	129	-4	10	NA	NA	NA	241
Pelican	106	-35	21	48,750	0	0	355
Petersburg	3,129	-3	7	49,028	3	3	198
Point Baker	16	-54	3	28,000	0	0	289
Port Alexander	64	-21	5	31,563	25	25	312
Port Protection	59	-6	0	10,938	44	44	451
Saxman	422	-2	66	44,375	7	7	94
Sitka	8,833	0	19	51,901	4	4	205
Skagway	854	-1	3	49,375	1	1	48
Tenakee Springs	109	5	3	33,125	9	9	330
Thorne Bay	482	-13	3	45,625	6	6	118
Whale Pass	61	5	2	62,083	0	0	185
Wrangell	1,911	-17	16	43,250	7	7	132
Yakutat	609	-10	47	47,054	12	12	385

Notes:
NA = not available
[1] The year these data were collected varies by community, as follows:
1987: Elfin Cove, Gustavus, Hyder, Metlakatla, Meyers Chuck, Pelican, Petersburg, Port Alexander, Saxman, Skagway, Tenakee Springs, and Wrangell;
1996: Angoon, Haines, Hoonah, Kake, Point Baker, Port Protection, Sitka, and Whitestone Logging Camp.
1997: Craig, Hydaburg, and Klawock
1998: Coffman Cove, Edna Bay, Hollis, Kasaan, Naukati Bay, Thorne Bay, and Whale Pass.
2000: Yakutat
Source: USDA Forest Service 2003b (Table 3.4-35); ADF&G 2006; Alaska DOL 2007a

Analyzing Impacts to Communities

Small, rural communities are seldom self-contained economic units. Although it is possible to describe a community's economic structure, complex social and economic forces, many of which are outside the control of community residents, have great influence on community economics. This makes it difficult to precisely predict the effects of forest-wide management alternatives on individual communities. Forest Service activities provide economic opportunities to the private sector. How that sector and the various industries that comprise it respond depends on many variables in addition to Forest Service management.

Forest plans are programmatic, meaning that they establish direction and allowable activities for broad land areas, rather than schedule specific activities on specific patches of land. This also makes it difficult to predict effects on individual communities. This is a common source of frustration to local residents, who want to know exactly how they and the places they care about could be affected. While many outputs of forest management, such as scheduled timber harvest, generally translate into social and economic activity, such as employment in the timber industry, it is difficult to predict which communities would benefit the most from that activity. Communities may even compete with each other in many instances. Communities that rely on a given resource-related industry would, however, be expected to be the first to benefit or lose from significant changes in planned output levels affecting that industry.

Another factor affecting the accuracy of predicting specific impacts at the community scale is that people and businesses have proven themselves highly adaptable. Researchers have used the term community resiliency (Harris 1996) or community capacity (FEMAT 1993) to describe a community's ability to weather significant changes. Some of the factors judged important for small, rural communities in the Pacific Northwest include community infrastructure, the presence of amenities, social cohesion and effective community leadership, and economic diversity. Some communities will be more effective than others in coping with changes that do result. While information such as population size can be used as a rough proxy for resiliency (generally, larger communities tend to be more resilient than smaller ones), this is not always the case. However, analyses have not been conducted regarding the resiliency of Southeast Alaska communities, and we do not know how well information gained elsewhere applies to understanding Southeast communities. It is also worth noting that while a community as a whole may be resilient to change, individuals within that community will still be negatively affected.

Given these considerations, it is more accurate to identify areas of concern for which the risks of effects from a given alternative are higher or lower, rather than say, "Here is what we know will happen to each and every community." One of the hazards associated with such attempts to assess impacts is that analyses tend to view social and economic conditions as static, failing to consider that economies are dynamic, and adjust to different impacts in different ways.

Potential Effects by Resource Area

The alternatives have implications for specific places on the Forest and particular parts of the community use areas of various communities. They also have potential implications in terms of employment in resource dependent industries and the availability of subsistence resources. The following paragraphs discuss the potential implications for wood products, recreation and tourism, and subsistence in general terms to provide some background to the reasoning employed in the community effects discussions presented in the following sections.

Wood Products

Based on the analysis presented in the preceding section, projected direct wood products employment would be higher than current (2005) levels (499 jobs) under all of the alternatives, except Alternative 1 (Table 3.22-20). These projections assume in all cases that the timber supply would be stable and that the entire NIC I component of the projected ASQ would be harvested under each alternative. These projected increases range from 1.8 times the 2005 harvest level under Alternative 2 to 3.9 times under Alternative 7.

As noted in the preceding section, while forest management activities can generally translate into social and economic activity, it is difficult to predict where this activity will actually occur. It is, however, reasonable to assume that increased harvest levels would likely benefit those communities that have historically been dependent on the wood products industry, including the communities where the existing mills are located. The more timber intensive alternatives, especially Allternatives 4 and 7, assume that an integrated industry would develop over time in response to stable supplies of timber. If this were to occur, much of the associated employment would be in the communities where new facilities would be located.

Recreation and Tourism

The mix of primitive and roaded recreation opportunities would vary by alternative based on the allocation of the Forest to different LUD groups and range from maintaining almost all the existing Inventoried Roadless Areas in a natural condition (Alternative 1) to intensive timber management (Alternatives 4 and 7). Viewed in terms of projected recreation and tourism employment over the next decade, there would be very little difference between the alternatives.

Subsistence

Among the subsistence resources of greatest importance (salmon, other finfish, marine invertebrates, and deer), deer is the only one that is potentially significantly affected by the alternatives. Therefore, the subsistence analysis presented here uses deer as a key indicator for potential subsistence resource consequences concerning the abundance and distribution of the resources. Timber harvest tends to affect deer-related subsistence activities in two ways. In the short run, approximately 20 to 30 years following harvest, deer populations tend to increase in harvested areas. In the long-run, populations tend to decline as the canopy in even-aged forest stands closes, resulting in lower habitat quality. Reductions in habitat quality can be reduced through management (e.g., thinning) of young-growth stands. Deer populations in unharvested areas are likely to remain at fairly constant levels that are typically lower than a comparable harvested area in the short run, but higher in the long run. Road construction also affects subsistence by providing subsistence hunters with ready access to areas that may have been previously inaccessible. This effect may be perceived as either positive or negative depending on the parties involved, as increased access may lead to increased competition for resources. Potential effects are likely to vary by community and may be perceived differently by members of the same or neighboring communities.

While there would be some new road access under all alternatives in the long run, nearly all new roads constructed under the alternatives would be closed following harvest. These roads would, therefore, not be available for use by highway vehicles or high-clearance vehicles. They would, however, be available for access by other methods and would, as a result, have the potential to affect existing subsistence patterns.

The subsistence analysis for deer presented for each community is based on several pieces of information. First, it analyzes recent harvest and harvest trends for the WAAs that comprise each community's community use area. For this analysis, hunters are divided into three groups: residents of the community in question, all rural hunters, and all hunters. Next, it considers the results of deer habitat capability modeling presented in the *Wildlife* section, which addresses current and future habitat capability under each alternative relative to the habitat capability available in 1954. Finally, it draws upon the findings of the 1997 Forest Plan EIS (USDA Forest Service 1997a) because four of the current alternatives are very similar to three alternatives in the 1997 EIS. Alternatives 5 and 6 in this analysis are similar to the selected alternative in the 1997 analysis (Alternative 11) and Alternatives 4 and 7 in this analysis are similar to Alternatives 6 and 2 in the 1997 analysis, respectively. For the 1997 EIS, projected harvest levels were compared with estimated deer habitat capability, which was converted into long-term deer carrying capacities, by alternative in the short term (2005) and long term (2095). This analysis assumed that a deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success for their effort. At 20 percent it was assumed that the hunter success for their effort may decrease, and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable.

Individual Community Assessments

The following sections present socioeconomic descriptions and assessments of impact for 32 Southeast Alaska communities with a state land selection base. These are presented in alphabetical order.

Angoon

Angoon, located on the west coast of Admiralty Island at the mouth of Kootznoowoo Inlet, has been there so long that no precise date can be established for its original occupation. As the only permanent community on Admiralty Island, Angoon had a population of about 572 in 2000. It remains a traditional Tlingit Alaska Native village with 82 percent of its population identified as Alaska Native in the 2000 Census (U.S. Census Bureau, 2001).

The lands immediately adjacent to Angoon are part of Admiralty Island National Monument-Kootznoowoo Wilderness and would not be affected by any of the proposed alternatives. Other areas within Angoon's community use area would, however, be affected. Angoon's population increased 37 percent between the 1970 and 1990 census. Population was, however, approximately 13 percent below the 1990 level in 2000 and continued to decline in the first part of this decade, with an estimated total population of 497 in 2005. Total estimated population was 482 in Angoon in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	400	465	638	572	497	482

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

The Chatham School District and commercial fishing provide the majority of employment for Angoon. Approximately 10 percent of Angoon (72 residents) held commercial fishing permits (94 permits) in 2005. These permits were primarily used for hand-trolling for king and coho salmon. State and Federal grants recently funded a new shellfish farm in the area. Logging on Prince of Wales Island provides occasional jobs (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 13 percent of the labor force in Angoon was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $29,861, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	10	5
Construction	14	7
Manufacturing	3	2
Wholesale Trade	0	0
Retail Trade	22	11
Transportation, Warehousing & Utilities	10	5
Information	0	0
Finance, Insurance, Real Estate, Rental & Leasing	10	5
Professional, Scientific, Management, Administrative & Waste Mgmt	2	1
Education, Health & Social Services	77	39
Arts, Entertainment, Recreation, Accommodation & Food Services	30	15
Other Services (Except Public Admin)	1	1
Public Administration	16	8
Total Employment	**195**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community. Angoon is part of the Chatham Strait community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in of the planning record for this EIS. The non-federal government, wood products, and service sectors were the major employers in the Chatham Strait community group in 1999, accounting for 49, 18, and 17 percent of total employment, respectively. The wood products employment was entirely in the logging sector.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Angoon in their local day-to-day work, recreational, and subsistence activities is shown in Figure 3.23-2. This area contains 1,083,231 acres of National Forest System land (among other land ownerships). Table 3.23-9 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3 of this document.

Development LUDs presently account for 32 percent of the total acreage within the Angoon community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 27 percent under Alternative 5 (No Action) to 55 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-9). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 40 percent and 42 percent under Alternatives 4 and 7, respectively, compared to 32 percent under Alternative 5.

Figure 3.23-2
Angoon's Community Use Area

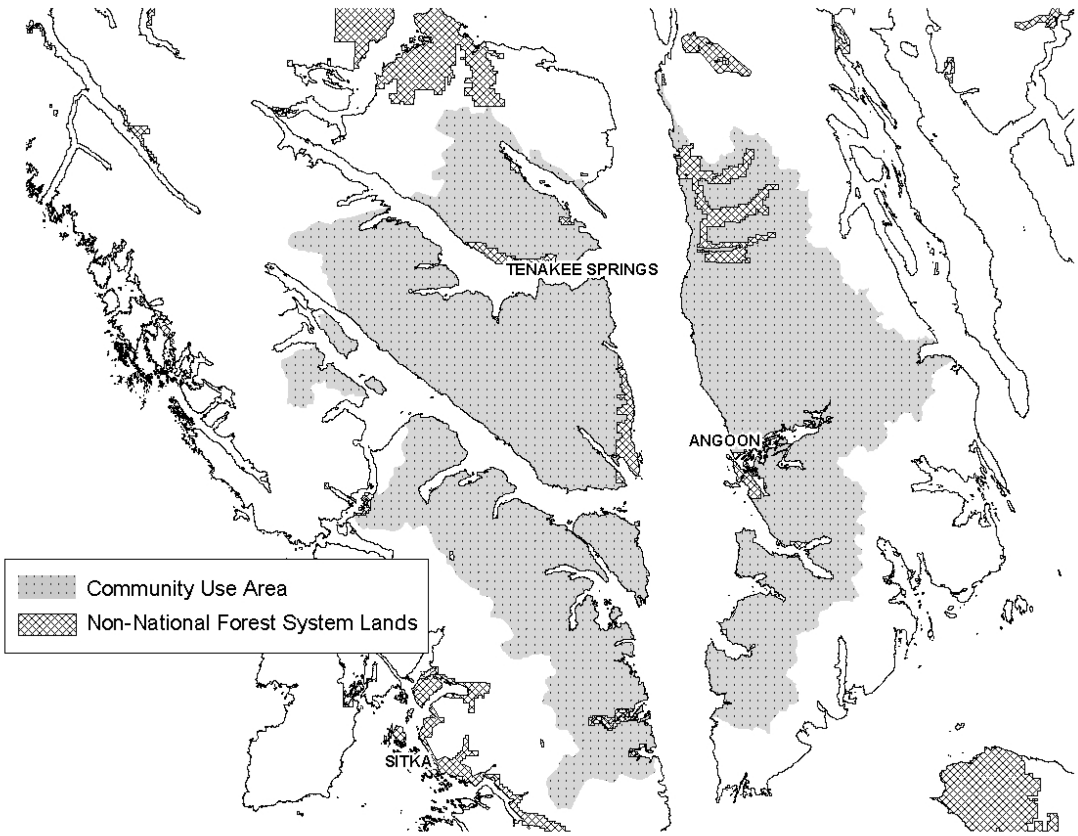


Table 3.23-9
LUD Groups in Angoon's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	17,334	61,675	74,138	113,750	91,130	85,871	129,236
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	440,588	440,588	440,588	440,588	440,588	440,588	440,588
Mostly Natural	599,119	447,753	381,812	207,876	296,339	319,769	192,331
Moderate Development	5,817	25,449	27,846	62,047	33,487	31,131	67,920
Intensive Development	37,707	169,440	232,985	372,720	312,817	291,743	382,392
Total	**1,083,231**	**1,083,231**	**1,083,231**	**1,083,231**	**1,083,231**	**1,083,231**	**1,083,231**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Total suitable acres would range from 2 percent of the Angoon community use area under Alternative 1 to 12 percent under Alternative 7, compared to 8 percent under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Economy

Angoon is a traditional native community. Commercial fishing and subsistence use are the primary factors influencing Angoon. For subsistence use, Admiralty and Catherine Islands are especially important to Angoon. All of the National Forest System land within the Angoon community use area on Admiralty Island would be maintained in their current condition under all alternatives. Commercial fishing would not be affected under any of the alternatives.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 52 percent of the total edible pounds of subsistence resources harvested by Angoon households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates), primarily salmon, accounted for the majority (81 percent) of per capita subsistence harvest in Angoon in 1996 (ADF&G 2006).

The 1988 TRUCS study found that deer accounted for 30 percent of the total edible pounds of subsistence resources harvested by Angoon households (Kruse and Frazier 1988). Deer accounted for 15 percent of per capita subsistence harvest by Angoon residents in 1996 (ADF&G 2006).

The WAAs used by Angoon residents for hunting deer lie within Game Management Unit (GMU) 4. Deer harvest in GMU 4 is considered very high relative to other areas of Southeast Alaska, which is indicative of relatively high deer populations (ADF&G 2005). Over 1997-2004, there has been no significant trend in the number of deer harvested or in the number of hunters (ADF&G 2005). However, as shown above, from 1990 to 2005 Angoon's human population has been on a declining trend and is currently 22 percent below 1990 levels.

Angoon residents take the majority (59 percent) of their deer from three WAAs on Admiralty Island (4042, 4054, and 4055). As shown in Table 3.23-10, these three WAAs will not be affected by any of the alternatives. The next two WAAs in importance contribute 20 percent of Angoon's deer harvest and would each be affected under the alternatives, with the greatest effects occurring under Alternatives 4 and 7.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that all of the alternatives should be able to provide habitat capability for deer hunted by Angoon residents, all rural hunters, and all hunters within the WAAs where Angoon hunters derive most of their deer harvest. Because Alternative 7, the most timber-intensive alternative in this EIS, is similar to Alternative 2 in the 1997 Forest Plan EIS, all alternatives in this EIS should be able to provide habitat capability for deer hunted by Angoon residents, as well as for all deer hunted within the WAAs.

Table 3.23-10
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Angoon Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Angoon Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
4042	47	49	53	100	100	100	100	100	100	100	100
4055	34	36	50	96	96	96	96	96	96	96	96
4054	24	25	30	100	100	100	100	100	100	100	100
3315	20	85	107	83	82	75	75	71	74	74	69
3308	16	98	158	66	64	59	57	53	56	57	51

*Calculated based on harvest where location is known.

In summary, use of most subsistence resources (fish and marine invertebrates) by Angoon residents is not expected to be affected under any of the alternatives. In addition, subsistence use of deer by Angoon households is unlikely to be directly affected by any of the alternatives as the areas most heavily used by Angoon residents (on Admiralty Island) will be essentially unmodified under all alternatives. It is possible, however, that the more timber-intensive alternatives, especially Alternatives 4 and 7, would create increased competition for deer within Angoon's subsistence use areas if hunters from other communities are displaced due to timber harvest activity. These impacts are estimated to be minor based on the limited accessibility of these areas to non-local hunters. The three WAAs of highest importance to Angoon hunters, which occur on Admiralty Island, have very low road densities. Open and total road densities range from 0 to 0.1 mile per square mile (for all ownerships combined).and road densities in these WAAs are expected to increase insiginificantly in the future under any of the alternatives. Although the WAAs of importance to Angoon across Chatham Strait on Chichagof, Baranof, and Catherine Islands have considerably higher road densities, these roads are generally isolated and not connected to a community road system.

Coffman Cove

Coffman Cove is located on northeast Prince of Wales Island. Settlement of Coffman Cove began in 1956 with development of a logging camp. A road connecting Coffman Cove to the larger community of Craig was built in the 1980s. Two scheduled airlines serve the community from Ketchikan. The population of Coffman Cove shows little change between 1980 and 2000. According to the 2000 Census, Coffman Cove had a 2000 population of 199, with Alaska Natives comprising 3 percent of the total (U.S. Census Bureau 2001). The population decreased by 22 percent between 2000 and 2005, with an estimated population of 156 in 2005. Total estimated population was 162 in Coffman Cove in 2006 (Alaska DOL 2007a).

Year	1980	1990	2000	2005	2006
Population	193	186	199	156	162

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

The logging industry and the local school system provide the majority of employment for Coffman Cove. One of the major log transfer sites on Prince of Wales Island is located at Coffman Cove. Oyster farming and commercial fishing also occur in the area. The city is conducting a study of the feasibility of creating a commercial/ industrial complex (Alaska DCED 2006). Roundtrip service is currently (summer 2006) provided to Coffman Cove from Wrangell and Petersburg by the Inter-Island Ferry Authority.

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 11 percent of the labor force in Coffman Cove was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $43,750, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	56	50
Construction	19	17
Manufacturing	0	0
Wholesale Trade	2	2
Retail Trade	4	4
Transportation, Warehousing & Utilities	0	0
Information	7	6
Finance, Insurance, Real Estate, Rental & Leasing	0	0
Professional, Scientific, Management, Administrative & Waste Mgmt	5	5
Education, Health & Social Services	7	6
Arts, Entertainment, Recreation, Accommodation & Food Services	0	0
Other Services (Except Public Admin)	3	3
Public Administration	8	7
Total Employment	**111**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Coffman Cove is located in the Thorne Bay Ranger District and is part of the North Prince of Wales community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS. Wood products employment in the North Prince of Wales community group declined by 186 jobs or 69 percent between 1990 and 1999. Wood products employment accounted for 83 jobs or 23 percent of total employment in this community group in 1999.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Coffman Cove in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-3. This area contains 1,228,787 acres of National Forest System land (among other land ownerships). Table 3.23-11 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 50 percent of the total acreage within the Coffman Cove community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 40

Figure 3.23-3
Coffman Cove's Community Use Area

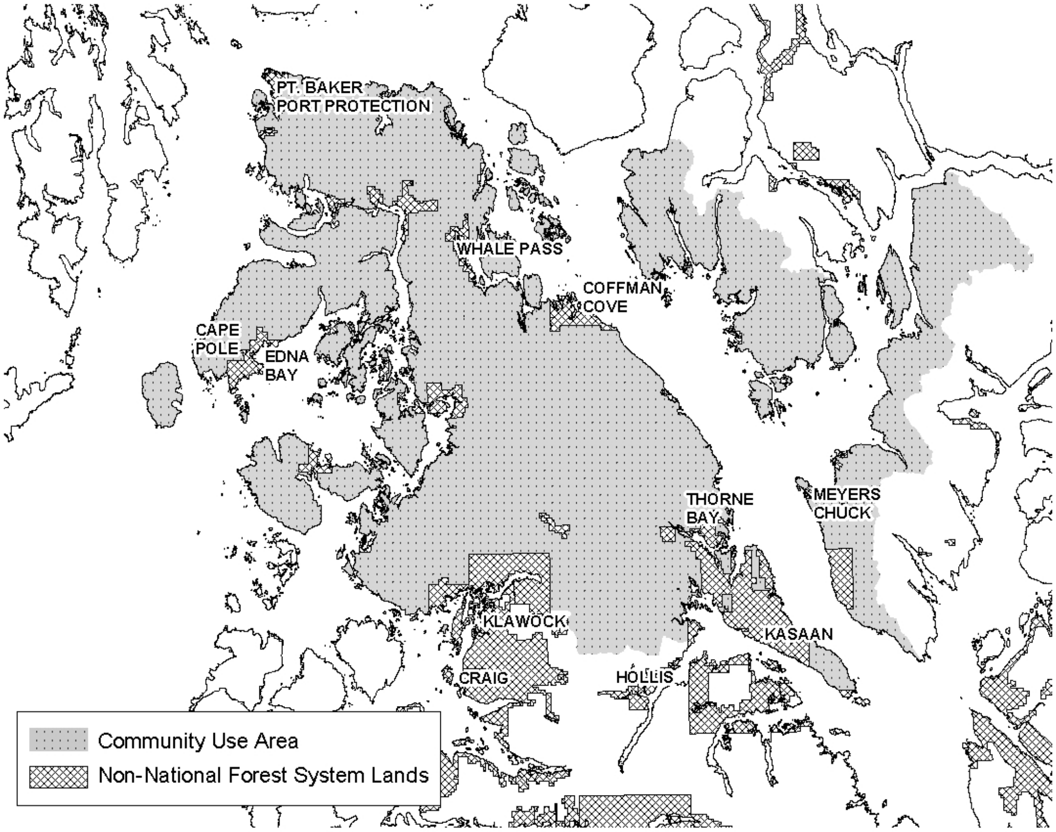


Table 3.23-11
LUD Groups in Coffman Cove's Community Use Area by Alternative

	Alternative						
	1	2	3	4	5	6	7
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	171,404	198,276	213,748	258,716	231,727	224,744	342,754
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	122,719	122,719	122,719	122,719	122,719	122,719	122,719
Mostly Natural	758,086	631,548	546,866	370,813	489,516	499,352	218,709
Moderate Development	98,294	144,517	184,157	247,719	208,000	204,089	340,708
Intensive Development	249,686	330,004	375,047	487,558	408,556	402,628	546,652
Total	**1,228,786**	**1,228,787**	**1,228,789**	**1,228,809**	**1,228,790**	**1,228,787**	**1,228,788**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

percent under Alternative 5 (No Action) to 62 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-11). Alternatives 4 and would increase the acreage in development LUDs. Development LUDs would account for 60 percent and 72 percent under Alternatives 4 and 7, respectively, compared to 50 percent under Alternative 5.

Total suitable acres would range from 14 percent of the Coffman Cove community use area under Alternative 1 to 28 percent under Alternative 7, compared to 19 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Economy

Coffman Cove is primarily a logging community and would, therefore, be directly affected by the amount of logging opportunities on northern Prince of Wales Island and elsewhere on the Tongass. Approximately 6.5 MMBF was under contract in the Thorne Bay Ranger District in August 2006. This volume would not be affected under any of the alternatives. These data provide an indication of potential impacts, actual impacts would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales were cancelled as part of the decision.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 65 percent of the total edible pounds of subsistence resources harvested by Coffman Cove households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for the majority (71 percent) of per capita subsistence harvest in the community in 1998 (ADF&G 2006).

The 1998 TRUCS study found that deer accounted for 32 percent of the total edible pounds of subsistence resources harvested by Coffman Cove households (Kruse and Frazier 1988). Deer accounted for 20 percent of per capita subsistence harvest by Coffman Cove residents in 1998 (ADF&G 2006).

Coffman Cove residents harvest deer almost entirely on Prince of Wales Island, which is included in GMU 2. Deer harvest and hunter effort in GMU 2 generally increased during 1997-2000 and subsequently declined during 2000-2004; however, no change has been noted in the average number of hunter-days required to harvest a deer (ADF&G 2005). As noted above, Coffman Cove's human population was relatively stable between 1980 and 2000, but has recently declined 22 percent below 2000 levels.

Residents of Coffman Cove harvest the majority (81 percent) of their deer from two WAAs in the eastern half of north-central Prince of Wales Island (1420 and 1421). As shown in Table 3.23-12, the Coffman Cove portion represents about one-third of the total harvest and about one-half of the rural hunter harvest in these WAAs. About 36 percent of the combined harvest in these WAAs is by non-rural hunters, suggesting that there is a harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

WAAs 1420 and 1421 occur in an area with substantial past harvest and, therefore, deer habitat capabilities are currently estimated to be considerably below 1954 levels (Table 3.23-12). Under each of the alternatives, additional harvest would occur that would reduce habitat capabilities after 100+ years to 36 to 43 percent of 1954 levels in WAA 1420 and 55-66 percent in WAA 1421.

Table 3.23-12
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Coffman Cove Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Coffman Cove Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
1420	87	151	231	52	43	42	40	39	40	40	36
1421	22	47	76	74	66	64	64	64	63	63	55

*Calculated based on harvest where location is known.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability over the long term for deer hunted by Coffman Cove residents. However, it concluded that demand would exceed the capability of the habitat to produce deer populations sufficient to avoid effects on hunter success for all rural hunters in the long term and for all hunters in both the short and long terms.

In summary, use of most subsistence resources by Coffman Cove residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its general lack of Non-development LUDs within the Coffman Cove use area, and lower under the other six alternatives. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within Coffman Cove's subsistence use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters. The level of road development is already relatively high in these WAAs. Existing open road densities are 1.1 and 0.7 miles per square mile and existing total road densities are 1.8 and 1.3 miles per square mile in WAAs 1420 and 1421, respectively (for all ownerships combined). Long-term (100+ years) road development would vary by alternative and would result in estimated maximum total road densities ranging from 1.6 to 2.0 miles per square mile in these WAAs under Alternative 1, to 2.0 to 2.2 miles per square mile in these WAAs under Alternative 7 (for all ownerships combined).

Craig

Craig is situated on a small island connected to the west coast of Prince of Wales Island by a causeway. Craig is located approximately 56 air miles northwest of Ketchikan and 6 and 23 road miles from Klawock and Hydaburg, respectively. A floatplane dock and heliport are maintained in Craig, and the State ferry serves Hollis 30 miles away enabling transportation of passengers, cargo, and vehicles.

Tlingit fish camps and seasonal villages originally occupied the present location of Craig. It was named for its contemporary founder, Craig Miller, who in 1907, with the help of local Haidas, established a saltery at Fish Egg Island.

The Forest Service established a permanent ranger station here around 1919. The city of Craig was incorporated in 1922 as a second-class city under the laws of the territory of Alaska and became a first-class city in 1973. Shaan-Seet Inc. (the village corporation established under the Alaska Native Claims Settlement Act of 1971) received an interim conveyance of 20,852 acres in 1979 (ADF&G 1994).

The population of Craig more than tripled between 1970 and 1990. According to the 2000 Census, Craig had a 2000 population of 1,397, with Alaska Natives comprising 22 percent of the total (U.S. Census Bureau 2001). The total population was 10 percent higher in 2000 than in 1990. The population decreased by an estimated 301 residents or 22 percent from 2000 to 2005. Total estimated population was 1,105 in Craig in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	272	527	1,260	1,397	1,096	1,105

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

The Craig economy is primarily based on the fishing and timber industry with commercial fishing, fish processing, logging, sawmill operations, government and commercial services providing the majority of employment. Estimated gross fishing earnings of local residents exceeded $2.6 million in 2000. Columbia Ward Fisheries, a fish buying station, and a major cold storage plant are located in Craig and 200 residents hold commercial fishing permits. Shan-Seet Village Corporation timber operations is a major employer of local residents. Craig's increased role as a service and transportation center for the Prince of Wales Island communities has largely been responsible for its growth (Alaska DCED 2002). The Viking Lumber sawmill is located near Craig. According to the 2006 mill survey conducted for the USDA Forest Service, this mill, which has an installed production capacity of 80 MMBF, processed approximately 19 MMBF in 2006 and employed 42 people (Juneau Economic Development Council 2007).

W.R. Jones and Son Lumber Company is also located in Craig. This mill with an installed production capacity of 1 MMBF, processed approximately 600 MBF in 2006 and employed 4 people (Juneau Economic Development Council 2007).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 9 percent of the labor force in Craig was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $45,298, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	174	24
Construction	57	8
Manufacturing	34	5
Wholesale Trade	18	3
Retail Trade	90	13
Transportation, Warehousing & Utilities	41	6
Information	12	2
Finance, Insurance, Real Estate, Rental & Leasing	11	2
Professional, Scientific, Management, Administrative & Waste Mgmt	7	1
Education, Health & Social Services	127	18
Arts, Entertainment, Recreation, Accommodation & Food Services	65	9
Other Services (Except Public Admin)	46	6
Public Administration	37	5
Total Employment	**719**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Craig is part of the Central Prince of Wales community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Craig in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-4. This area contains 766,935 acres of National Forest System land (among other land ownerships). Table 3.23-13 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 55 percent of the total acreage within the Craig community use area. Alternatives 5 and 6 would not have a significant effect on LUD allocations in the Craig community use area because the acreage in development LUD groups would remain virtually the same as under the current Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 39 percent under Alternative 5 (No Action) to 63 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-13). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 64 percent and 72 percent under Aternatives 4 and 7, respectively, compared to 55 percent under Alternative 5.

Total suitable acres would range from 15 percent under Alternative 1 to 28 percent under Alternative 7, compared to 20 percent of the total community use area under Alternative 5 (No Action).

Economy

Craig is primarily a commercial fishing, retail trade, and timber community. It is most likely to be affected by changes in timber employment, commercial fishing, and retail services. Viking Lumber, one of the larger remaining sawmills in the region, is located between Craig and Klawock.

Viking Lumber had 27 MMBF under contract in August 2006. Approximately 17 percent (4.6 MMBF) of this volume could be potentially affected under Alternative 1, which would maintain all Inventoried Roadless Areas on the Tongass in a natural condition and not permit timber harvest in these areas. None of the other alternatives would affect this volume. These data provide an indication of potential impacts, actual impacts would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales were cancelled as part of the decision.

Several small timber operators produce value-added products in Craig. These value added products include music wood, cabinets, and other products. These operators process relatively low volumes of timber, but require specific species and grades to meet their needs. All alternatives should meet their needs.

Commercial fisheries employment is not likely to be affected any of the alternatives.

Figure 3.23-4
Craig's Community Use Area

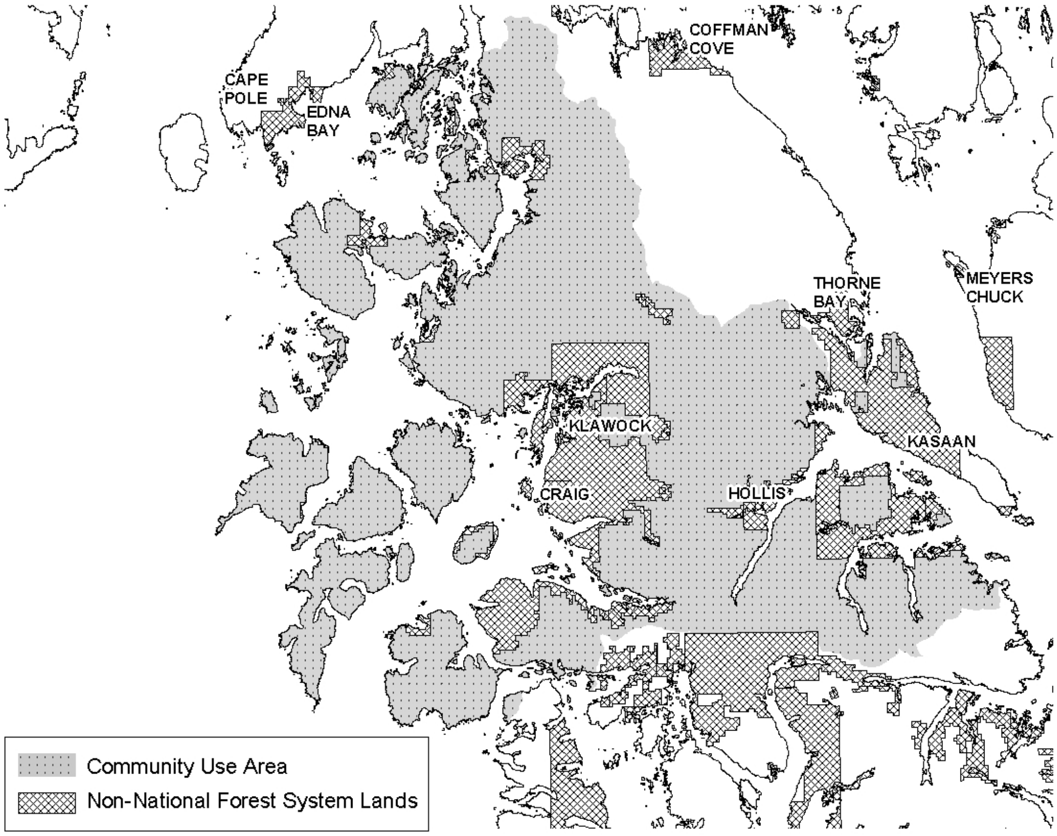


Table 3.23-13
LUD Groups in Craig's Community Use Area by Alternative

	Alternative						
	1	2	3	4	5	6	7
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	113,371	132,673	147,957	170,424	153,413	149,162	212,194
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	45,518	45,518	45,518	45,518	45,518	45,518	45,518
Mostly Natural	479,982	386,022	314,182	229,123	302,146	308,274	166,626
Moderate Development	42,759	59,597	71,035	86,288	76,686	74,907	100,174
Intensive Development	198,674	275,797	336,201	406,006	342,585	338,235	454,615
Total	**766,933**	**766,933**	**766,935**	**766,935**	**766,934**	**766,933**	**766,934**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 70 percent of the total edible pounds of subsistence resources harvested by Craig households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 67 percent of per capita subsistence harvest in Craig in 1997 (ADF&G 2006).

The 1988 TRUCS study found that deer accounted for 22 percent of the total edible pounds of subsistence resources harvested by Craig households (Kruse and Frazier 1988). Deer accounted for 19 percent of per capita subsistence harvest by Craig residents in 1997 (ADF&G 2006).

Craig residents harvest deer almost entirely on Prince of Wales and adjacent islands, which are included in GMU 2. Deer harvest and hunter effort in GMU 2 generally increased during 1997-2000 and subsequently declined during 2000-2004; however, no change has been noted in the average number of hunter-days required to harvest a deer (ADF&G 2005). As noted above, the human population of Craig more than tripled between 1970 and 1990, continued to grow and peaked around 2000, and then declined by 21 percent as of 2005.

Deer harvest by Craig residents is spread over many WAAs, but the majority (55 percent) of their deer are harvested from five WAAs in central and northern Prince of Wales Island (top five WAAs in Table 3.23-14). The Craig portion of the harvest in these five WAAs represents about one-quarter of the total harvest and about 40 percent of the rural hunter harvest (Table 3.23-14). About 30 percent of the combined harvest in these WAAs is by non-rural hunters, indicating that there is a harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

Table 3.23-14
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Craig Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Craig Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
1318	115	198	234	92	85	78	76	66	72	75	64
1422	66	209	300	60	50	48	47	46	47	47	43
1317	43	53	93	54	51	49	47	45	47	47	38
1319	37	177	220	74	69	67	66	59	64	64	54
1529	35	110	226	73	63	61	60	56	59	59	50
1214	34	49	91	79	70	66	65	62	64	64	53
1315	34	171	270	55	50	49	47	44	47	47	41
1332	25	31	37	85	83	82	78	75	77	78	70
1420	25	151	231	52	43	42	40	39	40	40	36

*Calculated based on harvest where location is known.

The majority of the WAAs used heavily by Craig residents are in areas with substantial past harvest and deer habitat capabilities are currently estimated to be considerably below 1954 levels (Table 3.23-14). Under each of the alternatives, additional harvest would further reduce habitat capabilities after 100+ years. Reductions would be smallest under Alternative 1 and highest under Alternative 7.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability over the long term for deer hunted by Craig residents. However, it concluded that demand would exceed the capability of the habitat to produce deer populations sufficient to avoid effects on hunter success for all rural hunters in the long term and for all hunters in both the short and long terms.

In summary, use of most subsistence resources by Craig residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its general lack of non-development LUDs throughout most of Prince of Wales Island, and second highest under Alternative 4 because of its lower use of non-development LUDs than the other alternatives. Alternatives 1, 2, and 3 would have the lowest risk and Alternatives 5 and 6 would be intermediate. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within Craig's subsistence use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters. The level of road development is already relatively high in these WAAs. Existing open road densities range from 0.6 to 1.9 miles per square mile and existing total road densities range from 1.2 to 1.9 miles per square mile in the five most important WAAs for Craig deer harvest (for all ownerships combined). Long-term (100+ years) road development would vary by alternative and would result in estimated maximum total road densities ranging from 1.3 to 2.8 miles per square mile in these WAAs under Alternative 1, to 1.6 to 3.0 miles per square mile in these WAAs under Alternative 7 (for all ownerships combined).

Edna Bay

Edna Bay is located on southeast Kosciusko Island, west of Prince of Wales Island, and north of Sea Otter Sound. Originally, Tlingit Indians from west Prince of Wales Island used Edna Bay on a seasonal basis. In 1943, a logging camp was established when the demand for aircraft-quality spruce was high. The camp closed in the late 1960s and the buildings were burned and the site cleaned. In 1977, the State selected part of the Tongass National Forest at Edna Bay, with the U.S. Forest Service reserving two administrative sites. In 1982, the State sold several lots around Edna Bay to private landowners. A small community developed as families, mainly those involved in commercial fishing, moved to Edna Bay. A school was constructed and a road connecting dispersed segments of the community was completed (ADF&G 1994).

Edna Bay remains an unincorporated city. The community has a local Fish and Game Advisory Committee and has shown a strong commitment to protecting local commercial fishing and subsistence resources (ADF&G 1994). Edna Bay is accessible by water or by float plane from Ketchikan. Most households own skiffs for transportation around the bay and to other near shore areas not accessible by road (ADF&G 1994).

Edna Bay's population fluctuated a great deal between 1970 and 1990. The population in 2000 was very similar to that identified in 1990. According to the 2000 Census, Edna Bay had a 2000 population of 49, with no Alaska Native population (U.S. Census Bureau 2001). The population declined by 16 percent—an estimated eight people—between 2000 and 2005, with an estimated population of 41 in 2005. Total estimated population was also 41 in Edna Bay in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	112	6	86	49	41	41

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

The majority of employment in Edna Bay is provided by a local sawmill, commercial fishing, and the local school district. Thirteen residents hold commercial fishing licences, primarily used for power trolling. During the summer, a fish buyer is also located in the bay (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. This data is an extrapolation based on information from a sample of residents. Because the sample size was small, the extrapolation may not be exact, but it should provide a general indication of distribution of employment. The potential work force was estimated to be 35 people and total employment estimated to be 18. While no adults in Edna Bay were identified as unemployed and seeking work in 2000, 49 percent of the population was identified as not employed and not seeking work. Median household income was $44,583, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	4	22
Construction	0	0
Manufacturing	0	0
Wholesale Trade	0	0
Retail Trade	2	11
Transportation, Warehousing & Utilities	4	22
Information	0	0
Finance, Insurance, Real Estate, Rental & Leasing	0	0
Professional, Scientific, Management, Administrative & Waste Mgmt	0	0
Education, Health & Social Services	8	44
Arts, Entertainment, Recreation, Accommodation & Food Services	0	0
Other Services (Except Public Admin)	0	0
Public Administration	0	0
Total Employment	**18**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community. Edna Bay is part of the North Prince of Wales community group (see Table 3.23-6). Detailed employment data are available for this community group for 1990, 1995, and 2000 in the planning record for this EIS. Wood products employment in the North Prince of Wales community group declined by 186 jobs or 69 percent between 1990 and 1999. Wood products employment accounted for 83 jobs or 23 percent of total employment in this community group in 1999.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Edna Bay in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-5. This area contains 665,386 acres of National Forest System land (among other land ownerships).

Development LUDs presently account for 49 percent of the total acreage within the Edna Bay community use area. Table 3.23-15 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly

Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 46 percent under Alternative 5 (No Action) to 67 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-15). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 54 percent and 62 percent under Alternatives 4 and 7, respectively, compared to 49 percent under Alternative 5.

Total suitable acres would range from 16 percent under Alternative 1 to 25 percent under Alternative 7, compared to 19 percent of the total community use area under Alternative 5 (No Action).

Economy

Edna Bay is primarily a commercial fishing and subsistence community. Commercial fishing is not expected to be significantly affected under any of the alternatives.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources accounted for 59 percent of the total edible pounds of subsistence resources harvested by Edna Bay households based on the 1998 TRUCS study (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 69 percent of per capita subsistence harvest in Edna Bay in 1998 (ADF&G 2006).

The 1988 TRUCS study found that deer accounted for 21 percent of the total edible pounds of subsistence resources harvested by Edna Bay households (Kruse and Frazier 1988). Deer accounted for 23 percent of per capita subsistence harvest by Edna Bay residents in 1998 (ADF&G 2006).

Three WAAs have been identified as most important to Edna Bay residents for deer harvest: WAA 1525, covering Kosciusko Island; WAA 1003, covering Heceta Island; and WAA 3315, covering Catherine Island and adjacent parts of Baranof Island. Over 75 percent of Edna Bay's harvest is derived from the first two WAAs, which are included in GMU 2. Deer harvest and hunter effort in GMU 2 generally increased during 1997-2000 and subsequently declined during 2000-2004; however, no change has been noted in the average number of hunter-days required to harvest a deer (ADF&G 2005). As noted above, Edna Bay's human population has fluctuated considerably from 1970 to 1990 and has declined since then, with the 2005 population at less than half the 1990 level.

Residents of Edna Bay are responsible for the majority (62 percent) of the deer harvested on Kosciusko Island (WAA 1525), but only a small portion of the deer harvested on Heceta Island and in other WAAs. As shown in Table 3.23-16, the Edna Bay portion represents about 14 percent of the total harvest and about 29 percent of the rural hunter harvest in these WAAs. About 43 percent of the combined harvest in these WAAs is by non-rural hunters, suggesting that there is a harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

Figure 3.23-5
Edna Bay's Community Use Area

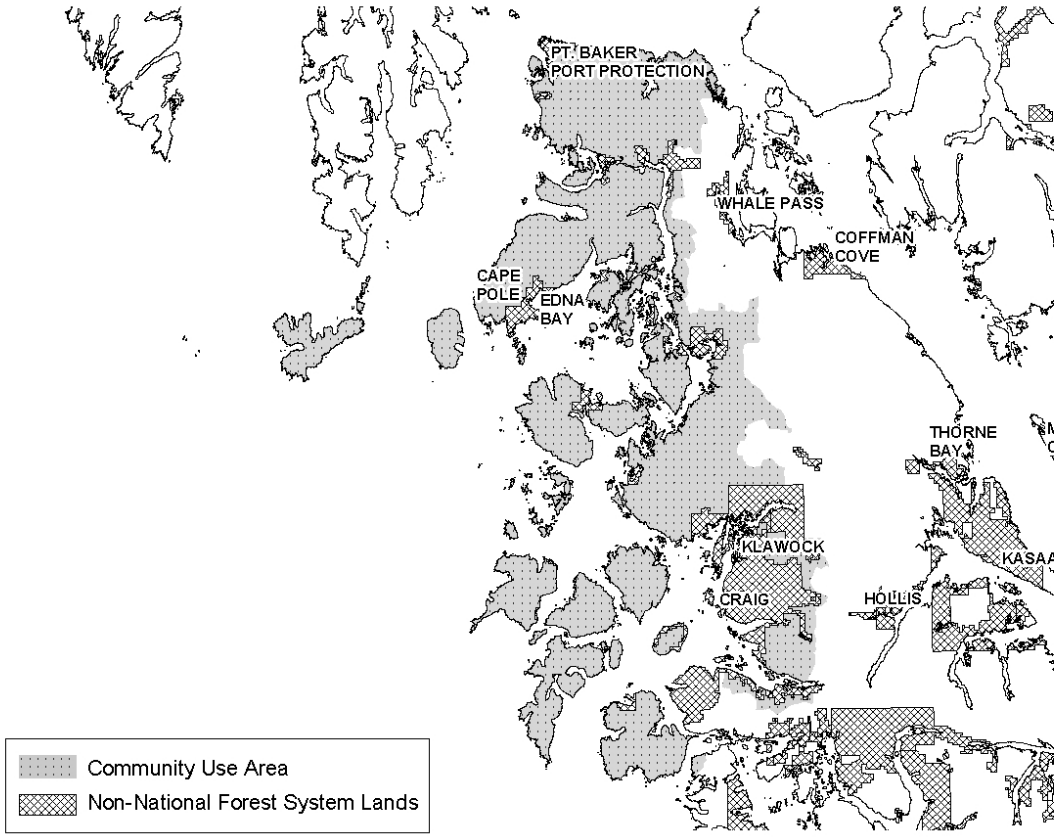


Table 3.23-15
LUD Groups in Edna Bay's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	93,739	109,869	118,889	130,966	125,071	121,641	169,454
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	36,103	36,103	36,103	36,103	36,103	36,103	36,103
Mostly Natural	442,587	364,760	325,637	269,822	305,207	309,110	218,426
Moderate Development	36,975	51,326	63,788	75,899	66,066	68,935	94,381
Intensive Development	149,720	213,197	239,859	283,563	258,011	251,238	316,476
Total	**665,385**	**665,386**	**665,387**	**665,388**	**665,387**	**665,386**	**665,386**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Table 3.23-16
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Edna Bay Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Edna Bay Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
1525	8	11	13	51	48	47	46	46	46	46	43
1003	4	31	61	66	54	53	53	49	51	52	47

*Calculated based on harvest where location is known.

The two WAAs used heavily by Edna Bay residents are in areas with substantial past harvest and deer habitat capabilities are currently estimated to be considerably below 1954 levels (Table 3.23-16). Under each of the alternatives, additional harvest would further reduce habitat capabilities. Reductions would be smallest under Alternatives 1 and 2 and greatest under Alternative 7.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that all of the alternatives should be able to provide habitat capability for deer hunted by Edna Bay residents, all rural hunters, and all hunters, within the WAAs where Edna Bay hunters derive most of their deer harvest. Because Alternative 7, the most timber-intensive alternative in this EIS, is similar to Alternative 2 in the 1997 Forest Plan EIS, the 1997 analysis indicates that all alternatives in this EIS should be able to provide habitat capability for deer hunted by Edna Bay residents, as well as for all deer hunted within the WAA's.

In summary, use of most subsistence resources by Edna Bay residents (fish and marine resources) is not expected to be affected under any of the alternatives. In addition, subsistence use of deer by Edna Bay households is unlikely to be directly affected by any of the alternatives, as the area most heavily used by Edna Bay residents appears to have a low current rate of harvest by local hunters and all hunters combined and it is unlikely that demand will increase sufficiently in the future to result in a direct effect. Future young-growth management (e.g., thinning) would further reduce the potential for effects on local hunters. It is possible, however, that additional timber harvest throughout Prince of Wales and adjacent islands would create increased competition for deer within Edna Bay's subsistence use areas if hunters from other communities are displaced due to timber harvest activity. These impacts are estimated to be relatively minor based on the limited accessibility of these island areas to non-local hunters. The two WAAs of highest importance to Edna Bay hunters have relatively high existing road densities. Existing open road densities range from 1.1 to 1.5 miles per square mile and total road densities range from 2.0 to 2.3 miles per square mile (for all ownerships combined). However, these road systems are not connected to any community road systems outside of Edna Bay. Long-term (100+ years) road development would vary by alternative and would result in estimated maximum total road densities ranging from 2.4 to 2.5 miles per square mile in these WAAs under Alternative 1, to 2.7 to 2.8 miles per square mile in these WAAs under Alternative 7 (for all ownerships combined).

Elfin Cove

Elfin Cove is a small fishing town located on northwest Chichagof Island. Prior to its development as a community, Native Tlingit groups, now based largely in Hoonah, used the Elfin Cove area for hunting, fishing, and gathering, as well as a safe harbor. According to the 2000 Census, Elfin Cove had a 2000 population of 32, none of whom were Alaska Natives (U.S. Census Bureau 2001).

A fish buyer established a business here in 1927. The opening of a cold storage plant at Pelican, less than 20 miles from Elfin Cove in Lisianski Inlet, meant that fish no longer had to be hauled all the way to Juneau. Today, the cove still serves as a key stopover and supply center for fishermen and the year-round community is made up largely of fishing households. In the 1980s, a school was completed that also functions as a community center.

Elfin Cove is an unincorporated community. The community has a local Fish and Game Advisory Committee and is accessible by floatplane from Juneau. Elfin Cove's population, which fluctuated between 1970 and 1990, was 25 people or 44 percent lower than it was in 1990. The population remained fairly stable between 2000 and 2005, with an estimated decrease in total population of three people. Total estimated population was 25 in Elfin Cove in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	49	28	57	32	29	25

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

The economy of Elfin Cove is highly seasonal and primarily based on the fishing industry. It is a fish buying and supply center for fishermen and residents participate in commercial fishing, sport fishing and charter services. Eighty percent of the population (26 residents) holds commercial fishing permits. Seasonal employment is also provided by summer lodges and local retail businesses (Alaska DCED 2006).

A recent study of nature-based tourism in Southeast Alaska found that although Elfin Cove had been dependent on the commercial fishing industry for decades, the focus of the town's economy had shifted toward tourism and sportfishing (Dugan et al. 2006). This study also found that the community's population ranged from 12 in the winter to 200 in the summer, with much of the summer increase associated with employment in nine sport fishing lodges. The study estimated that 54 people, mostly non-residents, were employed by these lodges during the summer. Small cruise ships, mostly carrying 60 to 70 passengers, dock at Elfin Cove, with 30 dockings in 2005 (Dugan et al. 2006).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. This data is an extrapolation based on information from a sample of residents. Because the sample size was small, the extrapolation may not be exact, but it should provide a general indication of distribution of employment. Approximately 23 percent of the labor force in Elfin Cove was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $33,750, compared to a regional median of $44,118 (Alaska DCED 2002).

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Elfin Cove is part of the North Chichagof community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS. Manufacturing and non-federal government were the major employers in the North Chichagof community group in 1999, accounting for 34 and 30 percent of total employment, respectively. Logging and seafood processing accounted for 24 and 10 percent of total employment, respectively.

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	3	30
Construction	0	0
Manufacturing	0	0
Wholesale Trade	0	0
Retail Trade	0	0
Transportation, Warehousing & Utilities	5	50
Information	0	0
Finance, Insurance, Real Estate, Rental & Leasing	0	0
Professional, Scientific, Management, Administrative & Waste Mgmt	0	0
Education, Health & Social Services	0	0
Arts, Entertainment, Recreation, Accommodation & Food Services	2	20
Other Services (Except Public Admin)	0	0
Public Administration	0	0
Total Employment	**10**	**100**

Source: Alaska DCED 2002

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Elfin Cove in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-6. This area contains 357,385 acres of National Forest System land (among other land ownerships). Table 3.23-17 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

The proposed alternatives would not have a significant effect on existing LUD allocations in the Elfin Cove community use area because the acreage in development LUDs would remain essentially the same as under the existing Forest Plan under all of the alternatives, with a very slight increase in development LUDs and suitable acres under Alternatives 4 and 7.

Economy

Commercial fishing, recreation and tourism, and subsistence use are important to Elfin Cove. The acreage in the Elfin Cove community use area is either Wilderness or Mostly Natural LUD allocations. Local timber production is not a significant part of the local economy. Commercial fishing is not expected to be significantly affected under any of the alternatives. Tourism, especially sportfishing, has recently become more important to Elfin Cove. A number of lodges operate out of the community. Recreation and tourism based on sportfishing is expected to increase by the same amount under all of the alternatives.

Icy Strait, northwest Chichagof Island, and Yakobi Island are the most important areas in terms of subsistence use to Elfin Cove. Portions of these areas are legislatively withdrawn from timber harvest as either Wilderness or LUD II and would be maintained in their current condition under all alternatives. The remaining area is allocated to Mostly Natural LUDs and would continue to be either mostly natural or further restricted by re-allocation as Recommended Wilderness or LUD II.

Figure 3.23-6
Elfin Cove's Community Use Area

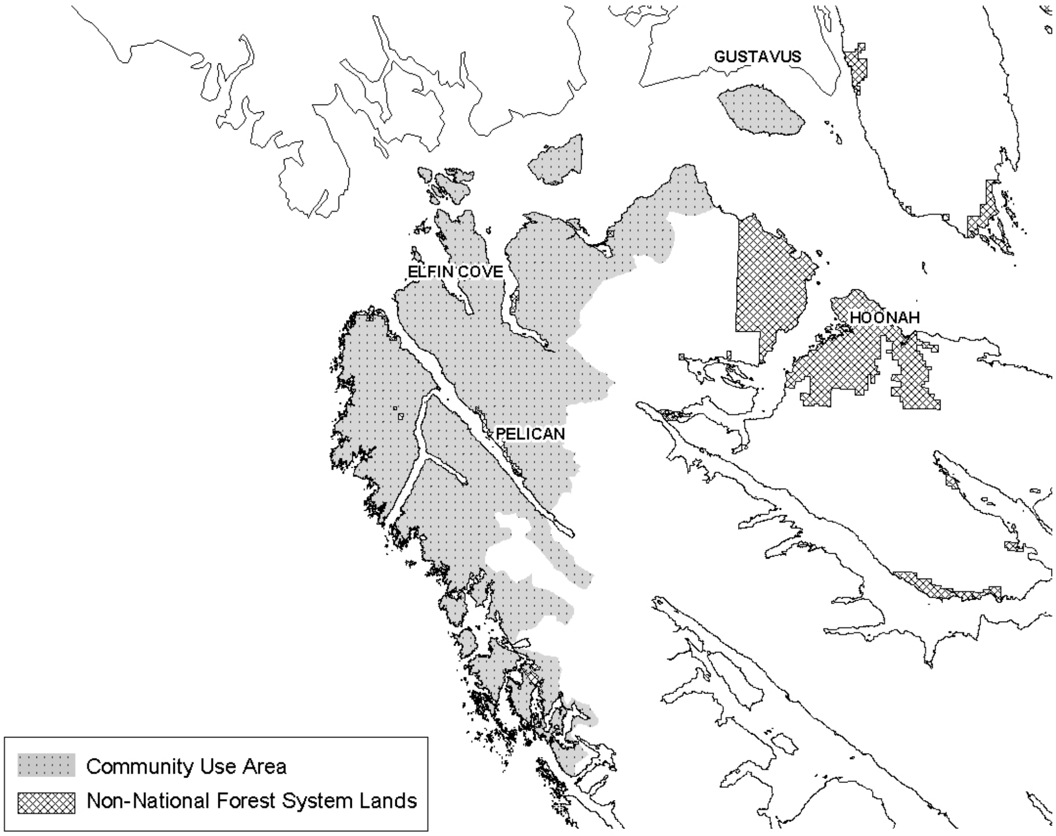


Table 3.23-17
LUD Groups in Elfin Cove's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	0	0	0	1,928	0	0	1,943
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	161,929	161,929	161,929	161,929	161,929	161,929	161,929
Mostly Natural	195,456	195,455	195,451	190,078	195,438	195,451	190,078
Moderate Development	0	0	0	363	0	0	363
Intensive Development	0	1	5	5,015	18	5	5,015
Total	**357,385**	**357,385**	**357,385**	**357,385**	**357,385**	**357,385**	**357,385**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources accounted for 63 percent of the total edible pounds of subsistence resources harvested by Elfin Cove households based on the 1988 TRUCS study (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 62 percent of per capita subsistence harvest in Elfin Cove in 1987 (ADF&G 2006).

The 1988 TRUCS study found that deer accounted for 27 percent of the total edible pounds of subsistence resources harvested by Elfin Cove households (Kruse and Frazier 1988). Deer accounted for 28 percent of per capita subsistence harvest by Elfin Cove residents in 1987 (ADF&G 2006).

The WAAs used by Elfin Cove residents for hunting deer lie within Game Management Unit (GMU) 4. Deer harvest in GMU 4 is considered very high relative to other areas of Southeast Alaska, which is indicative of relatively high deer populations (ADF&G 2005). Over 1997-2004, there has been no significant trend in the number of deer harvested or in the number of hunters (ADF&G 2005). However, as shown above, although from 1970 to 2005 the number of residents in Elfin Cove has fluctuated, the number in 2005 is 51 percent of the peak in 1990.

Elfin Cove residents take the majority (74 percent) of their deer from two WAAs on northwestern Chichagof Island (3417 and 3421). As shown in Table 3.23-18, these WAAs would not be affected by any of the alternatives because they are in wilderness, LUD II areas, or are in other Non-development LUDs. The next two WAAs in importance are also in the same area and also would not be affected by any of the alternatives because of their LUDs.

Table 3.23-18
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Elfin Cove Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	**Elfin Cove Residents**	**All Rural Hunters**	**All Hunters**	**2005**	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**	**Alt 7**
3421	14	29	36	100	100	100	100	100	100	100	100
3417	7	100	159	100	100	100	100	100	100	100	100

*Calculated based on harvest where location is known.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that all of the alternatives should be able to provide habitat capability for deer hunted by Elfin Cove residents, all rural hunters, and all hunters within the WAAs where Elfin Cove hunters derive most of their deer harvest in the short term. In the long term, sufficient habitat would be provided for Elfin Cove residents and all rural hunters, but not for all hunters. However, the predicted deficit for all hunters in the long term would be a natural condition and not due to timber harvest.

In summary, use of most subsistence resources (fish and marine invertebrates) by Elfin Cove residents is not expected to be affected under any of the alternatives. In addition, subsistence use of deer by Elfin Cove households would not be directly affected by any of the alternatives as the areas most heavily used by Elfin Cove residents are in Non-development LUDs. It is also unlikely that Elfin Cove residents would be affected by increased competition or access because of the limited access and the lack of activities under the alternatives in this area.

Gustavus

Gustavus is located in northern Southeast Alaska on the north shore of Icy Straits, east of the entrance to Glacier Bay. Prior to the founding of the present community, Huna Tlingit used the land and resources in the immediate vicinity of the community site. Use of a salmon camp near the mouth of the Salmon River was noted by early Gustavus settlers; however, after a short period of settlement by the new community, the Huna Tlingit generally discontinued use of the camp (ADF&G 1994). According to the 2000 Census, Gustavus had a 2000 population of 429, with Alaska Natives comprising 44 percent of the total (U.S. Census Bureau 2001).

Gustavus was settled and named "Strawberry Point" in 1914 by a small group of immigrants from the lower 48 planning to develop the land as agricultural homesteads. World War II brought development to Gustavus in the form of an airstrip and Federal Aviation Administration communications facilities. Nearby Glacier Bay National Monument was established in 1925 (ADF&G 1994).

The population of Gustavus, which increased considerably between 1970 and 1990, increased by 66 percent between 1990 and 2000 and continued to increase in the first part of this decade, although at a much slower rate with an estimated total population of 459 in 2005. Total estimated population was 441 in Gustavus in 2006 (Alaska DOL 2007a).

Year	**1970**	**1980**	**1990**	**2000**	**2005**	**2006**
Population	64	98	258	429	459	441

Source: USDA Forest Service 1997a, U.S. Census Bureau 2001; Alaska DOL 2007a

The economy of Gustavus is seasonal, at least partly due to its proximity to Glacier Bay National Park. The park and its lodge attract tourists and recreation enthusiasts during the summer months and there is also a commercial fishing industry. The lodge, airport, school, small businesses, and the Park Service are primary employers of local residents (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 14 percent of the labor force in Gustavus was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $34,766, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	**Number**	**Percent of Total**
Agriculture, Forestry, Fishing & Hunting, Mining	7	4
Construction	23	12
Manufacturing	7	4
Wholesale Trade	0	0
Retail Trade	7	4
Transportation, Warehousing & Utilities	19	10
Information	2	1
Finance, Insurance, Real Estate, Rental & Leasing	2	1
Professional, Scientific, Management, Administrative & Waste Mgmt	10	5
Education, Health & Social Services	26	14
Arts, Entertainment, Recreation, Accommodation & Food Services	60	32
Other Services (Except Public Admin)	10	5
Public Administration	17	9
Total Employment	**190**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Gustavus is part of the Gustavus community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS.

The services and Federal government sectors were the largest employers in the Gustavus community group in 1999, accounting for 40 and 36 percent of total employment, respectively. There is no wood products employment in this community. Recreation and tourism-related activities (lodging, restaurants, and recreation services) accounted for 40 percent of total employment in 1999.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Gustavus in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-7. This area contains 480,541 acres of National Forest System land (among other land ownerships). Table 3.23-19 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 35 percent of the total acreage within the Gustavus community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 59 percent under Alternative 5 (No Action) to 89 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-19). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 46 percent and 56 percent under Alternatives 4 and 7, respectively, compared to 35 percent under Alternative 5.

Total suitable acres would range from 2 percent under Alternative 1 to 16 percent under Alternative 7, compared to 7 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Economy

Gustavus is a small community located near Glacier Bay National Park. Recreation and tourism are important to Gustavus, especially in relation to use of the National Park. Commercial fishing and subsistence use are also important to the community.

Commercial fishing is not expected to be significantly affected by Forest Service activities under any of the alternatives.

Figure 3.23-7
Gustavus' Community Use Area

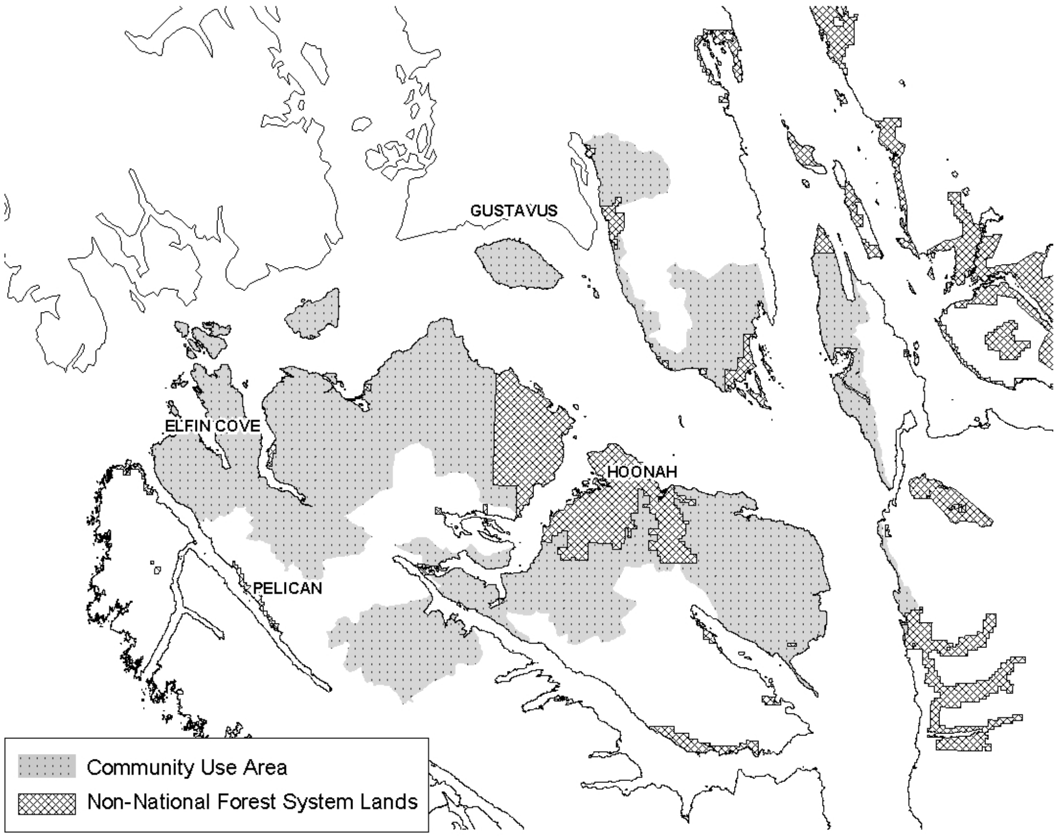


Table 3.23-19
LUD Groups in Gustavus' Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	9,588	31,446	32,587	57,039	35,168	34,056	74,892
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	26,740	26,740	26,740	26,740	26,740	26,740	26,740
Mostly Natural	429,439	343,865	327,090	232,949	283,366	309,137	182,377
Moderate Development	447	11,468	11,467	31,122	13,169	12,479	40,146
Intensive Development	23,915	98,468	115,244	189,726	157,266	132,184	231,278
Total	**480,541**	**480,541**	**480,541**	**480,537**	**480,541**	**480,541**	**480,541**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. Marine resources (fish and marine invertebrates) accounted for 69 percent of per capita subsistence harvest in Gustavus in 1987.

The 1988 TRUCS study found that deer accounted for 70 percent of the total edible pounds of subsistence resources harvested by Gustavus households (Kruse and Frazier 1988). Deer accounted for 27 percent of per capita subsistence harvest by Gustavus residents in 1987 (ADF&G 2006).

The primary WAAs used by Gustavus residents for hunting deer lie within Game Management Unit (GMU) 4. Deer harvest in GMU 4 is considered very high relative to other areas of Southeast Alaska, which is indicative of relatively high deer populations (ADF&G 2005). Over 1997-2004, there has been no significant trend in the number of deer harvested or in the number of hunters (ADF&G 2005). However, as shown above, the number of residents in Gustavus has increased steadily from 1970 to 2005, and the 2005 population is seven times the size it was in 1970.

Gustavus residents take the majority (80 percent) of their deer from two WAAs on northern Chichagof Island and Pleasant, Lemesurier, and Inian Islands (4256 and 4222). As shown in Table 3.23-20, WAA 4256, which provides over half of Gustavus' harvest, would not be affected by any of the alternatives because it is in wilderness. WAA 4222 would be affected by timber harvest, especially by Alternatives 4 and 7.

Table 3.23-20
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Gustavus Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Gustavus Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
4256	26	30	45	100	100	100	100	100	100	100	100
4222	12	45	64	97	96	95	94	86	94	94	86

*Calculated based on harvest where location is known.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that all of the alternatives should be able to provide habitat capability for deer hunted by Gustavus residents, all rural hunters, and all hunters within the WAAs where Gustavus hunters derive most of their deer harvest in the short term. In the long term, sufficient habitat would be provided for Gustavus residents and all rural hunters, but not for all hunters. The predicted deficit for all hunters in the long term would be a natural condition, but would occur earlier with timber harvest in the area.

In summary, use of most subsistence resources (fish and marine invertebrates) by Gustavus residents is not expected to be affected under any of the alternatives. In addition, subsistence use of deer by Gustavus households may be slightly affected to the point that some restriction in hunting by non-rural hunters might be necessary over the long term. It is also unlikely that Gustavus residents would be affected by increased competition or access because of the limited access and the lack of activities under the alternatives in this area.

Haines

Haines is located in the northern portion of Southeast Alaska, near the north end of Lynn Canal on the Chilkat Peninsula. Haines is one of three Southeast communities connected by road to Canada. According to the 2000 Census, Haines had a 2000 population of 2,292, with Alaska Natives comprising 11 percent of the total (U.S. Census Bureau 2001). Haines Borough includes the city of Haines, which had a 2000 population of 1,811, and several surrounding communities. These communities include Lutak, just north of Haines, which had a population of 39 in 2000 and Mosquito Lake, historically Chilkat Tlingit territory, which was home to 221 residents in 2000, 5 percent identified as Alaska Natives. Covenant Life, a religious community, had 102 residents in 2000.

The Haines area was originally settled by the Chilkat Tlingits. The Chilkat Tlingits are now considered as two groups: the Chilkats of the Chilkat River, with Klukwan being the major population center, and the Chilkoots living in and near Haines. Haines itself was a trade center and mission site (ADF&G 1994). Klukwan, a Chilkat Indian Village near the Chilkat River and 22 miles north of Haines, had a population of 139 in 2000. The village is known for its woven artwork of cedar bark and mountain goat hair. The area is host to the largest concentration of bald eagles in the world during the fall and winter at the nearby Chilkat Bald Eagle Reserve.

Settlement did not concentrate in Haines until the late 1800s. The commercial fishing industry located several canneries in the Chilkat Inlet area near Haines beginning in 1882; the Klondike gold rush brought thousands of prospectors to the town in the late 1890s; and the Dalton Trail was established as an open access route into the interior in the 1890s. Haines incorporated as a city in 1910 and as a third class borough in 1968 (ADF&G 1994).

Haines is a major trans-shipment point because of its ice-free, deep-water port and dock, and year-round road access to Canada and Interior Alaska on the Alaska Highway. It is a northern terminus of the Alaska Marine Highway System and a hub for transportation to and from Southeast Alaska (Alaska DCED 2006).

The population of Haines has increased steadily since 1970. In the last decade, between 1990 and 2000, it increased 46 percent (U.S. Census Bureau 2001). The estimated total population decreased by about 16 percent between 2000 and 2005. Total estimated population was 1,492 in Haines in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	463	993	1,238	1,811	1,525	1,492

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

The economy of Haines is highly seasonal. Commercial fishing, tourism, government, and transportation are the primary employers. Estimated gross fishing earnings of local residents neared $3 million in 2000 and 128 residents hold commercial fishing permits. Haines' road connection to the State Ferry has become increasingly important to the tourism businesses. In 2001, Royal Caribbean Cruise Lines ceased serving Haines as a port of call. Today, around 45,000 cruise ship passengers visit each year (Alaska DCED 2006). Approximately 38,000 visitors arrived by land in 2005.

Employment by industry data, as compiled by the Alaska DCED from the 2000 Census, are summarized in the table below. Approximately 14 percent of the labor force in Haines was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $39,926, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	46	6
Construction	92	12
Manufacturing	19	2
Wholesale Trade	7	1
Retail Trade	96	12
Transportation, Warehousing & Utilities	54	7
Information	20	3
Finance, Insurance, Real Estate, Rental & Leasing	28	4
Professional, Scientific, Management, Administrative & Waste Mgmt	52	7
Education, Health & Social Services	125	16
Arts, Entertainment, Recreation, Accommodation & Food Services	108	14
Other Services (Except Public Admin)	72	9
Public Administration	53	7
Total Employment	**772**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Haines is part of the Haines community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS.

Retail trade, services, and non-federal government were the main employers in the Haines community group in 1999, accounting for 26, 26, and 20 percent of total employment, respectively. Recreation and tourism-related activities (lodging, restaurants, and recreation services) accounted for 22 percent of total employment in 1999. Approximately 140 sawmill jobs were lost with the closure of the Chilkoot Lumber Mill in 1991. There was no wood products employment identified in the Haines community group in 1999.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of the Haines Borough in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-8. This area contains 232,496 acres of National Forest System land (among other land ownerships). Table 3.23-21 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Figure 3.23-8
Haines' Community Use Area

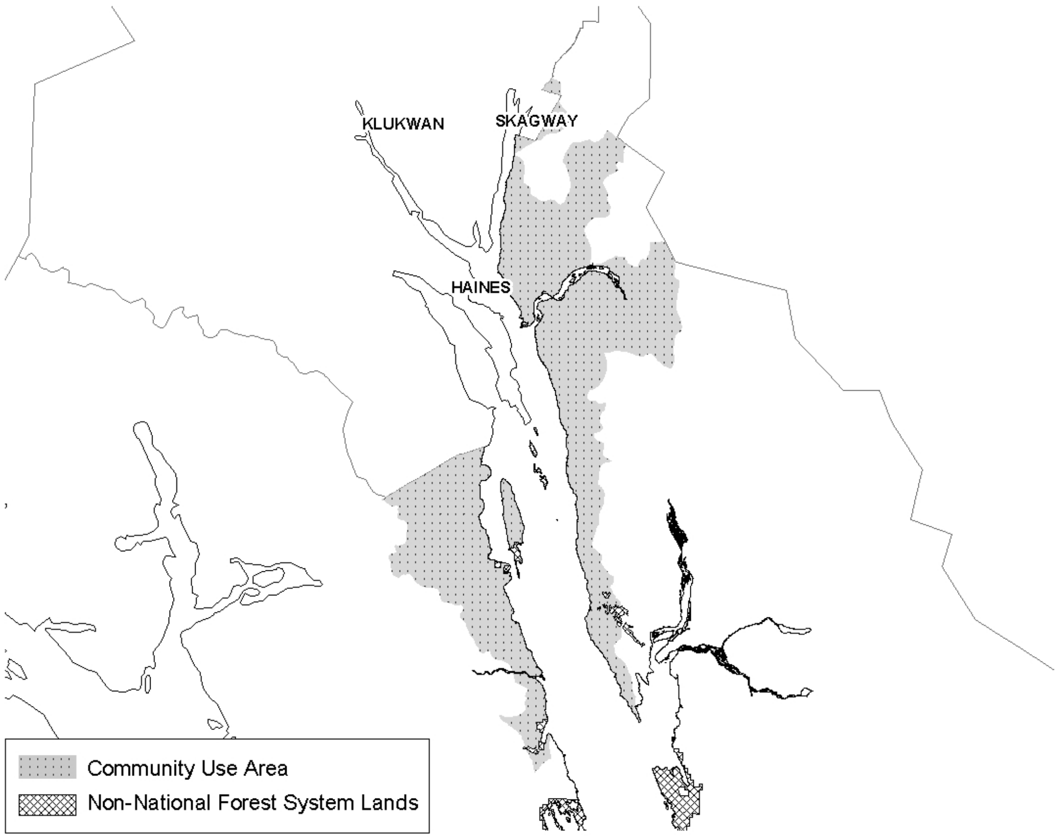


Table 3.23-21
LUD Groups in Haines' Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	233	326	2,208	8,732	6,066	5,694	9,733
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	253	253	253	253	253	253	253
Mostly Natural	231,717	231,393	216,585	180,501	195,999	199,757	180,501
Moderate Development	527	850	15,659	51,424	36,244	32,487	51,423
Intensive Development	0	0	0	318	0	0	319
Total	**232,496**	**232,496**	**232,496**	**232,496**	**232,496**	**232,496**	**232,496**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Development LUDs presently account for 16 percent of the total acreage within the Haines community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 84 percent under Alternative 5 (No Action) to 100 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-21). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 22 percent under both of these alternatives compared to 16 percent under Alternative 5.

Total suitable acres would range from 0 under Alternatives 1 and 4 percent under Alternatives 4 and 7, compared to 3 percent of the total community use area under Alternative 5 (No Action).

Economy

Commercial fishing, recreation and tourism, and subsistence use are important to Haines. Haines has an Alaska Marine Highway System ferry terminal and provides road access into Interior Alaska. Timber harvest on State land and wood processing were historically a major sector of the Haines economy, but there was no wood products employment in Haines in 2004 (see Table 3.23-3). Mining at the Kensington Mine southeast of Haines may become a more significant employer in the future. Construction activities initiated on the mine site were halted by legal challenges and the Forest Service now anticipates the submittal of a revised plan of operations in 2008. Although the major mine support is anticipated to be located in Juneau, it is likely that some benefits would accrue to Haines.

Commercial fishing is not expected to be significantly affected under any of the alternatives. Mining, and the potential opening of the Kensington Mine, is not anticipated to be affected differently by any alternative.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 68 percent of the total edible pounds of subsistence resources harvested by Haines' households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 76 percent of per capita subsistence harvest in Haines in 1996.

The 1988 TRUCS study found that deer accounted for 15 percent of the total edible pounds of subsistence resources harvested by Haines households (Kruse and Frazier 1988). Deer accounted for 4 percent of per capita subsistence harvest by Haines residents in 1996 (ADF&G 2006).

Haines residents mainly harvest deer in GMU 4. Deer harvest in GMU 4 is considered very high relative to other areas of Southeast Alaska, which is indicative of relatively high deer populations (ADF&G 2005). Over 1997-2004, there has been no significant trend in the number of deer harvested or in the number of hunters (ADF&G 2005). As noted above, the human population of Haines increased steadily from 1970 through 2000, but experienced an estimated decrease of 16 percent between 2000 and 2005. Haines had an estimated population of 1,525 in 2005.

Nineteen WAAs account for about 75 percent of deer harvest by Haines residents. The two most heavily used WAAs—3418 and 3104—accounted for 12 percent and

7 percent of total deer harvest by Haines residents, respectively. As these numbers suggest, deer harvest by Haines residents is spread over a fairly wide area in GMU 4 (Table 3.23-22). As a result, Haines residents tend to comprise a relatively small share of total harvest by WAA, with two main exceptions—WAAs 1106 and 4146, which are located on Chichagof Island and Admiralty Island, respectively, and have very low levels of deer harvest. About 38 percent of the combined harvest in the 19 WAAs used by Haines residents is by non-rural hunters, suggesting that there is a harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

Table 3.23-22
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Haines Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

WAA	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
	Haines Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
3418	19	62	70	100	100	100	100	100	100	100	100
3104	11	177	193	73	73	69	68	65	68	68	64
3731	9	54	87	92	92	91	91	86	90	91	83
3421	9	28	36	100	100	100	100	100	100	100	100
3525	8	107	171	78	71	67	67	62	65	66	58
4044	7	16	228	100	99	99	99	99	99	99	99
4252	7	75	99	92	92	78	78	70	77	76	69
3524	6	71	90	100	100	86	85	79	83	84	78
3523	6	99	164	81	76	74	74	72	73	73	63
3551	5	146	226	83	77	73	72	68	71	72	62
3627	5	35	72	76	70	67	65	62	64	65	61
3630	5	7	15	99	99	99	99	87	91	94	86
1106	5	6	20	99	99	99	99	99	99	99	99
4222	4	45	64	97	96	95	94	86	94	94	86
3310	4	127	140	93	93	93	93	93	93	93	93
4043	4	7	62	100	100	100	100	100	100	100	100
4146	4	5	35	100	100	100	100	100	100	100	100
3836	3	4	196	100	100	100	100	100	100	100	100
3001	3	422	431	81	81	79	79	72	78	79	71

*Calculated based on harvest where location is known.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted in the Haines community use area by Haines residents, all rural hunters, and all hunters in the short term. The selected alternative should also provide sufficient habitat capability for Haines residents in the long term. Projected harvest for all rural hunters and all hunters in the Haines community use area would exceed 10 percent habitat capability, the level that the analysis assumed would provide a reasonably high level of hunter success for their effort. The Final EIS analysis concluded that at some point a restriction in hunting might be necessary.

In summary, use of most subsistence resources by Haines residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer in some of the WAAs hunted by Haines residents may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its general lack of Non-Development LUDs under this alternative, and lower under the other six alternatives. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within Haine's subsistence use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters.

Hollis

Hollis is located on east Prince of Wales Island, 19 miles east of Craig. According to the 2000 Census, Hollis had a 2000 population of 139, with Alaska Natives comprising 5 percent of the total (U.S. Census Bureau 2001).

Hollis, initially settled as a mining camp at the turn of the century, developed into a logging camp in the mid-1950s. In 1960, when Thorne Bay became center of the logging industry on central Prince of Wales Island, most Hollis residents moved to Thorne Bay. In recent years, Hollis has grown as a community, due in part to an Alaska Marine Highway terminal there. Roads now connect Hollis with most other communities on Prince of Wales Island. A State land sale at Hollis in 1980 led to its present status as a permanent community (ADF&G 1994).

Viking Lumber, one of the larger sawmills presently operating in the region, is located nearby between Craig and Klawock. According to the 2006 mill survey conducted for the USDA Forest Service, this mill, which has an installed production capacity of 80 MMBF, processed approximately 19 MMBF in 2006 and employed 42 people (Juneau Economic Development Council 2007).

The population of Hollis increased by 28 people or 25 percent between 1990 and 2000. The estimated total population stayed essentially constant between 2000 and 2005, with an estimated 2 fewer people in 2005 than in 2000. Total estimated population was 156 in Hollis in 2006 (Alaska DOL 2007a).

Year	1990	2000	2005	2006
Population	111	139	137	156

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

Support services for the timber industry, the State Ferry, and the U.S. Forest Service provide the majority of employment to the residents of Hollis. While the timber industry is prevalent on the Prince of Wales Island, it does not occur directly in the Hollis Community (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 3 percent of the labor force in Hollis was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $43,750, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	12	19
Construction	4	6
Manufacturing	2	3
Wholesale Trade	4	6
Retail Trade	6	10
Transportation, Warehousing & Utilities	11	17
Information	0	0
Finance, Insurance, Real Estate, Rental & Leasing	3	5
Professional, Scientific, Management, Administrative & Waste Mgmt	2	3
Education, Health & Social Services	13	21
Arts, Entertainment, Recreation, Accommodation & Food Services	0	0
Other Services (Except Public Admin)	0	0
Public Administration	6	10
Total Employment	**63**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Hollis is part of the Central Prince of Wales community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Hollis in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-9. This area contains 289,873 acres of National Forest System land (among other land ownerships). Table 3.23-23 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 53 percent of the total acreage within the Hollis community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 35 percent under Alternative 5 (No Action) to 63 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-23). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 62 percent and 83 percent under Alternatives 4 and 7, respectively, compared to 53 percent under Alternative 5.

Figure 3.23-9
Hollis' Community Use Area

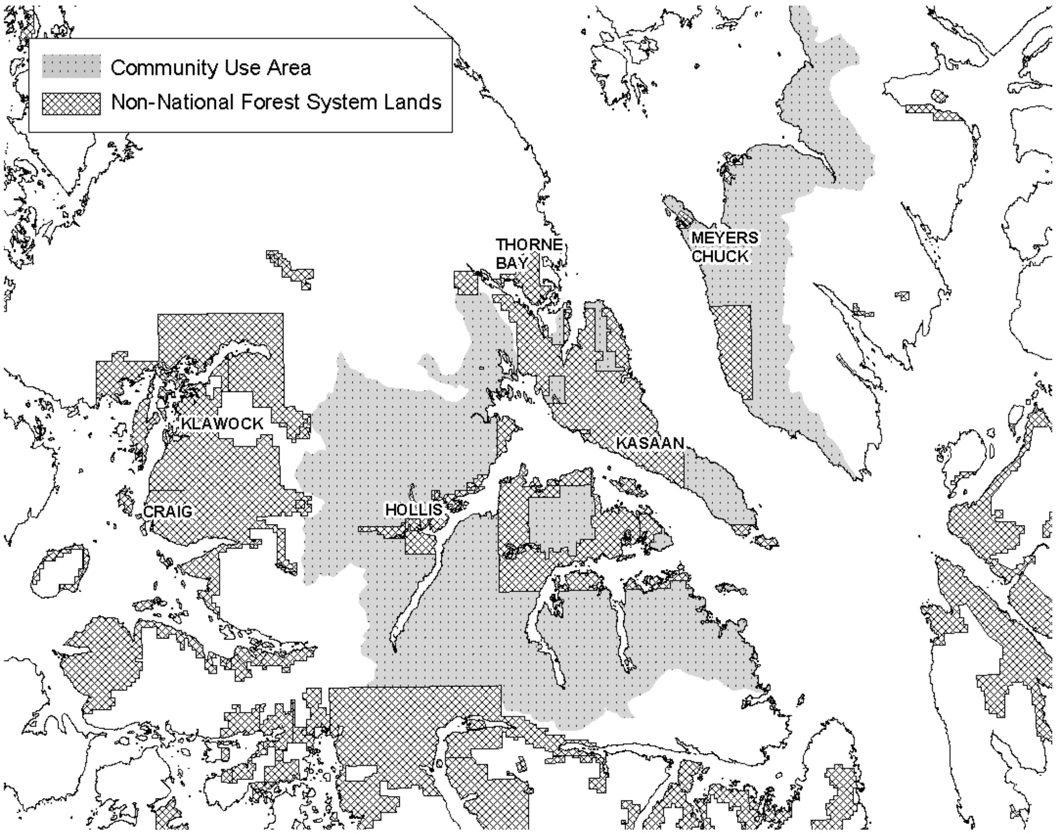


Table 3.23-23
LUD Groups in Hollis' Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	29,180	33,571	40,718	57,431	46,863	46,893	85,742
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	34,253	34,253	34,253	34,253	34,253	34,253	34,253
Mostly Natural	181,869	155,362	122,186	74,504	101,416	100,486	15,833
Moderate Development	21,518	26,338	29,168	41,408	35,301	35,467	62,373
Intensive Development	52,233	73,920	104,265	139,708	118,903	119,667	177,413
Total	**289,872**	**289,873**	**289,873**	**289,873**	**289,873**	**289,872**	**289,872**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Total suitable acres would range from 10 percent under Alternative 1 to 30 percent under Alternative 7, compared to 16 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Economy

Hollis is the site of the Alaska Marine Highway ferry terminal that provides access to the rest of Prince of Wales Island. As such, transportation is a major component of the community's economy. Subsistence and timber also play important roles.

Viking Lumber had 27 MMBF under contract in August 2006. Approximately 17 percent (4.6 MMBF) of this volume could be potentially affected under Alternative 1, which would maintain all Inventoried Roadless Areas on the Tongass in a natural condition and not permit timber harvest in these areas. None of the other alternatives would affect this volume. These data provide an indication of potential impacts, actual impacts would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales were cancelled as part of the decision.

The ferry terminal would continue to provide important access to Prince of Wales Island under all alternatives. Ferry access has become increasingly important to Prince of Wales Island as its population continues to grow.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 65 percent of the total edible pounds of subsistence resources harvested by Hollis households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 73 percent of per capita subsistence harvest in Hollis in 1998.

The 1988 TRUCS study found that deer account for 23 percent of the total edible pounds of subsistence resources harvested by Hollis households (Kruse and Frazier 1988). Deer accounted for 18 percent of the per capita subsistence harvest by Hollis residents in 1998 (ADF&G 2006).

Data were not provided for Hollis in the ADF&G deer harvest reports for 1996 to 2002. The majority of deer harvest by Hollis residents likely takes place in GMU 2—Prince of Wales Island. Deer harvest and hunter effort in GMU 2 generally increased during 1997-2000 and subsequently declined during 2000-2004; however, no change has been noted in the average number of hunter-days required to harvest a deer (ADF&G 2005). As noted above, the human population of Hollis has been relatively constant since 1990. Hollis had an estimated population of 137 residents in 2005.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide habitat capability for deer hunted in the Hollis community use area by Hollis residents and all rural hunters in both the short term and long term. Projected harvest by all hunters in the Hollis community use area would exceed 10 percent habitat capability; the level that the analysis assumed would provide a reasonably high level of hunter success for their effort, in both the short term and long term. The Final EIS analysis concluded that at some point a restriction in hunting might be necessary.

In summary, use of most subsistence resources by Hollis residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7, and second highest under Alternative 4 because of its lower use of Non-Development LUDs than the other alternatives. Alternatives 1, 2, and 3 would have the lowest risk and Alternatives 5 and 6 would be intermediate.

Hoonah

Hoonah is located on Port Frederick, along Icy Strait on the northeast shore of Chichagof Island, 40 air miles west of Juneau. Hoonah is predominantly a Native community and has been the principal village for the Hoonah Tlingit Clans since the late 1800s. According to the 2000 Census, Hoonah had a 2000 population of 501, with Alaska Natives comprising 61 percent of the total (U.S. Census Bureau 2001). Whitestone Logging Camp, with a population of 116 (U.S. Census Bureau 2001), is adjacent to Hoonah. The community of Game Creek, a religious ministry, is located 2.6 miles southwest of Hoonah.

The village of Hoonah has been occupied since prehistoric times by the Tlingit people. Groups of Huna Tlingit lived all or part of the year at seasonal camps and small winter settlements throughout the Huna territory. Dozens of camps and settlements have been documented through archaeological surveys. The Hoonah Tlingit have very close ties to the Glacier Bay area across Icy Strait.

In 1880, the Northwest Trading Company built a store in Hoonah. The following year, missionaries settled in the town and established the Presbyterian Home Mission church and school. By 1887, about 500 people were wintering in the village. When the post office was established in 1901, the village was officially named Hoonah, which means "village by the cliff" in Tlingit. In 1944, fire burned many homes in Hoonah and destroyed the traditional ceremonial costumes and keepsakes of the villagers. The town has since been rebuilt and has become a center for logging operations on northern Chichagof Island (ADF&G 1994). A sort yard and log transfer facility are located at Long Island. The community has a local Fish and Game Advisory Committee (ADF&G 1994).

Icy Strait Point, an old cannery located approximately 1.5 miles from in Hoonah opened in 2004 as Alaska's first cruise destination built specifically for tourists. Owned by the Hoonah Totem Corporation and operated by Pt. Sophia Development Corporation. A total of 67,620 cruise passengers visited Hoonah in 2004, 77,498 visited in 2005, and 135,519 cruise visitors were projected for 2006 (Cruise Line Agencies of Alaska 2006).

The Icy Straits Lumber Company and D&L Woodworks are both located in Hoonah. According to the 2006 mill survey conducted for the USDA Forest Service, the Icy Straits mill, which had an installed production capacity of 20 MMBF, processed approximately 0.7 MMBF in 2006 and employed 15 people (Juneau Economic Development Council 2007). D&L Woodworks had an installed production capacity of 1.8 MMBF and processed 0.1 MMBF in 2007, supporting approximately 1.5 years of full-time employment (Juneau Economic Development Council 2007). This processing total represented 3 percent and 6 percent of the existing capacity at the Icy Straits and D&L Woodworks facilities, respectively.

The population of Hoonah increased by 65 people or 8 percent between 1990 and 2000 and stayed essentially constant between 2000 and 2005. Total estimated population was 829 in Hoonah in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	748	680	795	860	861	829

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

Hoonah has a diverse economy with nearly full employment during the summer season. A total of 117 residents hold commercial fishing permits. Fishing, logging, and local government are the main employers. Estimated gross fishing earnings of local residents exceeded $1.5 million in 2000. Fish processing occurs at plants in Hoonah and nearby Excursion Inlet. Sealaska Timber Corporation employs a number of local residents through contracts with Whitestone Logging, Inc. and Southeast Stevedoring. The Huna Totem Corporation owns and operates a sort yard and timber transfer facility. The City of Hoonah and the school district are the major public sector employers (Alaska DCED 2002). Residents are also employed by the recently opened Icy Strait Point development. A total of 67,620 cruise passengers visited Hoonah in 2004, 77,498 visited in 2005, and 135,519 cruise visitors are projected for 2006 (Cruise Line Agencies of Alaska 2006).

The economy of Hoonah has undergone a major transformation in recent years with the completion of Icy Strait Point (Dugan et al. 2006). Icy Strait Point is the largest single employer in Hoonah, with 124 employees, mostly Hoonah residents, working there three to four days a week. Icy Strait Point includes a museum and serves as a base for tours, including forest tours, whale watching, and fishing charters. These tours served an estimated 30,000 people in 2005 (Dugan et al. 2006).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 21 percent of the labor force in Hoonah was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $39,028, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	75	24
Construction	10	3
Manufacturing	36	11
Wholesale Trade	2	1
Retail Trade	20	6
Transportation, Warehousing & Utilities	42	13
Information	0	0
Finance, Insurance, Real Estate, Rental & Leasing	6	2
Professional, Scientific, Management, Administrative & Waste Mgmt	6	2
Education, Health & Social Services	74	23
Arts, Entertainment, Recreation, Accommodation & Food Services	15	5
Other Services (Except Public Admin)	2	1
Public Administration	29	9
Total Employment	**317**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Hoonah is part of the North Chichagof community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS. Manufacturing and non-federal government were the major employers in the North Chichagof community group in 1999, accounting for 34 and 30 percent of total employment, respectively. Logging and seafood processing accounted for 24 and 10 percent of total employment, respectively.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Hoonah in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-10. This area contains 583,825 acres of National Forest System land (among other land ownerships). Table 3.23-24 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 46 percent of the total acreage within the Hoonah community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 51 percent under Alternative 5 (No Action) to 87 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-24). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 58 percent and 69 percent under Alternatives 4 and 7, respectively, compared to 46 percent under Alternative 5.

Total suitable acres would range from 3 percent under Alternative 1 to 19 percent under Alternative 7, compared to 10 percent of the total community use area under Alternative 5 (No Action).

Economy

Commercial fishing, logging, and subsistence use are important to Hoonah. The Icy Straits sawmill, which is located in Hoonah, employed 15 people in 2006. Hoonah residents are also employed by the recently opened Icy Strait Point development. Commercial fishing is not expected to be significantly affected under any of the alternatives.

The Icy Straits sawmill had approximately 8 MMBF under contract in August 2006. Approximately 30 percent (2.5 MMBF) of this volume could be potentially affected under Alternative 1. None of the other alternatives would affect this volume. These data provide an indication of potential impacts, actual impacts would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales were cancelled as part of the decision.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 59 percent of the total edible pounds of subsistence resources harvested by Hoonah households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 74 percent of per capita subsistence harvest in Hoonah in 1996.

The 1988 TRUCS study found that deer accounted for 23 percent of the total edible pounds of subsistence resources harvested by Hoonah households (Kruse and Frazier 1988). Deer accounted for 14 percent of per capita subsistence harvest by Hoonah residents (ADF&G 2006).

Figure 3.23-10
Hoonah's Community Use Area

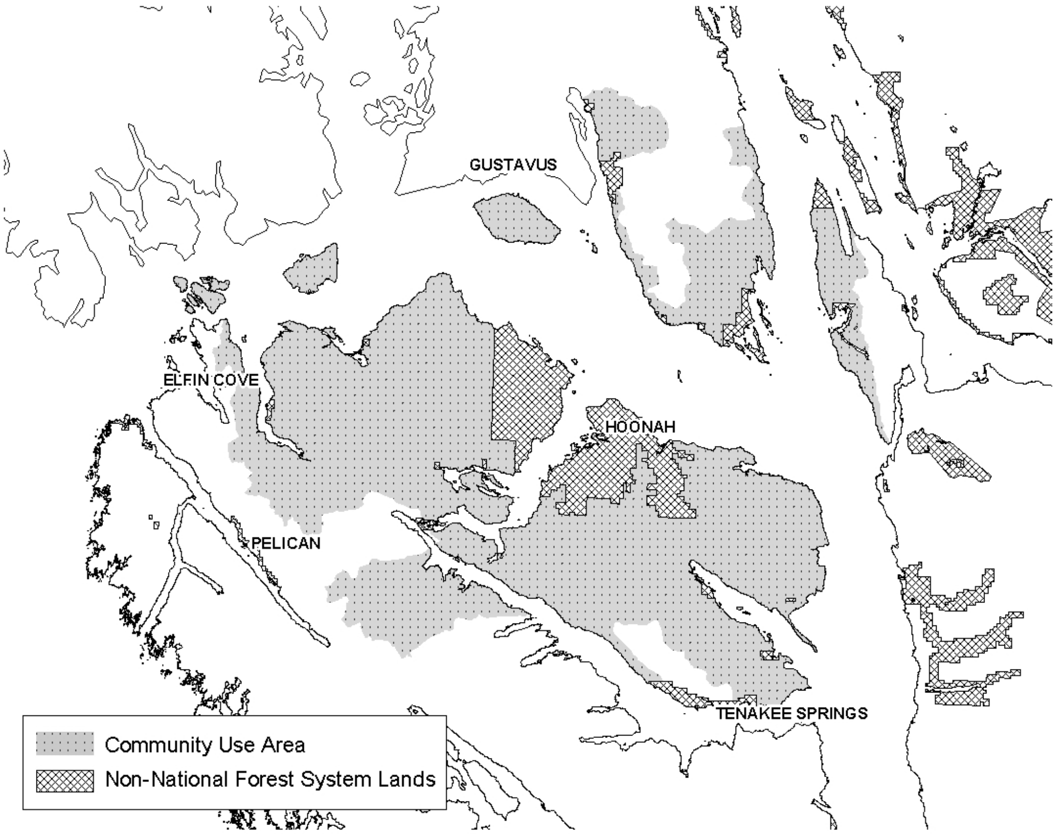


Table 3.23-24
LUD Groups in Hoonah's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	20,211	51,358	53,071	86,596	56,811	54,540	109,951
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	23,113	23,113	23,113	23,113	23,113	23,113	23,113
Mostly Natural	508,614	381,703	347,870	219,502	294,907	329,917	159,977
Moderate Development	4,153	16,568	15,958	53,154	19,250	17,580	64,254
Intensive Development	47,945	162,441	196,884	288,053	246,555	213,215	336,482
Total	**583,825**	**583,825**	**583,825**	**583,821**	**583,825**	**583,825**	**583,825**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Hoonah residents mainly harvest deer on Chichagof Island, which is included in GMU 4. Deer harvest in GMU 4 is considered very high relative to other areas of Southeast Alaska, which is indicative of relatively high deer populations (ADF&G 2005). Over 1997-2004, there has been no significant trend in the number of deer harvested or in the number of hunters (ADF&G 2005). As noted above, the human population of Hoonah increased steadily from 1970 through 2000 and remained relatively constant from 2000 to 2005. Hoonah had an estimated population of 861 in 2005.

Four WAAs account for the majority (74 percent) of deer harvest by Hoonah residents (Table 3.23-25). The Hoonah portion represents from 78 percent to 93 percent of the rural hunter harvest and from 49 percent to 70 percent of the total harvest in these WAAs. About 35 percent of the combined harvest in these WAAs is by non-rural hunters, suggesting that there is a harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

Table 3.23-25
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Hoonah Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

WAA	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
	Hoonah Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
3551	132	146	226	83	77	73	72	68	71	72	62
3523	92	99	164	81	76	74	74	72	73	73	63
3525	83	107	171	78	71	67	67	62	65	66	58
3524	63	71	90	100	100	86	85	79	83	84	78

*Calculated based on harvest where location is known

Three of the WAAs identified in Table 3.23-26 are in areas with substantial past harvest and deer habitat capabilities are currently estimated to be considerably below 1954 levels. Under each of the alternatives, additional harvest would further reduce habitat capabilities. Reductions would be smallest under Alternatives 1 and 2 and greatest under Alternative 7.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted by Hoonah residents in the short term. Projected deer harvest in the Hoonah community use area for all rural hunters and all hunters would exceed 10 percent habitat capability, the level that the analysis assumed would provide a reasonably high level of hunter success for their effort, in the short term. Projected harvest for Hoonah residents was estimated to exceed this level in the long term. The Final EIS analysis concluded that at some point a restriction in hunting might be necessary.

In summary, use of most subsistence resources by Hoonah residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its general lack of Non-Development LUDs in Hoonah's community use area, and second highest under Alternative 4 because of its lower use of Non-Development LUDs than the other alternatives (Table 3.23-25). Alternatives 1, 2, and 3 would have the lowest risk and Alternatives 5 and 6 would be intermediate. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within Hoonah's subsistence use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters. The level of road development is already relatively high in these WAAs. Existing open road densities range from 0.4 to 2.1 miles per square mile and existing total road densities range from 0.8 to 2.1 miles per square mile (for all ownerships combined). Long-term (100+ years) road development would vary by alternative and would result in estimated maximum total road densities ranging from 1.1 to 3.1 miles per square mile in these WAAs under Alternative 1, to 1.5 to 3.4 miles per square mile in these WAAs under Alternative 7 (for all ownerships combined).

Hydaburg

Hydaburg is located on the southwest side of Prince of Wales Island, 45 air miles northwest of Ketchikan. According to the 2000 Census, Hydaburg had a 2000 population of 382, with Alaska Natives comprising 85 percent of the total (U.S. Census Bureau 2001).

The Haida Indians migrated to Prince of Wales Island, a predominantly Tlingit area, from Graham Island, Canada. After combining three villages, the present site was chosen initially as the Hydaburg Indian Reservation in 1912. It became a fishing village with the first fish processing plant opening in 1927, and three other canneries operating through the 1930s. Seafood processing was active until 1984 when a fire destroyed the cannery (ADF&G 1994). Hydaburg is connected by road to Craig, Klawock, Hollis, and northern parts of the Island.

In 1936, Hydaburg became the first Alaskan Native village to form an Indian Reorganization Act Council. In 1972, Hydaburg incorporated as a first class city. The community has a local Fish and Game Advisory Committee (ADF&G 1994).

Hydaburg's population increased by 79 percent between 1970 and 1990, but remained fairly constant between 1990 and 2000, and decreased slightly (3 percent) between 2000 and 2005. Total estimated population was 352 in Hydaburg in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	214	298	384	382	369	352

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

Hydaburg's economy is based primarily on the timber and fishing industries. A total of 39 residents hold commercial fishing permits. The Haida Corporation has a substantial timber holding, a log storage facility, and a sort yard. It suspended logging in 1985 due to a decline in the timber market and leases the storage facility and sort yard to Sealaska Corporation. The city of Hydaburg, Sealaska Corporation, Haida Corporation, and SEARHC are the leading employers. Potential development ideas for the community include a fish processing facility, a U.S. Forest Service Visitor Center, specialty woodworking, and some type of retail center (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 31 percent of the labor force in Hydaburg was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $31,625, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	5	6
Construction	11	12
Manufacturing	0	0
Wholesale Trade	0	0
Retail Trade	8	9
Transportation, Warehousing & Utilities	7	8
Information	0	0
Finance, Insurance, Real Estate, Rental & Leasing	3	3
Professional, Scientific, Management, Administrative & Waste Mgmt	4	4
Education, Health & Social Services	40	44
Arts, Entertainment, Recreation, Accommodation & Food Services	2	2
Other Services (Except Public Admin)	3	3
Public Administration	7	8
Total Employment	**90**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Hydaburg is part of the Hydaburg community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS. Non-federal government and services were the main employers in the Hydaburg community group in 1999, accounting for 48 and 19 percent of total employment, respectively.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Hydaburg in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-11. This area contains 764,430 acres of National Forest System land (among other land ownerships). Table 3.23-26 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 44 percent of the total acreage within the Hydaburg community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 44 percent under Alternative 5 (No Action) to 77 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-26). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 54 percent and 59 percent under Alternatives 4 and 7, respectively, compared to 44 percent under Alternative 5.

Total suitable acres would range from 5 percent under Alternative 5 to 19 percent under Alternative 7, compared to 12 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Figure 3.23-11
Hydaburg's Community Use Area

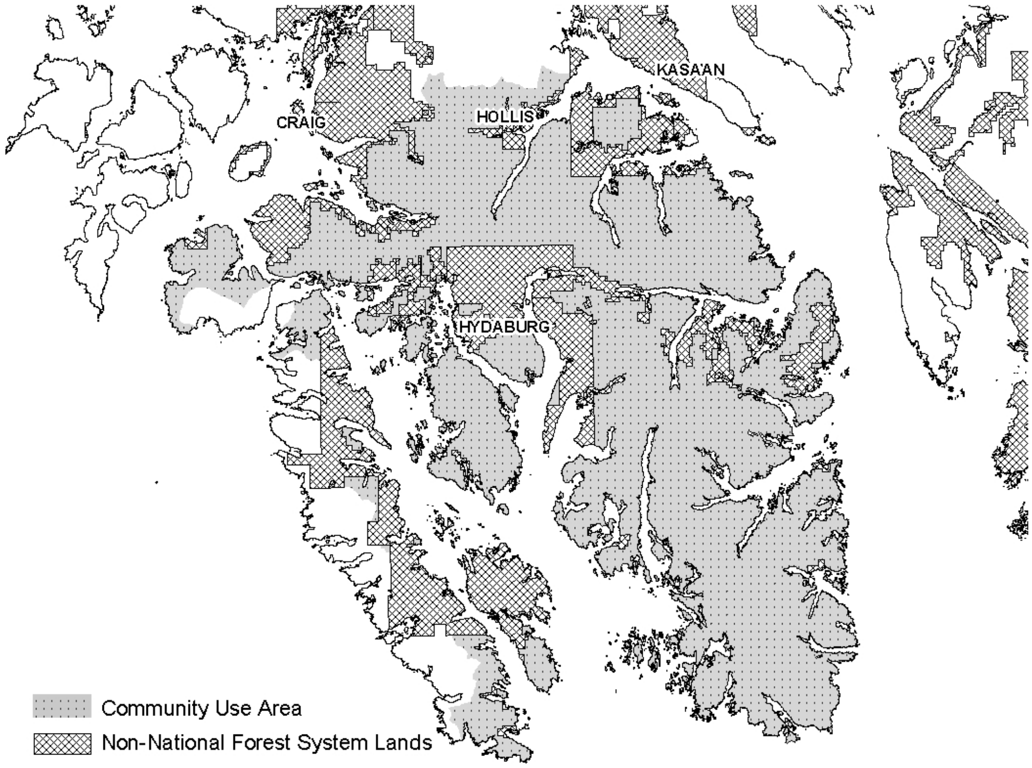


Table 3.23-26
LUD Groups in Hydaburg's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	35,885	54,380	77,736	113,772	94,397	91,860	142,789
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	87,503	87,503	87,503	87,503	87,503	87,503	87,503
Mostly Natural	589,020	505,340	390,557	267,725	338,976	341,121	227,616
Moderate Development	27,692	49,387	54,131	109,515	68,704	62,074	114,791
Intensive Development	60,214	122,201	232,239	299,688	269,248	273,733	334,521
Total	**764,430**	**764,430**	**764,430**	**764,431**	**764,431**	**764,430**	**764,431**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Economy

Subsistence use and commercial fishing are the primary elements of Hydaburg's economy. Commercial fisheries employment is not likely to be affected under any of the alternatives.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 80 percent of the total edible pounds of subsistence resources harvested by Hydaburg households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for the majority (85 percent) of per capita subsistence harvest in Hydaburg in 1997.

The 1988 TRUCS study found that deer accounted for 13 percent of the total edible pounds of subsistence resources harvested by Hydaburg households (Kruse and Frazier 1988). Deer accounted for 9 percent of per capita subsistence harvest by Hydaburg residents in 1997 (ADF&G 2006).

Hydaburg residents primarily harvest deer on south Prince of Wales Island, which is included in GMU 2. Deer harvest and hunter effort in GMU 2 generally increased during 1997-2000 and subsequently declined during 2000-2004; however, no changehas been noted in the average number of hunter-days required to harvest a deer (ADF&G 2005). As noted above, Hydaburg's human population increased steadily from 1970 through 1990 and decreased slightly from 2000 to 2005. Hydaburg had an estimated 2005 population of 861.

Residents of Hydaburg harvest the majority (75 percent) of their deer from two WAAs in central Prince of Wales Island (1107 and 1214) (Table 3.23-27). The Hydaburg portion represents about 47 percent of the total harvest and 53 percent of rural hunter harvest in WAA 1107 and less than 10 percent of total and rural harvest in WAA 1214. Non-rural harvest comprises 10 percent of total harvest in WAA 1107 and 42 percent in WAA 1214. This suggests that there is a limited harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

Table 3.23-27
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Hydaburg Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Hydaburg Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
1107	19	37	41	98	97	97	97	88	90	90	86
1214	3	53	91	79	70	66	65	62	64	64	53

*Calculated based on harvest where location is known

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted by Hydaburg residents, as well as for all deer hunted within the WAAs of the Hydaburg community use area in the long term.

In summary, use of most subsistence resources by Hydaburg residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives.

However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its general lack of Non-Development LUDs throughout most of Prince of Wales Island, and second highest under Alternative 4 because of its lower use of Non-Development LUDs than the other alternatives. Alternatives 1, 2, and 3 would have the lowest risk and Alternatives 5 and 6 would be intermediate. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within Hydaburg's subsistence use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters. The level of road development is already relatively high in these WAAs. Existing open road densities are 0.9 and 1.5 miles per square mile and existing total road densities are 0.9 and 1.6 miles per square mile in WAAs 1107 and 1214, respectively (for all ownerships comined). Long-term (100+ years) road development would vary by alternative and would result in estimated maximum total road densities ranging from 1.5 to 2.3 miles per square mile in these WAAs under Alternative 1, to 1.5 to 2.7 miles per square mile in these WAAs under Alternative 7 (for all ownerships combined).

Hyder

Hyder is a small community located at the head of Portland Canal, a 70-mile-long fjord that forms part of the United States/Canadian border. Hyder is just 2 miles from Stewart, British Columbia, and 75 air miles from Ketchikan. Hyder is one of three Alaskan communities connected by road to Canada. According to the 2000 Census, Hyder had a 2000 population of 97, with no Alaska Native population (U.S. Census Bureau 2001).

Nass River Tsimshians inhabited the area, which they called Skam-a-Kounst, "a safe place," prior to the coming of white prospectors in the late 1890s. The first official exploration and building at the town site occurred in 1896 by the U.S. Army Corps of Engineers. Stewart also became settled at this time, as gold, silver, and other mineral mining operations developed. The two towns grew together with an initial economic base in mining (ADF&G 1994).

The population of Hyder, which slightly more than doubled between 1970 and 1990, remained fairly constant between 1990 and 2005, decreasing by an estimated 6 persons. Total estimated population was 92 in Hyder in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	49	77	99	97	91	92

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

Hyder's economy is primarily based on tourism and, as such, is seasonal. Four of the five largest employers are tourist related. Four residents hold commercial fishing permits. Many tourists enter Hyder from Canada. Stewart, British Columbia and Hyder are only 2 miles apart and share visitor services. A bottled water business opened in 1998 and employs several local residents (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 47 percent of the labor force in Hyder was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $11,719 compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	0	0
Construction	10	42
Manufacturing	0	0
Wholesale Trade	0	0
Retail Trade	2	8
Transportation, Warehousing & Utilities	4	17
Information	0	0
Finance, Insurance, Real Estate, Rental & Leasing	0	0
Professional, Scientific, Management, Administrative & Waste Mgmt	0	0
Education, Health & Social Services	4	17
Arts, Entertainment, Recreation, Accommodation & Food Services	4	17
Other Services (Except Public Admin)	0	0
Public Administration	0	0
Total Employment	**24**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Hyder is part of the Hyder community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS. The Federal government and services sectors were the main employers in the Hyder community group in 1999, accounting for 69 and 25 percent of total employment, respectively.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Hyder in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-12. This area contains 108,809 acres of National Forest System land (among other land ownerships). Table 3.23-28 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 10 percent of the total acreage within the Hyder community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 90 percent under Alternative 5 (No Action) to 100 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-28). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 31 percent under Alternatives 4 and 7 compared to 10 percent under Alternatives 5 and 6.

Total suitable acres would range from 0 under Alternative 1 to 5 percent under Alternatives 4 and 7, compared to 3 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Figure 3.23-12
Hyder's Community Use Area

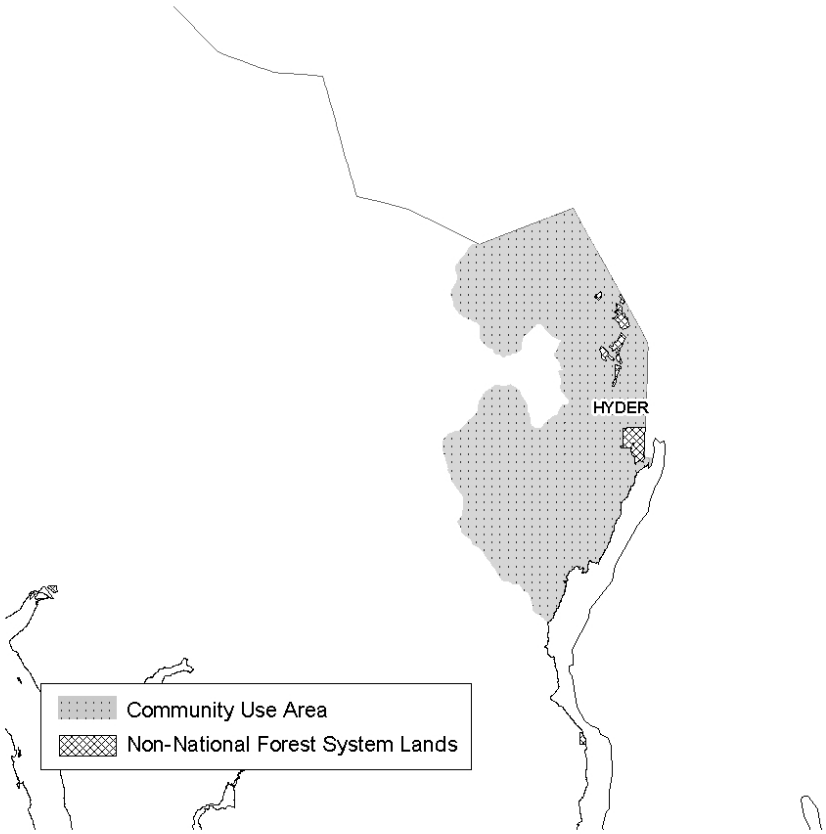


Table 3.23-28
LUD Groups in Hyder's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	0	3,011	3,011	5,543	3,054	3,054	5,788
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	71	71	71	71	71	71	71
Mostly Natural	108,738	99,539	99,539	75,530	98,275	98,275	75,530
Moderate Development	0	9,199	9,199	33,110	10,463	10,463	33,110
Intensive Development	0	0	0	98	0	0	98
Total	**108,809**	**108,809**	**108,809**	**108,809**	**108,809**	**108,809**	**108,809**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Economy

Hyder is a small former mining town that now relies upon tourism and commercial fishing for the majority of its income. Tourism (especially bear viewing) has become increasingly important to the economy of Hyder. A number of organizations commenting on the Draft EIS pointed out that the area around Hyder is a well-known mining area (as noted above) and stated that several old mines in the area are being evaluated for further development and a number of new projects have been identified and are in various stages of development. These organizations requested that the LUD classification in this area be changed from Semi-remote Recreation to a Moderate Development LUD with a Minerals overlay. A Minerals overlay has been added to this area in the Final Proposed Plan under all of the action alternatives. The Minerals LUD overlay may have the effect of changing potential exploration and development costs from high to moderate in the affected area. This is discussed further in the *Minerals* section of this EIS.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 80 percent of the total edible pounds of subsistence resources harvested by Hyder households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for the majority (85 percent) of per capita subsistence in Hyder in 1987.

The 1988 TRUCS study found that deer accounted for only a fraction of the total edible pounds of subsistence resources harvested by Hyder households (Kruse and Frazier 1988). Deer accounted for a very small amount of per capita subsistence harvest by Hyder residents in 1987.

Data were not provided for Hyder in the ADF&G deer harvest reports for 1996 to 2002. The majority of deer harvest by Hyder residents likely takes place in GMU 1A. Deer harvest in GMU 1A generally declined from 1997 to 2004, with the number of hunters and hunter effort also decreasing over this period (ADF&G 2005). As noted above, the population of Hyder increased from 1970 through 1990 and has remained fairly constant since. Hyder had an estimated population of 91 residents in 2005.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted in Hyder's community use area by Hyder residents, all rural hunters, and all hunters in the short term. In the long term projected harvest for all rural hunters and all hunters in the Hyder community use area would exceed 10 percent habitat capability, the level that the analysis assumed would provide a reasonably high level of hunter success for their effort.

In summary, use of most subsistence resources by Hyder residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 and second highest under Alternative 4, because of their lower use of Non-Development LUDs compared with the other alternatives. Alternatives 1, 2, and 3 would have the lowest risk and Alternatives 5 and 6 would be intermediate. It is unlikely that Hyder residents would be affected by increased competition or access in WAA 826, which surrounds their community, because of the limited access to this area. Existing road densities are also relatively low and total road density is not expected to increase to more than 0.6 mile per square mile even under Alternative 7 (for all lands combined).

Juneau and Vicinity

The city and Borough of Juneau surrounds the Gastineau Channel in Southeast Alaska. Juneau lies approximately 900 air miles northwest of Seattle and 600 air miles southeast of Anchorage. The City and Borough is comprised of three communities: Juneau, Auke Bay, and Douglas. According to the 2000 Census, the City and Borough of Juneau had a 2000 population of 30,711, accounting for 42 percent of the population in Southeast Alaska. Alaska Natives comprised almost 11 percent of the total population (U.S. Census Bureau 2001).

Originally, Tlingit Indians made seasonal and permanent villages along the north and south coast near the present site of Juneau. Gold discovered in the Juneau area started the mining town in 1880 and the settlement grew rapidly. Two of the world's largest lode gold mines produced over $180 million in gold before finally closing in 1944. The state capital was moved from Sitka to Juneau in 1906 while Alaska was still a territory. Alaska became the 49th State in 1959. Juneau has developed as a government and regional services center, with added economic contributions from fishing and tourism.

The population of Juneau has grown steadily since 1970, almost doubling between 1970 and 1990 and increasing a further 15 percent between 1990 and 2000. The population in Juneau has continued to growth, increasing by approximately 2 percent (482 residents) between 2000 and 2005. Total estimated population was 30,650 in Juneau in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	13,556	19,528	26,751	30,711	31,193	30,650

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

The Juneau economy is primarily based on government, tourism, support services for logging, fish processing and mining. The State, city and Borough of Juneau, and federal agencies provide nearly 45% of the employment in the community. Juneau is the State capital and is the home of the State legislators and their staff during the legislative season (January to May). Tourism is a significant part of the economy during the summer months providing an estimated $130 million in income. Juneau is an important cruise ship docking location due to the local attractions: Mendenhall Glacier, Juneau Icefield, Tracy Arm Fjord Glacier, and the new Mount Roberts Tram. Estimated gross fishing earnings of local residents exceeded $10.4 million in 2000. Cold storage facilities in Juneau process over 2 million pounds of seafood annually and DIPAC, a private non-profit organization, operates a salmon hatchery. The Kennecott Green's Creek Mine, the largest silver mine in North America, produces gold, silver, lead and zinc (Alaska DCED 2002). In addition, the Forest Service approved a plan of operations for the Kensington Gold Mine north of Juneau in 2005 and Coeur Alaska, Inc. subsequently began construction activities on the site. Construction and development was, however, halted by legal challenges and the Forest Service now anticipates the submittal of a revised plan of operations in 2008.

Tourism in Juneau is dominated by cruise ships, but a recent study noted that a substantial number of independent unguided travelers also make their way through Juneau in pursuit of hiking, kayaking, boating, hunting, and other outdoor activities (Dugan et al. 2006). The six major cruise lines who dock at Juneau each offer 34 to 37 shore excursions for purchase on the ship or before the cruise begins.

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 5 percent of the labor force in Juneau was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $62,034, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	854	5
Construction	1,035	6
Manufacturing	199	1
Wholesale Trade	174	1
Retail Trade	1,689	10
Transportation, Warehousing & Utilities	1,072	6
Information	417	3
Finance, Insurance, Real Estate, Rental & Leasing	723	4
Professional, Scientific, Management, Administrative & Waste Mgmt	1,339	8
Education, Health & Social Services	3,383	20
Arts, Entertainment, Recreation, Accommodation & Food Services	1,162	7
Other Services (Except Public Admin)	755	5
Public Administration	3,735	23
Total Employment	**16,537**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Juneau is part of the Juneau community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS. Non-federal government, services, and retail trade were the main employers in the Juneau community group in 1999, accounting for 37, 21, and 15 percent of total employment, respectively. Recreation-related activities (lodging, restaurants, and recreation services) accounted for 11 percent of total employment.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Juneau in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-13. This area contains 2,013,397 acres of National Forest System land (among other land ownerships). Table 3.23-29 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 8 percent of the total acreage within the Juneau community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 73 percent under Alternative 5 (No Action) to 80 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-29). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 10 and 11 percent under alternatives 4 and 7, respectively, compared to 8 percent under Alternative 5.

Total suitable acres would range from no acreage under Alternatives 1 through 3 to 2.4 percent under Alternative 7, compared to 1.6 percent of the total community use area under Alternative 5 (No Action).

Figure 3.23-13
Juneau's Community Use Area

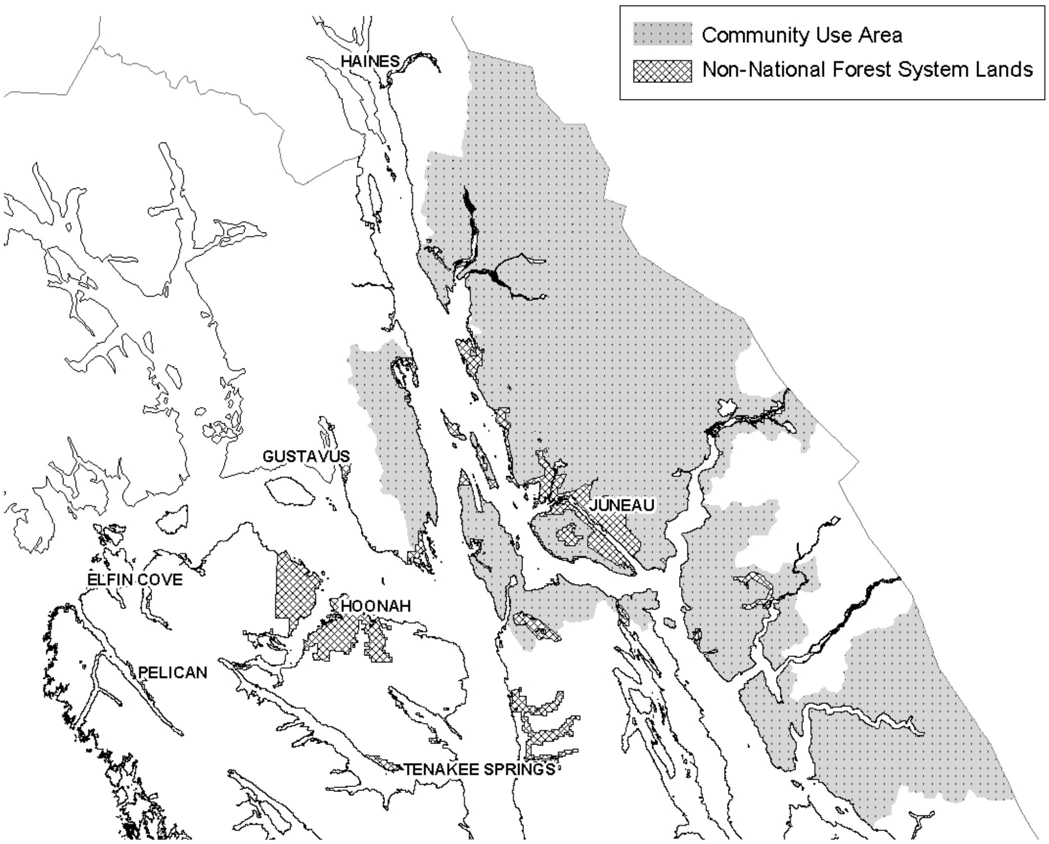


Table 3.23-29
LUD Groups in Juneau's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	621	2,986	8,514	45,408	31,439	25,123	47,865
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	388,994	388,994	388,994	388,994	388,994	388,994	388,994
Mostly Natural	1,602,469	1,596,636	1,580,021	1,413,085	1,470,366	1,479,129	1,412,235
Moderate Development	21,934	24,203	40,818	175,434	131,124	122,472	176,382
Intensive Development	0	3,564	3,564	35,884	22,913	22,802	35,869
Total	**2,013,397**	**2,013,397**	**2,013,397**	**2,013,398**	**2,013,397**	**2,013,397**	**2,013,480**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Economy

As the State capital, government is important to Juneau. Besides changes in government employment, Juneau is most likely to be affected by changes in mining, recreation and tourism, and commercial fishing. None of the alternatives are expected to affect these aspects of the local economy.

Subsistence

Juneau is not classified as a subsistence community; however, many residents use the surrounding Tongass for sport hunting and fishing. Juneau is the largest community in Southeast Alaska and accounted for 44 percent of the region's population in 2005, with an estimated total of 31,193 residents. Given the non-subsistence status of the community and its large size, no attempt is made here to summarize the WAAs that community residents use to hunt deer. The following paragraphs do, however, summarize the findings of the 1997 EIS and provide a general overview of the likely impacts of the current alternatives.

The majority of deer harvest by Juneau residents likely takes place within the community's identified use area (Figure 3.23-13), which is mainly located within GMU 1C. GMU 1C has been characterized from 1997-2004 by substantial annual variation in deer harvest, with no evident long-term trend in harvest levels (ADF&G 2005).

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted by all rural hunters in the long term. Projected deer harvest in the Juneau community use area by all rural hunters and Juneau residents and all hunters was estimated to exceed 10 percent habitat capability; the level that the analysis assumed would provide a reasonably high level of hunter success for their effort in the short term and long term. The Final EIS analysis concluded that at some point a restriction in hunting might be necessary.

In summary, use of most subsistence resources by Juneau residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7, and second highest under Alternative 4 because of its lower use of Non-Development LUDs than the other alternatives. Alternatives 1, 2, and 3 would have the lowest risk and Alternatives 5 and 6 would be intermediate.

Kake

Kake is located on west Kupreanof Island, along Keku Strait, 38 air miles northwest of Petersburg. According to the 2000 Census, Kake had a 2000 population of 710, with Alaska Natives comprising 67 percent of the total (U.S. Census Bureau 2001).

Tlingit Alaska Natives villages and fishing camps in the Kake area pre-date non-Alaska Native explorations of Southeast Alaska. During the 1800s these villages were consolidated at the present site of Kake. In the years following the American purchase of Alaska from Russia in 1867, there were several confrontations between the *Keex'* Tlingit and the Russian and American military administrations culminating in the destruction of three Kake villages. For many years, the *Keex'* people did not rebuild their villages. Eventually, they concentrated on Kupreanof Island at the present townsite along Keku Strait (ADF&G 1994).

The period of 1880 through 1915 brought a territorial government, missionary activity, economic innovations, and a larger white population into *Keex'* Tlingit territory. By the 1920s, Kake had become self-governing, with a mayor and police chief. In 1949, Kake formed an IRA Council under the Indian Reorganization Act of

1936. In 1952, Kake became incorporated as a first class city. In 1971, the passage of ANCSA resulted in the incorporation of the village and the selection of corporation lands (ADF&G 1994).

The population of Kake, which increased by 56 percent between 1970 and 1990, remained fairly constant between 1990 and 2000, and decreased by an estimated 112 people or 16 percent between 2000 and 2005. Total estimated population was 536 in Kake in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	448	555	700	710	598	536

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

The Kake economy is primarily based on timber and fishing industries. Sixty-seven residents hold commercial fishing permits. The city, including the school district, and the timber industry are the largest employers. Turn Mountain Timber, a joint venture between Whitestone logging and Kake Tribal Logging, and the log sort yard and transfer facility at Point McCarny employ a number of local residents. Kake Tribal Corporation, which owns a local cold storage plant and Ocean Fresh Seafoods, is the largest individual employer. The Gunnock Creek Hatchery, a non-profit organization, operates a salmon hatchery to assist in sustaining the salmon fishery in the area (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 25 percent of the labor force in Kake was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $39,643, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	34	14
Construction	34	14
Manufacturing	10	4
Wholesale Trade	0	0
Retail Trade	22	9
Transportation, Warehousing & Utilities	19	8
Information	0	0
Finance, Insurance, Real Estate, Rental & Leasing	3	1
Professional, Scientific, Management, Administrative & Waste Mgmt	0	0
Education, Health & Social Services	57	23
Arts, Entertainment, Recreation, Accommodation & Food Services	17	7
Other Services (Except Public Admin)	20	8
Public Administration	32	13
Total Employment	**248**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Kake is located in the Petersburg Ranger District and part of the Kake community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS.

The non-federal government, finance, insurance, and real estate (F.I.R.E), and manufacturing sector were the major employers in the Kake community group in 1999, accounting for 28, 22, and 21 percent of total employment, respectively. Wood products (logging) employment decreased by 57 percent between 1990 and 1999, declining from 123 to 53 jobs. Wood products employment accounted for 21 percent of total employment in the Kake community group in 1999.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Kake in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-14. This area contains 454,186 acres of National Forest System land (among other land ownerships). Table 3.23-30 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Figure 3.23-14
Kake's Community Use Area

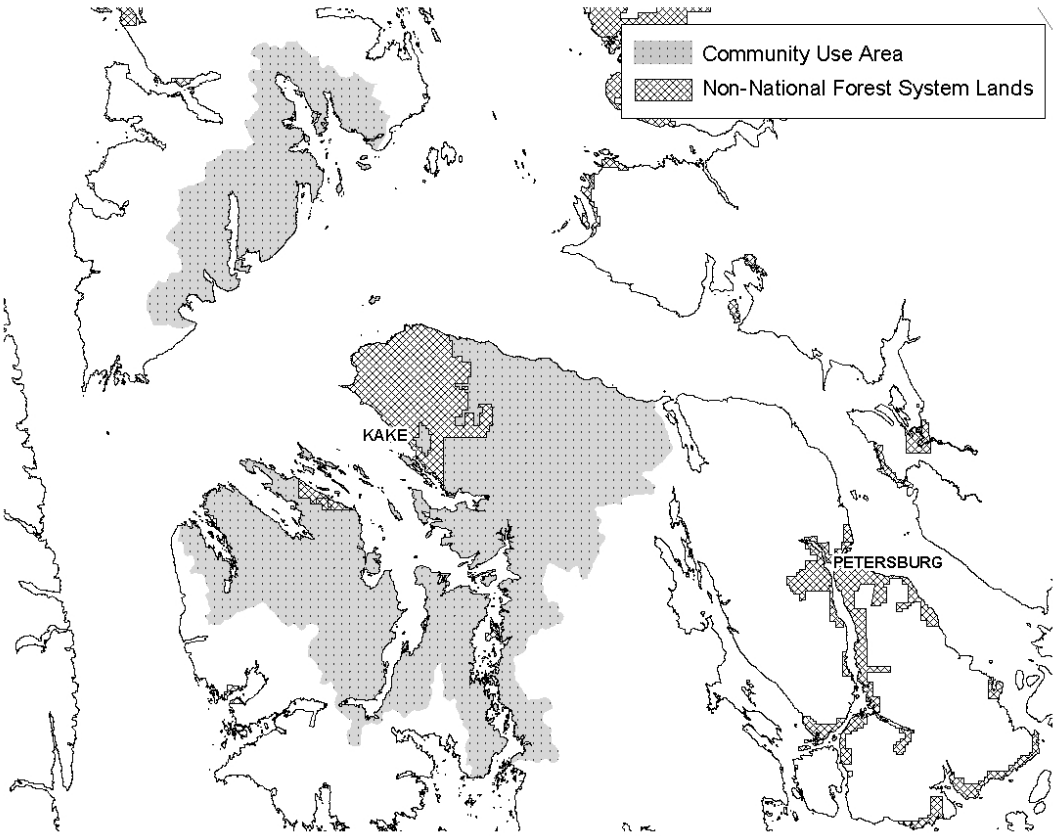


Table 3.23-30
LUD Groups in Kake's Community Use Area by Alternative

	Alternative						
	1	2	3	4	5	6	7
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	16,662	62,758	65,251	78,711	73,014	70,998	87,801
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	105,149	105,149	105,149	105,149	105,149	105,149	105,149
Mostly Natural	313,278	203,252	191,676	110,747	151,246	170,011	91,839
Moderate Development	5,806	8,035	10,242	18,292	13,885	15,480	23,345
Intensive Development	29,953	137,749	147,144	220,001	183,905	163,545	233,853
Total	**454,187**	**454,185**	**454,210**	**454,188**	**454,186**	**454,185**	**454,186**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Development LUDs presently account for 44 percent of the total acreage within the Kake community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 33 percent under Alternative 5 (No Action) to 69 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-30). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 52 percent and 57 percent under Alternatives 4 and 7, respectively, compared to 44 percent under Alternatives 5.

Total suitable acres would range from 4 percent under Alternative 1 to 19 percent under Alternative 7, compared to 16 percent of the total community use area under Alternative 5 (No Action).

Economy

Kake is a traditional native community where commercial fishing, timber harvesting, and subsistence use are important. For subsistence use, west Kupreanof and north Kuiu Islands are some of the most important areas.

Timber harvest has been an important contributor to the Kake economy for approximately 20 years. During that period, both private and National Forest System lands have been harvested. Recently, timber harvest has diminished on both ownerships. Logging employment in the Kake community group declined by 70 jobs or 57 percent between 1990 and 1999, but still comprised 21 percent of total employment in 1999 (Table 3.23-7).

A total of 20.6 MMBF is presently under contract in the Petersburg Ranger District. Approximately 22 percent or 4.6 MMBF of this volume would be affected under Alternative 1, which would maintain all Inventoried Roadless Areas on the Tongass in a natural condition and not permit timber harvest in these areas. None of the other alternatives would affect this volume. These data provide an indication of potential impacts, actual impacts would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales were cancelled as part of the decision.

Commercial fishing is not expected to be significantly affected under any of the alternatives.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 52 percent of the total edible pounds of subsistence resources harvested by Kake households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 60 percent of per capita subsistence harvest in Kake in 1996.

The 1988 TRUCS study found that deer accounted for 24 percent of the total edible pounds of subsistence resources harvested by Kake households (Kruse and Frazier 1988). Deer accounted for 28 percent of per capita subsistence harvest by Kake residents in 1996 (ADF&G 2006).

Kake residents harvest deer on Admiralty Island and Kupreanof Island, which are included in GMU 4 and GMU 3, respectively. Deer harvest in GMU 4 is considered very high relative to other areas of Southeast Alaska, which is indicative of relatively high deer populations. Over 1997-2004, there has been no significant trend in the number of deer harvested or in the number of hunters (ADF&G 2005). Deer harvest in GMU 3 declined between 1998-2002 and increased between 2002-2004. The number of deer hunters declined between 2000-2002 and slightly increased between 2002-2004 (ADF&G 2005). As noted above, Kake's human population increased from 1970 to 1990, stayed relatively constant between 1990 and 2000, and decreased from 2000 to 2005. Kake had an estimated 2005 population of 598.

Five WAAs account for the majority (76 percent) of deer harvest by Kake Residents (Table 3.23-31). The Kake portion ranges from about 19 percent (WAA 3939) to 91 percent (WAA 5131) of the total harvest and from 21 percent to 100 percent of the rural hunter harvest in these WAAs. About 7 percent of the combined harvest in these WAAs is by non-rural hunters, suggesting that there is a small harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

Table 3.23-31
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Kake Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

WAA	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
	Kake Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
3940	35	75	77	92	92	92	92	92	92	92	92
3939	24	114	125	100	100	100	100	100	100	100	100
5132	18	21	21	73	71	68	67	64	65	67	62
5131	15	15	17	90	86	83	83	80	81	82	79
4041	14	24	29	90	90	90	90	90	90	90	90

*Calculated based on harvest where location is known

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted in the Kake community use area by Kake residents, all rural hunters, and all hunters in the short term. In the long term, the selected alternative (Alternative 11 in the 1997 Forest Plan EIS) should be able to provide sufficient habitat capability for deer hunted in the Kake community use area by Kake residents and all rural hunters. Projected harvest for all hunters in the Kake community use area would, however, exceed 10 percent habitat capability; the level that the analysis assumed would provide a reasonably high level of hunter success for their effort.

In summary, use of most subsistence resources by Kake residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer in some of the WAAs hunted by Kake residents may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its general lack of Non-Development LUDs within the Kake use area, and lower under the other six alternatives. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within Kake's subsistence use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. The impacts are estimated to be relatively low based on the limited accessibility of these areas to non-local hunters. Three of the five WAAs of highest importance to Kake hunters (WAAs 3939, 3940, and 4041) occur at the south end of Admiralty Island. They are currently unroaded and there are no plans for future road development in these areas. This is not the case for the other two WAAs of importance to Kake hunters (WAAs 5131 and 5132), which are located surrounding or adjacent to the community of Kake on Kupreanof Island. These WAAs, which currently have total road densities of 0.4 and 2.2 miles per square mile, respectively, are projected to have long-term maximum total road densities ranging from 0.6 and 3.2 miles per square mile under Alternative 1 to 1.0 and 3.3 miles per square mile under Alternative 7, respectively (all ownerships combined).

Kasaan

Kasaan is a small village located on the eastern side of Prince of Wales Island 30 miles northwest of Ketchikan. According to the 2000 Census, Kasaan had a 2000 population of 39, with Alaska Natives comprising 38 percent of the total (U.S. Census Bureau 2001).

Originally Tlingit territory, Kasaan gets its name from the Tlingit word meaning "pretty town." Haidas migrated north from the Queen Charlotte Islands in the early 1700s to the Island and established the village known as "Old Kasaan." Between 1892 and 1900, the Copper Queen mine, camp, sawmill, post office, and store were built on Kasaan Bay, and the Haida people relocated to this new village (Alaska DCED 2006). The Haida village of Kasaan was settled at its present site in 1904 (ADF&G 1994).

Kasaan's population grew by 80 percent between 1970 and 1990. The population declined between 1990 and 2000, decreasing by 15 people or 28 percent. The population has increased since 2000, with an estimated 61 people living in Kasaan in 2005. Total estimated population was 59 in Kasaan in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	30	25	54	39	61	59

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

Most villagers participate in subsistence for supplemental food sources (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. This data is an extrapolation based on information from a sample of residents. Extrapolation of a small sample may have inaccuracies but should provide a general indication of distribution of employment. Approximately 20 percent of the labor force in Kasaan was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $43,500, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	2	13
Construction	2	13
Manufacturing	3	19
Wholesale Trade	0	0
Retail Trade	0	0
Transportation, Warehousing & Utilities	2	13
Information	0	0
Finance, Insurance, Real Estate, Rental & Leasing	0	0
Professional, Scientific, Management, Administrative & Waste Mgmt	0	0
Education, Health & Social Services	2	13
Arts, Entertainment, Recreation, Accommodation & Food Services	0	0
Other Services (Except Public Admin)	0	0
Public Administration	5	31
Total Employment	**16**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Kasaan is part of the North Prince of Wales community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS. Wood products employment in the North Prince of Wales community group declined by 186 jobs or 69 percent between 1990 and 1999. Wood products employment accounted for 83 jobs or 23 percent of total employment in this community group in 1999.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Kasaan in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-15. This area contains 540,324 acres of National Forest System land (among other land ownerships). Table 3.23-32 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for about 47 percent of the total acreage within the Kasaan community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 45 percent under Alternative 5 (No Action) to 78 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-32). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 61 percent and 72 percent under Alternatives 4 and 7, respectively, compared to 47 percent under Alternative 5.

Total suitable acres would range from 6 percent under Alternative 1 to 24 percent under Alternative 7, compared to 13 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Figure 3.23-15
Kasaan's Community Use Area

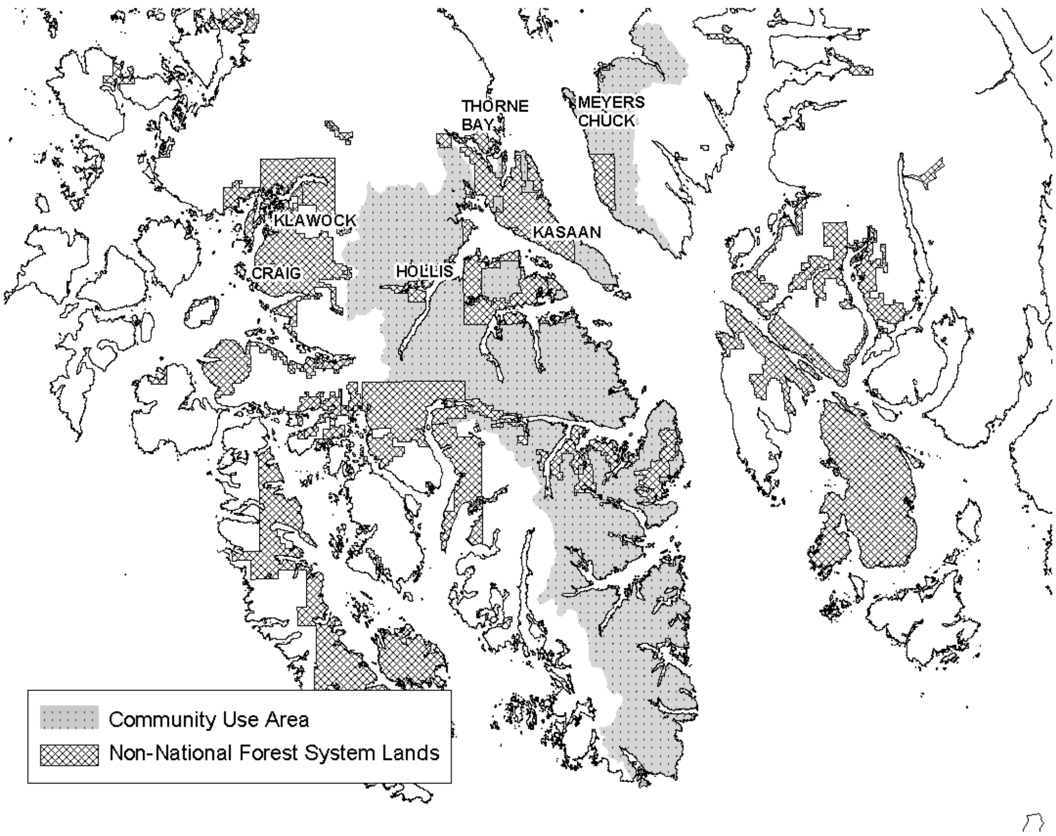


Table 3.23-32
LUD Groups in Kasaan's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	29,928	45,137	63,693	93,428	70,810	69,888	128,100
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	42,343	42,343	42,343	42,343	42,343	42,343	42,343
Mostly Natural	421,877	348,098	264,463	166,490	242,878	242,474	107,599
Moderate Development	22,156	42,265	45,291	85,178	53,098	51,591	106,158
Intensive Development	53,947	107,619	188,227	246,313	202,005	203,916	284,224
Total	**540,324**	**540,324**	**540,324**	**540,325**	**540,325**	**540,324**	**540,324**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Economy

Subsistence use and commercial fishing are the primary elements of Kasaan's economy. Commercial fisheries employment is not likely to be affected under any of the alternatives. Much of the timber harvest in the vicinity of Kasaan is on private land owned by the Kasaan Native Corporation. This land would not be affected under any of the alternatives.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 74 percent of the total edible pounds of subsistence resources harvested by Kasaan households (Kruse and Frazier 1988) and 75 percent of per capita harvest in 1998 (ADF&G 2006).

The 1988 TRUCS survey found that deer account for 22 percent of the total edible pounds of subsistence resources harvested by Kasaan households (Kruse and Frazier 1988). Deer accounted for 15 percent of per capita subsistence harvest by Kasaan residents in 1998 (ADF&G 2006).

The majority of deer harvest by Kasaan residents takes place near the community on north Prince of Wales Island, which is included in GMU 2. Deer harvest and hunter effort in GMU 2 generally increased during 1997-2000 and subsequently declined during 2000-2004; however, no change has been noted in the average number of hunter-days required to harvest a deer (ADF&G 2005). As noted above, the population of Kasaan fluctuated from 1970 to 2000. From 2000 to 2005 Kasaan's population increased by 56 percent, with an estimated population of 61 in 2005.

Residents of Kasaan harvest the majority (90 percent) of their deer from WAA 1315 on north Prince of Wales Island (Table 3.23-33). The Kasaan portion makes up 1 percent of the total harvest and 2 percent of the rural hunter harvest in this WAA. About 35 percent of the harvest in this WAA is by non-rural hunters, suggesting that there is a harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

Table 3.23-33
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Kasaan Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Kasaan Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
1315	4	175	270	55	50	49	47	44	47	47	41

*Calculated based on harvest where location is known

WAA 1315 occurs in an area with substantial past harvest and, therefore, deer habitat capabilities are currently estimated to be considerably below 1954 levels (Table 3.23-33). Under each of the alternatives, additional harvest would occur that would reduce habitat capabilities after 100+ years to 41-50 percent of 1954 levels (Table 3.23-33).

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted in the Kasaan community use area by Kasaan residents in the short term and long term. This alternative was also estimated to provide sufficient habitat for all rural hunters in the short term. Projected deer harvest for all hunters in the Kasaan community use area exceeds the level that is both sustainable and provides a reasonably high level of hunter success for their effort in the short term and long term. Projected deer harvest for all rural hunters also exceeds this level in the long term.

Kasaan is currently competing with other communities in their subsistence use areas and this is likely to continue to do so under all alternatives. Alternatives increasing access by road due to harvest activity may increase competition from other communities on Prince of Wales Island indirectly impacting Kasaan's use. An increase in access may also allow Kasaan households to increase the range of their use.

In summary, use of most subsistence resources by Kasaan residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its general emphasis on Development LUDs, and lower under the other six alternatives. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within Port Protection's subsistence use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters. The level of road development is already relatively high in this WAA. Existing open road densities are 1.5 miles per square mile and existing total road densities are 2.0 miles per square mile, respectively (all ownerships combined). Long-term (100+ years) road development would vary by alternative and would result in estimated maximum total road densities ranging from 2.7 miles per square mile in these WAAs under Alternative 1, to 2.9 miles per square mile in these WAAs under Alternative 7 (for all ownerships combined).

Ketchikan

Ketchikan is located on Revillagigedo Island near the southernmost boundary of Alaska. Ketchikan lies approximately 679 miles north of Seattle and 235 miles south of Juneau. It is the first Alaska port-of-call for northbound ships. Ketchikan Gateway Borough includes Ketchikan, Saxman, Mountain Point, Clover Pass, Ward Cove and Herring Cove, which are located on the Ketchikan road system, and Pennock Island.

According to the 2000 Census, Ketchikan Gateway Borough had a 2000 population of 14,070, with 56 percent of the population living in the city of Ketchikan. Alaska Natives make up 18 percent of the borough population (U.S. Census Bureau 2001). Native populations in 1990 varied from a high of 80 percent in Saxman to a low of less than 8 percent in the Ketchikan suburbs. Alaska Natives accounted for 66 percent of total population in Saxman in 2000. Refer to the section on Saxman for information directly relating to that community.

The Ketchikan area was a summer fishing camp for the Tlingit Alaska Natives. Their name for the area, "kitschk-him," meant "thundering wings of an eagle." Its abundant fish and timber resources eventually attracted non-Natives, with the first cannery opening in Ketchikan in 1886 and four more by 1912. Nearby gold and copper discoveries briefly brought activity to Ketchikan during the late 1890s, but timber and fishing became the chief economic forces at the turn of the century and have remained important. The 1954 construction of a pulp mill in Ward Cove continued a tradition begun by the 1903 opening of Ketchikan Spruce Mills, which operated for more than 70 years. Ketchikan has also remained an important hub for fishing, both for fish processing and as home to those with commercial fishing permits (401 area residents).

The population of Ketchikan increased by 14 percent between 1980 and 1990 and then decreased by 4 percent between 1990 and 2000. The population decreased by a further 3 percent (237 residents) between 2000 and 2005. Total estimated population was 7,662 in Ketchikan in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	6,994	7,198	8,263	7,922	7,685	7,662

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

Ketchikan is an industrial center and a major port of entry in Southeast Alaska. It has a diverse economy, supported by a large fishing fleet, fish processing facilities, timber and tourism. The estimated gross fishing earnings of local residents neared $10 million in 2000. Four canneries, three cold storage facilities, and a fish processing plant support the fishing industry in summer months. Ketchikan is a cruise ship stop and receives over 650,000 annual visitors. While the timber industry is important to the economy with the home base for several timber companies, the Ketchikan Pulp Corporation's pulp mill closed almost a decade ago, in March 1997.

Ketchikan received approximately 887,000 cruise ship visitors in 2005 and has a well-developed network and system of shore-excursions, with 47 shore excursions advertised by the various cruise lines that dock there. Most nature-based activities that originate in Ketchikan fell into four general categories: flightseeing, marine charters, adventure experiences, and general sightseeing. In all cases, the majority of clients participating in these activities were cruise ship passengers (Dugan et al. 2006).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 8 percent of the labor force in Ketchikan was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $45,802, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	170	4
Construction	276	7
Manufacturing	219	6
Wholesale Trade	85	2
Retail Trade	427	11
Transportation, Warehousing & Utilities	430	11
Information	93	2
Finance, Insurance, Real Estate, Rental & Leasing	229	6
Professional, Scientific, Management, Administrative & Waste Mgmt	238	6
Education, Health & Social Services	731	19
Arts, Entertainment, Recreation, Accommodation & Food Services	414	11
Other Services (Except Public Admin)	183	5
Public Administration	393	10
Total Employment	**3,888**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Ketchikan Gateway Borough is comprised of the Ketchikan and Revillagigideo community groups (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS.

Since completion of the 1997 Forest Plan EIS analysis, the Ketchikan pulp mill has closed. Closure of the mill, the community's largest employer, resulted in the loss of 500 direct jobs, many of which were high paying and year round. Employment data compiled by the Alaska DOL indicate that employment in the lumber and wood products sector declined from 11.8 percent of total wage and salary employment in 1996 to 5.7 percent in 1999 (Baker 2001). A study by the Alaska DOL found that 3 years after the mill closure about 45 percent of the laid-off workers were employed in other jobs in the Ketchikan/Prince of Wales area, about 15 percent were employed elsewhere in Alaska, and about 40 percent had left the state altogether (Landry 2001).

Gateway Forest Products opened lumber and veneer facilities on the former site of the KPC Pulp Mill in Ketchikan in 2000. Gateway Forest Products filed for bankruptcy protection in February 2002. This application was dismissed by the U.S. Bankruptcy Court in April 2002. The Ketchikan veneer mill restarted in 2007 using timber imported from British Columbia. More recently, the mill has acquired timber from a logging contractor that purchased timber from several Southeast Alaska timber sales (Brackley and Haynes, in press; Damstedt 2007).

The Pacific Log and Lumber sawmill, one of the larger remaining sawmills in Southeast Alaska is also located in Ketchikan. According to the 2006 mill survey conducted for the USDA Forest Service, this mill, which has an installed production capacity of 39.6 MMBF, processed approximately 4.2 MMBF in 2006 and employed 20 people (Juneau Economic Development Council 2007).

Approximately 21 percent of employment in the Ketchikan community group was in non-federal government. Services and retail trade accounted for 21 and 17 percent of total employment, respectively, with recreation-related activities comprising 10 percent of total employment.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Ketchikan in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-16. This area contains 1,975,122 acres of National Forest System land (among other land ownerships). Table 3.23-34 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for about 21 percent of the total acreage within the Ketchikan community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 31 percent under Alternative 5 (No Action) to 48 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-34). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 32 percent and 33 percent under Alternatives 4 and 7, respectively, compared to 21 percent under Alternative 5.

Figure 3.23-16
Ketchikan's Community Use Area

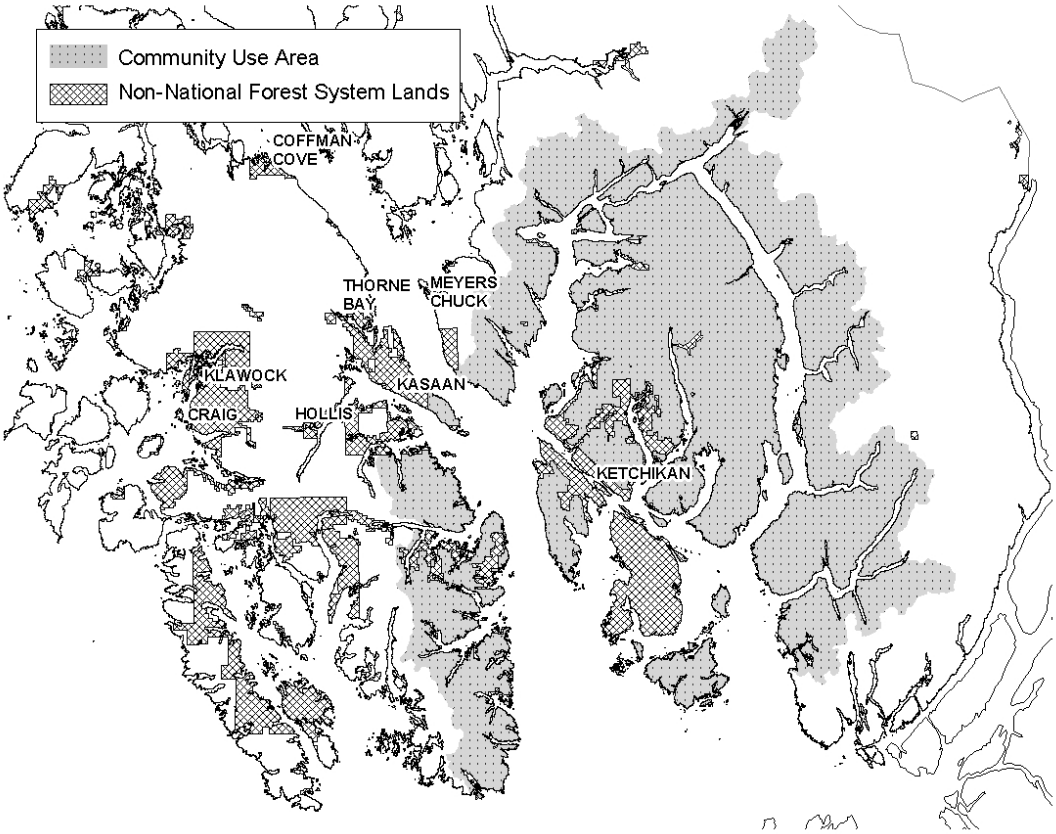


Table 3.23-34
LUD Groups in Ketchikan's Community Use Area by Alternative

	Alternative						
	1	2	3	4	5	6	7
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	47,897	90,739	111,299	176,699	127,271	124,987	204,834
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	934,620	934,619	934,619	934,616	934,620	934,619	934,619
Mostly Natural	943,733	764,232	665,107	417,910	618,698	615,905	396,436
Moderate Development	36,231	82,362	88,211	187,083	100,554	97,706	199,418
Intensive Development	60,538	193,909	287,185	435,514	321,252	326,892	444,655
Total	**1,975,122**	**1,975,122**	**1,975,122**	**1,975,123**	**1,975,123**	**1,975,122**	**1,975,129**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Total suitable acres would range from 2 percent under Alternative 1 to 10 percent under Alternative 7, compared to 6 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Economy

Ketchikan would be primarily influenced by changes in timber processing, recreation and tourism use, commercial fishing, and recreation opportunities, as well as potential restrictions on transportation and utility projects.

Pacific Log and Lumber had approximately 43 MMBF under contract in August 2006. In addition, 24.5 MMBF is presently under contract with Alcan Forest Products, who are located in Ketchikan, but do not operate a facility there. Approximately 75 percent (32.1 MMBF) of the volume under contract with Pacific Log and Lumber could potentially be affected under Alternative 1, which would maintain all Inventoried Roadless Areas on the Tongass in a natural condition and not permit timber harvest in these areas. Alternative 1 would also affect 62 percent (15.2 MMBF) of volume under contract with Alcan Forest Products. None of the other alternatives would affect this volume. These data provide an indication of potential impacts, actual impacts would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales were cancelled as part of the decision.

Recreation and tourism have become increasingly important to the economy of Ketchikan, with more than 650,000 cruise ship passengers visiting Ketchikan annually. Ketchikan is also the stopover point for visitors traveling to Misty Fiords and Prince of Wales Island.

Commercial fisheries employment is not likely to be affected under any of the alternatives.

Subsistence

Ketchikan is not classified as a subsistence community; however, many residents use the surrounding Tongass for hunting and fishing. Ketchikan Gateway Borough is the second largest community in Southeast Alaska and accounted for 19 percent of the region's population in 2005, with an estimated total of 13,125 residents. Given the non-subsistence status of the community and its large size, no attempt is made here to summarize the WAAs that community residents use to hunt deer. The following paragraphs do, however, summarize the findings of the 1997 EIS and provide a general overview of the likely impacts of the current alternatives.

The majority of deer harvest by Ketchikan residents likely takes place within the community's identified use area (Figure 3.23-16), which is mainly located within GMU 1A and GMU 2. Deer harvest in GMU 1A generally declined from 1997 to 2004, with the number of hunters and hunter effort also decreasing over this period (ADF&G 2005). Deer harvest in GMU 2 generally increased between 1997 and 2000 and subsequently declined between 2001 and 2004. The average number of days required to harvest a deer, however, remained constant across the entire period (ADF&G 2005).

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted by all hunters in the short term. However, projected deer harvest in the long term by rural hunters and Ketchikan residents and all hunters exceeds the level that is both sustainable and provides a reasonably high level of hunter success for their effort. If a restriction were necessary, sport hunting by Ketchikan residents would be restricted before subsistence hunting by rural hunters is restricted.

In summary, use of most subsistence resources by Ketchikan residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7, and second highest under Alternative 4 because of its lower use of Non-Development LUDs than the other alternatives. Alternatives 1, 2, and 3 would have the lowest risk and Alternatives 5 and 6 would be intermediate.

Klawock

Klawock is located on the west coast of Prince of Wales Island, across from Klawock Island, approximately 56 air miles from Ketchikan. It is connected by road to Craig and to other communities on the Prince of Wales Island road system. According to the 2000 Census, Klawock had a 2000 population of 854, with Alaska Natives comprising 51 percent of the total (U.S. Census Bureau 2001).

The mouth of the Klawock River, where the village of Klawock is now located, has been the site of Tlingit occupation for at least the past 600 years. According to oral history, some members of the Kuiu *kwaan* of Kuiu Island moved to Klawock as well (ADF&G 1994). Klawock is now the center of the Tlingit population on west Prince of Wales Island.

The history of Klawock is closely tied to the fishing industry. A trading post and salmon saltery were established in 1868, and the first cannery in Alaska was built here by a San Francisco firm in 1878. A hatchery for red salmon operated at Klawock Lake between 1897 and 1917 (Alaska DCED 2006). In 1929, Klawock incorporated as a first class city. The community has a local Fish and Game Advisory Committee (ADF&G 1994).

The community has been historically dependent on fishing and cannery operations. The timber industry increased in importance in recent years with a relatively large number of residents employed in logging and ship loading in the Klawock and Craig area (Alaska DCED, 2002). Viking Lumber, one of the larger sawmills presently operating in the region, is located between Klawock and Craig. According to the 2006 mill survey conducted for the USDA Forest Service, this mill, which has an installed production capacity of 80 MMBF, processed approximately 19 MMBF in 2006 and employed 42 people (Juneau Economic Development Council 2007).

A total of 47 residents hold commercial fishing permits.

Retail trade and services have become increasingly important to the economy of Klawock. Many residents of communities on northern Prince Wales, as well as recreationists and tourists shop at the shopping center located in Klawock. Klawock has a new airport that has the capacity to accommodate large jet aircraft. The new airport is currently not in commercial operation.

Klawock's population, which more than tripled between 1970 and 1990, increased by 132 people or 18 percent between 1990 and 2000. The population decreased by 74 people or 9 percent between 2000 and 2005. Total estimated population was 776 in Klawock in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	213	318	722	854	780	776

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001.; Alaska DOL 2007a

Historically, the Klawock economy has been dependent on fishing and cannery operations. The cannery operations were closed in the late 1980's and the timber industry has become increasingly important. Sealaska's logging operation, through a contract with Shaan-Seet, Inc., is the largest employer. The City and school district are also significant employers. The state operates a salmon hatchery on Klawock Lake to maintain the local salmon fisheries (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 16 percent of the labor force in Klawock was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $35,000, compared to a regional median of $44,118 (Alaska DCED 2002).

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Klawock is part of the Central Prince of Wales community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS.

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	50	13
Construction	41	11
Manufacturing	24	6
Wholesale Trade	13	3
Retail Trade	75	20
Transportation, Warehousing & Utilities	17	5
Information	5	1
Finance, Insurance, Real Estate, Rental & Leasing	6	2
Professional, Scientific, Management, Administrative & Waste Mgmt	4	1
Education, Health & Social Services	53	14
Arts, Entertainment, Recreation, Accommodation & Food Services	28	8
Other Services (Except Public Admin)	32	9
Public Administration	24	6
Total Employment	**372**	**100**

Source: Alaska DCED 2002

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Klawock in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-17. This area contains 767,934 acres of National Forest System land (among other land ownerships). Table 3.23-35 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for about 55 percent of the total acreage within the Klawock community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain largely the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 39 percent under Alternative 5 (No Action) to 63 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-35). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 64 percent and 72 percent under Alternatives 4 and 7, respectively, compared to 55 percent under Alternative 5.

Total suitable acres would range from 15 percent under Alternative 1 to 28 percent under Alternative 7, compared to 20 percent of the total community use area under Alternative 5 (No Action).

Figure 3.23-17
Klawock's Community Use Area

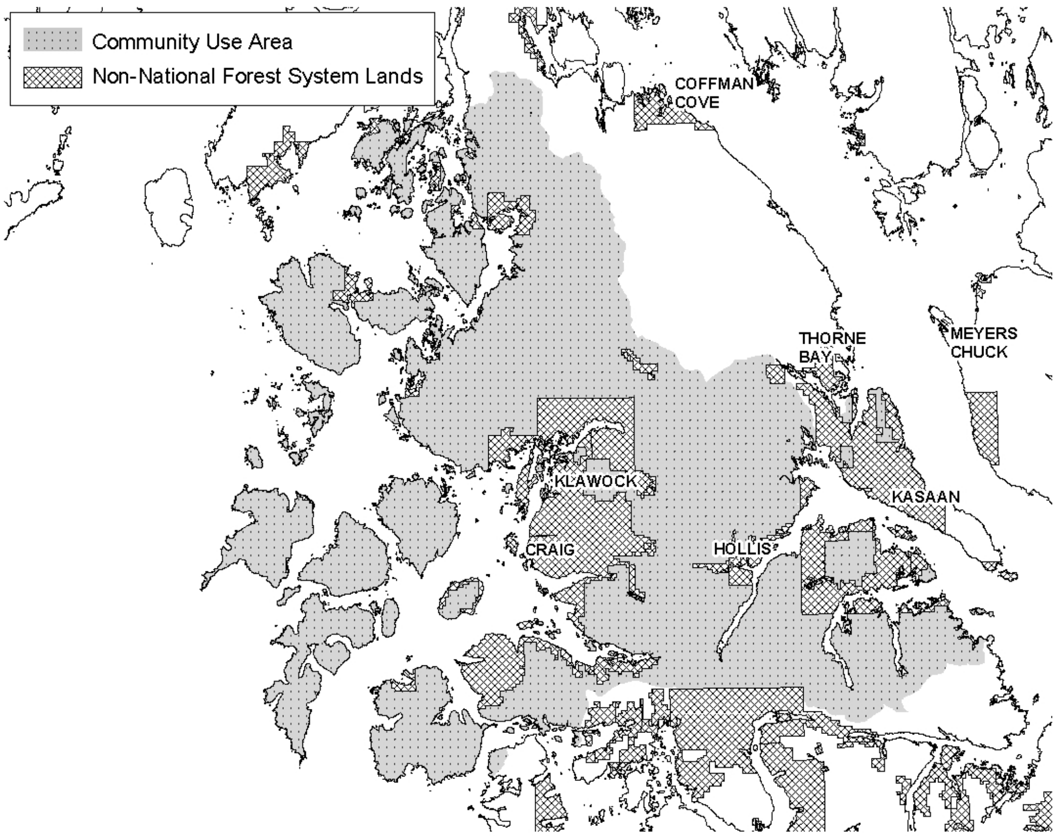


Table 3.23-35
LUD Groups in Klawock's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	113,371	132,673	147,957	170,424	153,413	149,162	212,194
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	45,518	45,518	45,518	45,518	45,518	45,518	45,518
Mostly Natural	479,982	386,022	314,182	229,123	302,146	308,274	166,626
Moderate Development	42,759	59,597	71,035	86,288	76,686	74,907	100,174
Intensive Development	198,674	275,797	336,201	406,006	342,585	338,235	454,615
Total	**766,933**	**766,933**	**766,935**	**766,935**	**766,934**	**766,933**	**766,934**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Economy

Klawock is a traditional native community. Timber employment, subsistence use, and retail services are most likely to be affected in this community. Viking Lumber one of the larger remaining sawmills in the region is located between Craig and Klawock.

Viking Lumber had 27 MMBF under contract in August 2006. Approximately 17 percent (4.6 MMBF) of this volume could be potentially affected under Alternative 1, which would maintain all Inventoried Roadless Areas on the Tongass in a natural condition and not permit timber harvest in these areas. None of the other alternatives would affect this volume. These data provide an indication of potential impacts, actual impacts would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales were cancelled as part of the decision.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 75 percent of the total edible pounds of subsistence resources harvested by Klawock households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 69 percent of per capita subsistence harvest in Klawock in 1997. The 1988 TRUCS study found that deer accounted for 19 percent of the total edible pounds of subsistence resources harvested by Klawock households (Kruse and Frazier 1988). Deer accounted for 15 percent of per capita subsistence harvest by Klawock residents in 1997 (ADF&G 2006).

Klawock residents mainly harvest deer on north Prince of Wales Island, which is included in GMU 2. Deer harvest and hunter effort in GMU 2 generally increased during 1997-2000 and subsequently declined during 2000-2004; however, no change has been noted in the average number of hunter-days required to harvest a deer (ADF&G 2005). As noted above, the human population of Klawock increased steadily from 1970 to 2000, but decreased by an estimated 9 percent between 2000 and 2005. Klawock had an estimated population of 78 in 2005.

Residents of Klawock harvest the majority (75 percent) of their deer from six WAAs in north Prince of Wales Island (Table 3.23-36). The Klawock portion represents from about 4 percent (WAA 1315) to 31 percent (WAA 1318) of the total harvest and about 6 percent to 37 percent of the rural hunter harvest in these WAAs. About 33 percent of the combined harvest in these WAAs is by non-rural hunters, suggesting that there is a limited harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

Most of the WAAs identified in Table 3.23-36 occur in areas with substantial past harvest and, therefore, deer habitat capabilities are currently estimated to be below 1954 levels. Under each of the alternatives, additional harvest would occur that would reduce habitat capabilities after 100+ years to 64-85 percent of 1954 levels in WAA 1318 and 41-50 percent in WAA 1315.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted by Klawock residents in the short term and long term. Projected deer harvest for all rural and for all hunters was estimated to exceed the level that the analysis assumed would provide a reasonably high level of hunter success for their effort in both the short term and long term. At some point a restriction in hunting may be necessary.

Table 3.23-36
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Klawock Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

WAA	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
	Klawock Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
1318	73	198	234	92	85	78	76	66	72	75	64
1422	50	209	300	60	50	48	47	46	47	47	43
1529	25	122	226	73	63	61	60	56	59	59	50
1420	14	151	231	52	43	42	40	39	40	40	36
1315	11	175	270	55	50	49	47	44	47	47	41
1214	10	53	91	79	70	66	65	62	64	64	53

*Calculated based on harvest where location is known

In summary, use of most subsistence resources by Klawock residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its low level of Non-Development LUDs throughout most of Prince of Wales Island, and second highest under Alternative 4 because of its lower use of Non-Development LUDs than the other alternatives. Alternatives 1, 2, and 3 would have the lowest risk and Alternatives 5 and 6 would be intermediate. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within the Klawock subsistence use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters. The level of road development is already relatively high in these WAAs. For example, for the three WAAs with the highest deer harvest by Klawock residents, existing open road densities range from 0.9 to 1.9 miles per square mile and existing total road densities range from 1.5 to 1.9 miles per square mile (all ownerships combined). Long-term (100+ years) road development in these three WAAs would vary by alternative and would result in estimated maximum total road densities ranging from 1.7 to 2.8 miles per square mile under Alternative 1, to 2.0 to 3.0 miles per square mile under Alternative 7 (for all ownerships combined).

Metlakatla

Metlakatla is located on Annette Island, 15 miles south of Ketchikan. According to the 2000 Census, Metlakatla had a 2000 population of 1,375, with Alaska Natives comprising 82 percent of the total (U.S. Census Bureau 2001).

Metlakatla, which is believed to have been occupied at one time by Tlingit Indians, was settled in 1887 by Church of England minister William Duncan and about 830 Tsimshian followers from northern British Columbia. In 1891, an Act of Congress declared Annette Island an Indian Reservation (the Annette Island Reserve), the only one in Alaska. This action set aside the reservation for the exclusive use and occupancy by “Metlakatla Indians and such other Natives of Alaska who might join them” (ADF&G 1994).

Metlakatla is a traditional Tsimshian community with a subsistence lifestyle. The community was not part of ANCSA. The 86,000-acre Island reservation and surrounding 3,000 feet of coastal waters are not subject to State jurisdiction. The Annette Island Reserve regulates commercial fishing in these waters, and operates its own tribal court system (Alaska DCED 2006). The community participates in regional fish and game management issues (ADF&G 1994).

Non-federal government was the largest employer in the Metlakatla community group in 1999, accounting for 322 jobs or 68 percent of total employment. Wood products employment, which decreased by 60 percent (56 jobs) between 1990 and 1999, accounted for 40 jobs or 9 percent of total employment in 1999. These jobs were all in the sawmill sector. The two sawmills located in Metlakatla, Annette Island Sawmill and Metlakatla Forest Products, were both idle in 2005 and are not expected to reopen. A total of 49 residents hold commercial fishing permits.

The population of Metlakatla, which increased by a third between the 1980 and 1990 census, saw a 2 percent decline between 1990 and 2000. The population declined by an estimated 33 people—a further 2 percent—between 2000 and 2005. Total estimated population was 1,377 in Metlakatla in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	1,050	1,056	1,407	1,375	1,342	1,377

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

Metlakatla is a federal Indian reservation with no local taxes. The economy is based primarily on the fishing and wood products industry. Metlakatla Indian Community, the largest employer, operates a salmon hatchery on Tamgas Creek, the tribal court, and all local services. Annette Island Packing Co. is a cold storage facility in Metlakatla owned by the community (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 21 percent of the labor force in Metlakatla was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $43,516, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	36	7
Construction	54	11
Manufacturing	41	8
Wholesale Trade	3	1
Retail Trade	44	9
Transportation, Warehousing & Utilities	42	8
Information	4	1
Finance, Insurance, Real Estate, Rental & Leasing	13	3
Professional, Scientific, Management, Administrative & Waste Mgmt	12	2
Education, Health & Social Services	149	30
Arts, Entertainment, Recreation, Accommodation & Food Services	19	4
Other Services (Except Public Admin)	8	2
Public Administration	76	15
Total Employment	**501**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Metlakatla is part of the Metlakatla community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record for this EIS. Non-federal government and retail trade were the main employers in the Metlakatla community group in 1999, accounting for 68 and 10 percent of total employment, respectively.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Metlakatla in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-18. This area contains 1,975,123 acres of National Forest System land (among other land ownerships). Table 3.23-37 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Figure 3.23-18
Metlakatla's Community Use Area

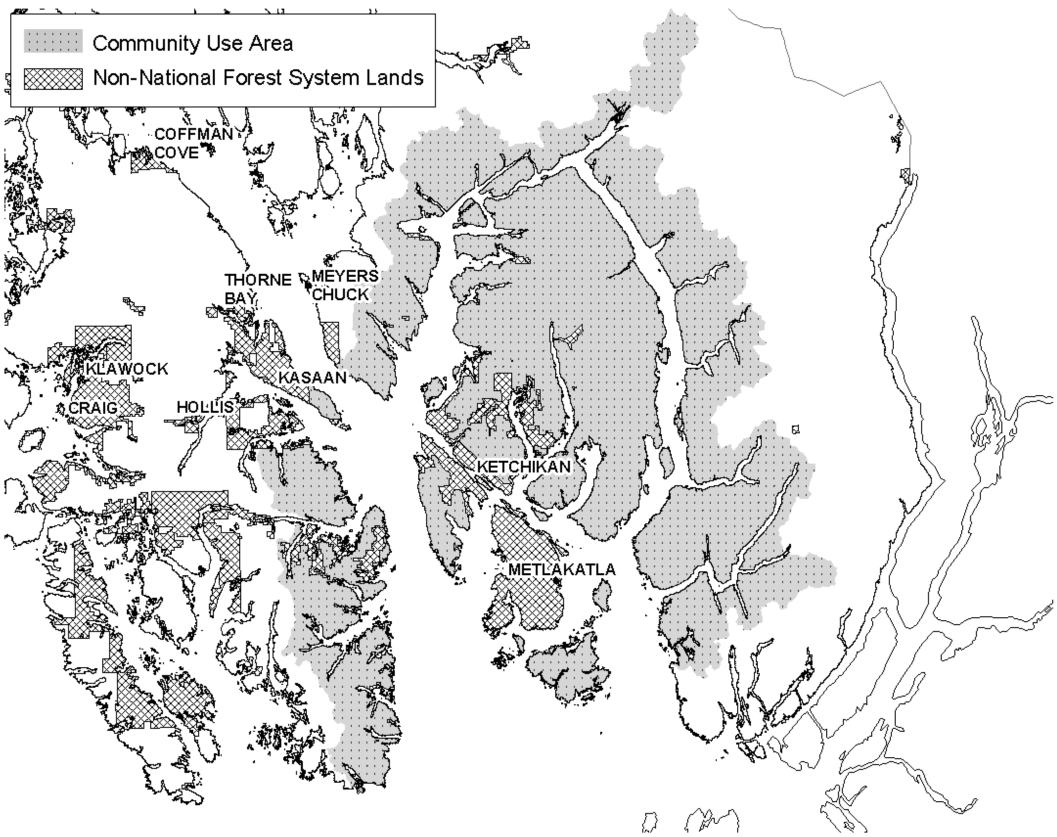


Table 3.23-37
LUD Groups in Metlakatla's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	47,897	90,739	111,299	176,699	127,271	124,987	204,834
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	934,620	934,619	934,619	934,616	934,620	934,619	934,619
Mostly Natural	943,733	764,232	665,107	417,910	618,698	615,905	396,436
Moderate Development	36,231	82,362	88,211	187,083	100,554	97,706	199,418
Intensive Development	60,538	193,909	287,185	435,514	321,252	326,892	444,655
Total	**1,975,122**	**1,975,122**	**1,975,122**	**1,975,123**	**1,975,123**	**1,975,122**	**1,975,129**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Development LUDs presently account for about 21 percent of the total acreage within the Metlakatla community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 and 2. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 31 percent under Alternative 5 (No Action) to 48 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-37). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 32 percent and 33 percent under Alternatives 4 and 7, respectively, compared to 21 percent under Alternative 5.

Total suitable acres would range from 2 percent under Alternative 1 to 10 percent under Alternative 7, compared to 6 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Economy

Metlakatla could be affected primarily by changes in commercial fishing, timber processing, and subsistence opportunities.

Commercial fisheries employment is not likely to be affected under any of the alternatives. As noted above, the two sawmills in Metlakatla are presently idle and not expected to re-open. Alternatives 1 and 2 would provide sufficient volume to support the existing Southeast Alaska sawmills operating at their current production levels. The sawmills in Metlakatla would be unlikely to re-open under these alternatives.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 75 percent of the total edible pounds of subsistence resources harvested by Metlakatla households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 75 percent of per capita subsistence harvest in Metlakatla in 1987.

The 1988 TRUCS study found that deer account for 15 percent of the total edible pounds of subsistence resources harvested by Metlakatla households (Kruse and Frazier 1988). Deer accounted for 15 percent of per capita subsistence harvest by Metlakatla residents in 1987 (ADF&G 2006).

The majority of deer harvest by Metlakatla residents occurs in the vicinity of the community in GMU 1A and on north Prince of Wales Island in GMU 2. Deer harvest in GMU 1A generally declined from 1997 to 2004, with the number of hunters and hunter effort also decreasing over this period (ADF&G 2005). Deer harvest in GMU 2 generally increased between 1997 and 2000 and subsequently declined between 2001 and 2004. The average number of days required to harvest a deer, however, remained constant across the entire period (ADF&G 2005). As noted above, the human population of Metlakatla increased from 1970 to 1990, declined from 1990 to 2000, and declined a further estimated 2 percent from 2000 to 2005. Metlakatla had an estimated population of 1,342 in 2005.

The majority (70 percent) of deer harvest by Metlakatla residents takes place in three WAAs located in the vicinity of the community (WAAs 101, 202, and 405) (Table 3.23-38). Metlakatla residents account for 100 percent of rural harvest in these WAAs and from 33 percent to 90 percent of total harvest. The other WAA identified as important to Metlakatla residents in Table 3.23-38, is located on north Prince of Wales Island. Metlakatal residents account for just 2 percent of rural harvest in this area. About 60 percent of the combined harvest in these WAAs is by non-rural hunters, suggesting that there is a harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

Table 3.23-38
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Metlakatla Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Metlakatla Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
101	16	16	99	94	94	89	87	86	86	86	85
202	8	8	12	0	0	0	0	0	0	0	0
405	3	3	31	83	80	74	73	73	74	73	71
1529	3	122	226	73	63	61	60	56	59	59	50

*Calculated based on harvest where location is known

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted in the Metlakatla community use area by Metlakatla residents, all rural hunters, and all hunters in both the long term and short term.

In summary, use of most subsistence resources by Metlakatla residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its overall emphasis on Development LUDs, and lower under the other six alternatives. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. The two WAAs of highest importance to Metlakatla hunters have existing open and total road densities ranging from less than 0.1 to 0.8 mile per square mile (for all ownerships combined). Long-term (100+ years) road development would vary by alternative and would result in estimated maximum total road densities ranging from 0.2 to 2.3 miles per square mile in these WAAs under

Alternative 1, to 0.5 to 2.3 miles per square mile in these WAAs under Alternative 7 (for all ownerships combined); however, the contribution of Tongass lands to these projected road densities is relatively small.

Meyers Chuck

Meyers Chuck is a small fishing village on the northwest tip of Cleveland Peninsula, 40 miles northwest of Ketchikan. According to the 2000 Census, Meyers Chuck had a 2000 population of 21, none of whom were Alaska Native (U.S. Census Bureau 2001).

Beginning as a protected anchorage for fishing vessels, Meyers Chuck grew with the building of a cannery in Union Bay in 1916. Postal service began in 1922. Fishing and fish processing, and support services sustained the community until the mid-1900s. Fishing and fish processing are still the basic sources of income in the community.

Meyers Chuck's population was the same in 1990 as it was in 1970, but declined by 16 residents, or 43 percent, between 1990 and 2000. The population declined by a further 6 people or 29 percent between 2000 and 2005. Total estimated population was 11 in Meyers Chuck in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	37	50	37	21	15	11

Source: USDA Forest Service, 1997a; U.S. Census Bureau, 2001; Alaska DOL, 2007a

The Meyers Chuck economy is primarily based on fishing with five residents (25 percent of the population) holding commercial fishing licensees. Due to the relatively few cash opportunities, many residents depend on subsistence activities (Alaska DCED, 2002).

Employment by industry data for Meyers Chuck is not included because it was based on a very small sample size and may not be a good indicator of the economy as a whole. The 2000 U.S. Census identified 3 people as employed in a potential workforce of 13 residents. While no adults in Meyers Chuck were identified as unemployed and seeking work in 2000, 77 percent of the population was identified as unemployed and not seeking work. Median household income was $64,375 compared to a regional median of $44,118 (Alaska DCED, 2002).

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Meyers Chuck is part of the Cleveland Peninsula community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Meyers Chuck in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-19. This area contains 380,308 acres of National Forest System land (among other land ownerships). Table 3.23-39 shows how the land within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 30 percent of the total acreage within the Meyers Chuck community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would

Figure 3.23-19
Meyers Chuck's Community Use Area

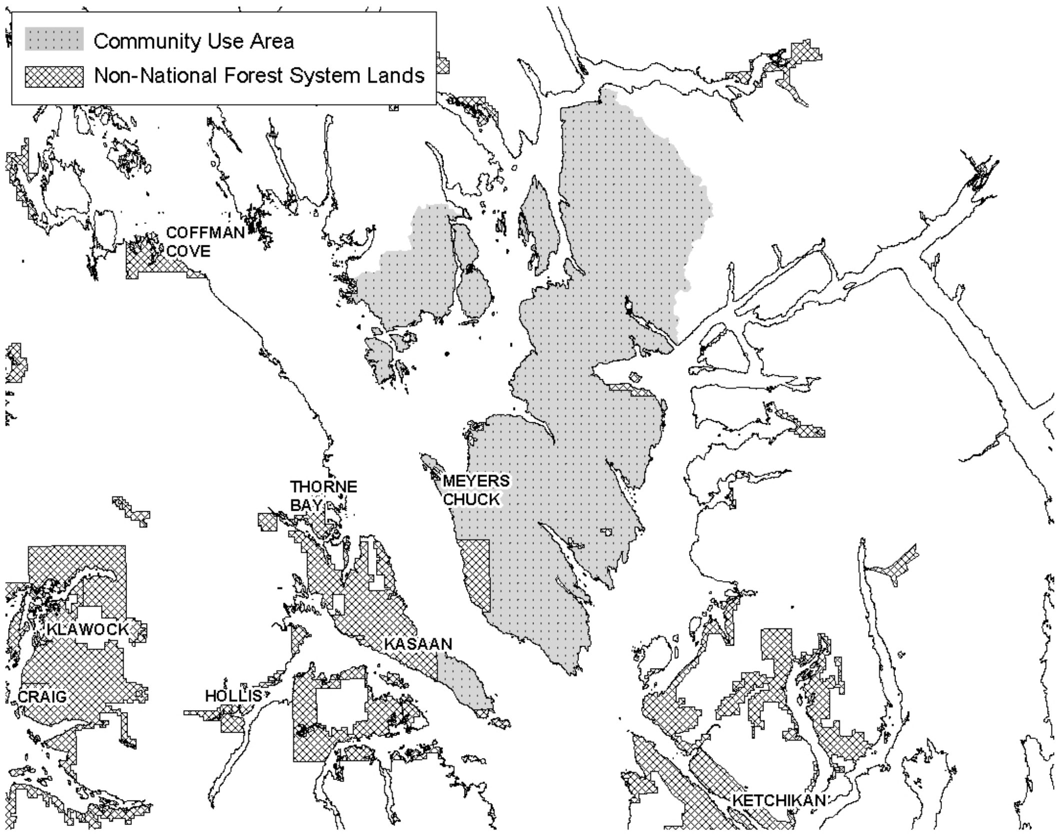


Table 3.23-39
LUD Groups in Meyers Chuck's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	0	2,222	11,711	56,183	31,849	31,259	78,597
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	48,596	48,596	48,596	48,596	48,596	48,596	48,596
Mostly Natural	329,712	324,174	281,769	134,504	214,661	212,167	89,166
Moderate Development	0	2,191	19,138	69,814	33,310	32,295	92,573
Intensive Development	0	3,348	28,805	125,413	81,742	85,251	147,974
Total	**378,308**	**378,308**	**378,308**	**378,327**	**378,308**	**378,308**	**378,308**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

occur under Alternatives 1, with the acreage allocated to Mostly Natural LUDs increasing from 56 percent under Alternative 5 (No Action) to 87 percent, with a commensurate reduction in development LUDs (Table 3.23-39). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 52 percent and 64 percent under Alternatives 4 and 7 compared to 30 percent under Alternative 5.

Total suitable acres would range from no acreage under Alternative 1 to 21 percent under Alternative 7, compared to 8 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Economy

Meyers Chuck is primarily a fishing community and would be primarily influenced by changes in fishing. Commercial fishing is not likely to be affected under any of the alternatives.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 80 percent of the total edible pounds of subsistence resources harvested by Meyers Chuck households (Kruse and Frazier, 1988). Marine resources (fish and marine invertebrates) accounted for the majority (83 percent) of per capita subsistence harvest in Meyers Chuck in 1987.

The 1988 TRUCS study found that deer account for 5 percent of the total edible pounds of subsistence resources harvested by Meyers Chuck households (Kruse and Frazier, 1988). Deer accounted for 5 percent of per capita subsistence harvest by Meyers Chuck residents in 1987 (ADF&G 2006).

The WAAs used by Meyers Chuck residents for hunting deer lie within GMUs 1A, 2, and 4. Meyers Chuck had an estimated population of 15 in 2005 and this is reflected in the small total number of deer harvested by community residents (Table 3.23-40). Four WAAs accounted for more than 75 percent of the annual average harvest by Meyers Chuck residents from 1996 to 2002. The WAA located in GMU 4 (3308) is located outside the Meyers Chuck community use area and was only hunted in one year. This WAA is not considered further in this analysis.

Deer harvest in GMU 1A generally declined from 1997 to 2004, with the number of hunters and hunter effort also decreasing over this period (ADF&G 2005). Deer harvest in GMU 2 generally increased between 1997 and 2000 and subsequently declined between 2001 and 2004. The average number of days required to harvest a deer, however, remained constant across the entire period (ADF&G 2005).

Meyers Chuck residents take almost half (49 percent) of their deer from three WAAs (1003, 614, and 1319). These WAAs would each be affected under the alternatives, with the greatest effects occurring under Alternatives 4 and 7 (Table 3.23-40).

In summary, use of most subsistence resources (fish and marine invertebrates) by Meyers Chuck residents is not expected to be affected under any of the alternatives. Subsistence deer harvest patterns would be most likely to be affected under Alternative 7, which allocates the largest share of WAAs used by Meyers Chuck residents to development LUDs.

Table 3.23-40
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Meyers Chuck Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Meyers Chuck Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
1003	4	17	61	66	54	53	53	49	51	52	47
614	2	4	8	98	98	98	98	72	98	98	70
3308	2	98	158	66	64	59	57	53	56	57	51
1319	2	177	220	74	69	67	66	59	64	64	54

*Calculated based on harvest where location is known.

Naukati Bay

Naukati Bay is a town, approximately 6.5 square miles in size, located on the northwest coast of Prince of Wales Island. According to the 2000 Census, Naukati Bay had a 2000 population of 135, with Alaska Natives comprising 10 percent of the total (U.S. Census Bureau 2001).

The U.S. Coast and Geodetic Survey named the area “Naukatee Nay” in 1904 after the local Native name. Naukati Bay was first developed as a logging camp, but in 1991 an area approximately a mile from the camp was opened by the State Department of Natural Resources as a land disposal site for homesteaders (Alaska DCED 2006).

The population of Naukati Bay increased by 42 people or 45 percent between 1990 and 2000. The population declined by 29 people or 21 percent between 2000 and 2005. Total estimated population was 129 in Naukati Bay in 2006 (Alaska DOL 2007a).

Year	1990	2000	2005	2006
Population	93	135	106	129

Source: USDA Forest Service, 1997a; U.S. Census Bureau 2001; Alaska DOL, 2007a

The Naukati Bay economy is heavily dependent on the timber industry and employment is primarily seasonal. The Naukati Logging camp provides log transfer services for several smaller camps on Prince of Wales Island (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 29 percent of the labor force in Naukati Bay was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $27,500, compared to a regional median of $44,118 (Alaska DCED 2002).

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Naukati Bay is located in the Thorne Bay Ranger District and is part of the North Prince of Wales community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record. Wood products employment in the North Prince of Wales community group declined by 186 jobs or 69 percent between 1990 and 1999. Wood products employment accounted for 83 jobs or 23 percent of total employment in this community group in 1999.

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	17	44
Construction	2	5
Manufacturing	0	0
Wholesale Trade	0	0
Retail Trade	2	5
Transportation, Warehousing & Utilities	0	0
Information	2	5
Finance, Insurance, Real Estate, Rental & Leasing	0	0
Professional, Scientific, Management, Administrative & Waste Mgmt	2	5
Education, Health & Social Services	9	23
Arts, Entertainment, Recreation, Accommodation & Food Services	3	8
Other Services (Except Public Admin)	0	0
Public Administration	2	5
Total Employment	**39**	**100**

Source: Alaska DCED 2002

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Naukati Bay in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-20. This area contains 1,109,349 acres of National Forest System land (among other land ownerships). Table 3.23-41 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 48 percent of the total acreage within the Naukati Bay community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 45 percent under Alternative 5 (No Action) to 63 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-41). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 55 percent and 69 percent under Alternatives 4 and 7, respectively, compared to 48 percent under Alternative 5.

Total suitable acres would range from 15 percent under Alternative 1 to 28 percent under Alternative 7, compared to 19 percent of the total community use area under Alternative 5 (No Action).

Economy

Naukati Bay is primarily a logging community and as such will be directly affected by the amount of logging opportunities on north Prince of Wales Island. Approximately 6.5 MMBF was under contract in the Thorne Bay Ranger District in August 2006. This volume would not be affected under any of the alternatives. These data provide an indication of potential impacts, actual impacts would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales were cancelled as part of the decision.

Figure 3.23-20
Naukati Bay's Community Use Area

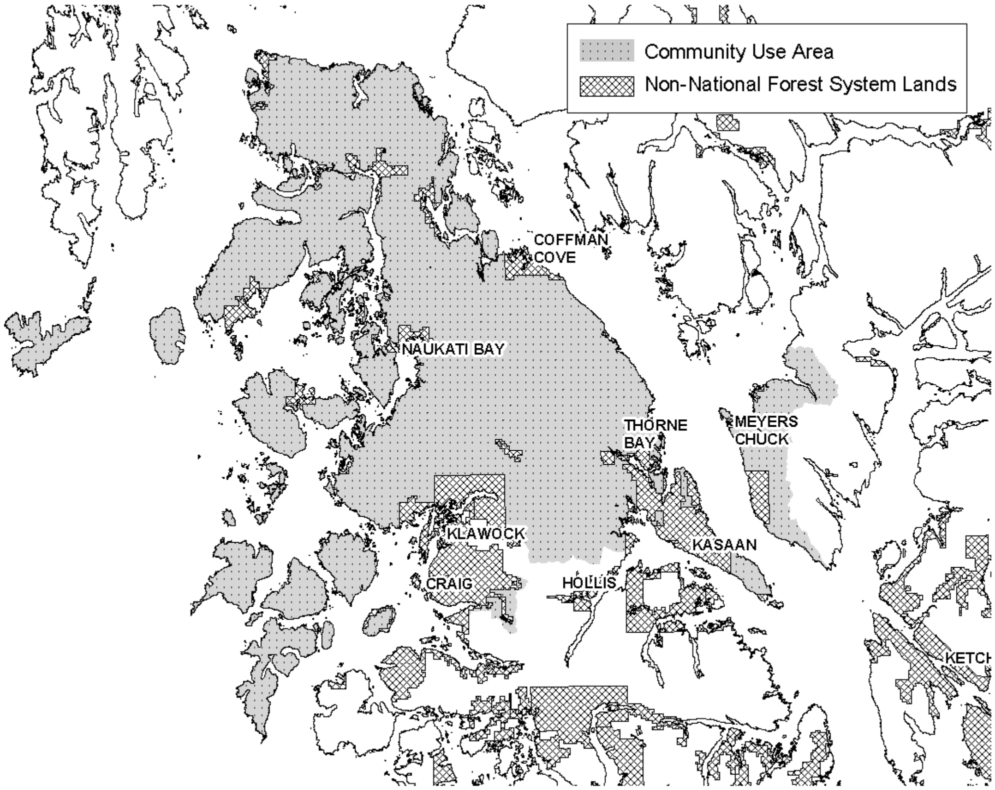


Table 3.23-41
LUD Groups in Naukati Bay's Community Use Area by Alternative

	Alternative						
	1	2	3	4	5	6	7
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	168,053	182,465	193,690	228,053	210,908	204,686	308,479
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	75,923	75,923	75,923	75,923	75,923	75,923	75,923
Mostly Natural	695,124	615,063	556,587	423,984	500,059	509,065	268,147
Moderate Development	95,904	112,411	139,346	168,888	160,274	159,214	265,623
Intensive Development	242,395	305,951	337,493	440,556	373,094	365,146	499,656
Total	**1,109,347**	**1,109,348**	**1,109,350**	**1,109,351**	**1,109,350**	**1,109,348**	**1,109,349**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Subsistence

Naukati Bay was not surveyed by the Tongass Resource Use Cooperative Survey, and there are no baseline subsistence data for this community. No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. Marine resources (fish and marine invertebrates) accounted for 73 percent of per capita subsistence harvest in Naukati Bay in 1987.

Deer accounted for 19 percent of per capita subsistence harvest by Naukati Bay residents in 1988 (ADF&G 2006).

Naukati Bay residents harvest deer almost entirely on Prince of Wales Island, which is included in GMU 2. Deer harvest and hunter effort in GMU 2 generally increased during 1997-2000 and subsequently declined during 2000 to 2004; however, no change has been noted in the average number of hunter-days required to harvest a deer (ADF&G 2005). As noted above, Naukati Bay's human population decreased by an estimated 21 percent between 2000 and 2005.

Residents of Naukati Bay harvest the majority (78 percent) of their deer from three WAAs on north Prince of Wales Island (1422, 1527, and 1529). As shown in Table 3.23-42, the Naukati Bay portion ranges from 4 percent to 28 percent of the total harvest and from 7 percent to 46 percent of the rural hunter harvest in these WAAs. About 37 percent of the combined harvest in these WAAs is by non-rural hunters, suggesting that there is a harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

Table 3.23-42
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Naukati Bay Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Naukati Bay Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
1422	53	209	300	60	50	48	47	46	47	47	43
1527	14	31	50	73	65	61	60	60	59	59	55
1529	8	122	226	73	63	61	60	56	59	59	50

*Calculated based on harvest where location is known.

WAAs 1422, 1527, and 1529 occur in an area with substantial past harvest and, therefore, deer habitat capabilities are currently estimated to be considerably below 1954 levels (Table 3.23-42). Under each of the alternatives, additional harvest would occur that would reduce habitat capabilities after 100+ years to 43-50 percent of 1954 levels in WAA 1422, 55-65 percent in WAA 1527, and 50-63 percent in WAA 1529.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted in the Naukati Bay community use area by Naukati residents, all rural hunters, and all hunters in the short term. Projected deer harvest for all rural hunters and all hunters would exceed 10 percent habitat capability, the level that the analysis assumed would provide a reasonably high level of hunter success for their effort in the long term. The Final EIS analysis concluded that at some point a restriction in hunting might be necessary.

In summary, use of most subsistence resources by Naukati Bay residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its overall emphasis on Development LUDs within the Naukati Bay use area, and lower under the other six alternatives. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within Naukati Bay's subsistence use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters. The level of road development is already relatively high in these WAAs. Existing open road densities are 1.0. 0.9, and 0.9 mile per square mile and existing total road densities are 1.9, 1.5, and 1.5 miles per square mile in WAAs 1422, 1527, and 1529, respectively). Long-term (100+ years) road development would vary by alternative and would result in estimated maximum total road densities ranging from 1.7 to 2.1 mile per square mile in these WAAs under Alternative 1, to 1.9 to 2.5 miles per square mile in these WAAs under Alternative 7 (for all ownerships combined).

Pelican

Pelican is a fishing village along Lisianski Inlet on the northwest corner of Chichagof Island, located approximately 70 air miles north of Sitka and 70 air miles west of Juneau. Part of the community is built on pilings over tideland. A boardwalk serves as the town's main thoroughfare due to lack of flat land for roads. According to the 2000 Census, Pelican had a 2000 population of 199, with Alaska Natives comprising 21 percent of the total (U.S. Census Bureau 2001).

Prior to its settlement in 1938, the Pelican area was used as a safe harbor by fishermen and as a hunting, fishing, trapping, and gathering site by Hoonah Tlingit groups, who claimed lands on either side of Cross Sound (ADF&G 1994).

Pelican was incorporated as a second class city in 1943. Pelican employs a full-time city manager and is governed by a mayor and city council. The community has a local Fish and Game Advisory Committee. The Native community, largely Tlingit, is represented by a local Tlingit and Haida Community Council. No Native land allotments or withdrawals occur in the immediate vicinity of Pelican. Pelican is accessible via the Alaska ferry system, as well as floatplane from Juneau or Sitka (ADF&G 1994).

The population of Pelican, which grew by 67 percent between 1970 and 1990, decreased by 27 percent between 1990 and 2000. The population continued to decline in the first part of this decade, decreasing by 48 people or 29 percent between 2000 and 2005. Total estimated population was 106 in Pelican in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	133	180	222	163	115	106

Source: USDA Forest Service, 1997a; U.S. Census Bureau, 2001; Alaska DOL, 2007a

The Pelican economy is primarily based on commercial fishing (41 residents hold permits) and seafood processing. Pelican Seafoods, the largest employer, operates a seafood processing plant, the electric utility, a fuel company, and a store. It was purchased by Kaioh Suisan, a Japanese firm, in 1989 and then closed in 1996. It was subsequently purchased by Kake Tribal Corporation and re-opened during the same year. The plant processes salmon, halibut, sable fish, rockfish, and dungenesss crab (Alaska DCED 2002).

There have been low levels of tourism in Pelican for some time but more recently with the decline in commercial fishing tourism has begun to play a more important role in the local economy (Dugan et al. 2006). Tourism in Pelican is primarily focused on sport fishing and marine wildlife viewing charters, with 12 marine charters operating out of the town in 2005. The town also serves as a jumping-off point for independent travelers accessing nearby wilderness.

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 8 percent of the labor force in Pelican was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $48,750, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	21	26
Construction	2	2
Manufacturing	25	31
Wholesale Trade	0	0
Retail Trade	3	4
Transportation, Warehousing & Utilities	7	9
Information	0	0
Finance, Insurance, Real Estate, Rental & Leasing	0	0
Professional, Scientific, Management, Administrative & Waste Mgmt	2	2
Education, Health & Social Services	16	20
Arts, Entertainment, Recreation, Accommodation & Food Services	0	0
Other Services (Except Public Admin)	0	0
Public Administration	5	6
Total Employment	**81**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Pelican is part of the North Chichagof community group, which also includes Elfin Cove and Hoonah (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record. Manufacturing and non-federal government were the major employers in the North Chichagof community group in 1999, accounting for 34 and 30 percent of total employment, respectively. Logging and seafood processing accounted for 24 and 10 percent of total employment, respectively.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Pelican in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-21. This area contains 488,851 acres of National Forest System land (among other land ownerships). Table 3.23-43 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs account for less than one percent of the lands in the Pelican community use area under Alternative 5 (No Action). The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The main difference between the alternatives is the amount of acres allocated to development LUDs. Under Alternatives 4 and 7, approximately 5 percent of the area would be allocated to development LUDs, compared to less than 1 percent under Alternatives 2, 3, 5, and 6 and zero under Alternative 1.

Figure 3.23-21
Pelican's Community Use Area

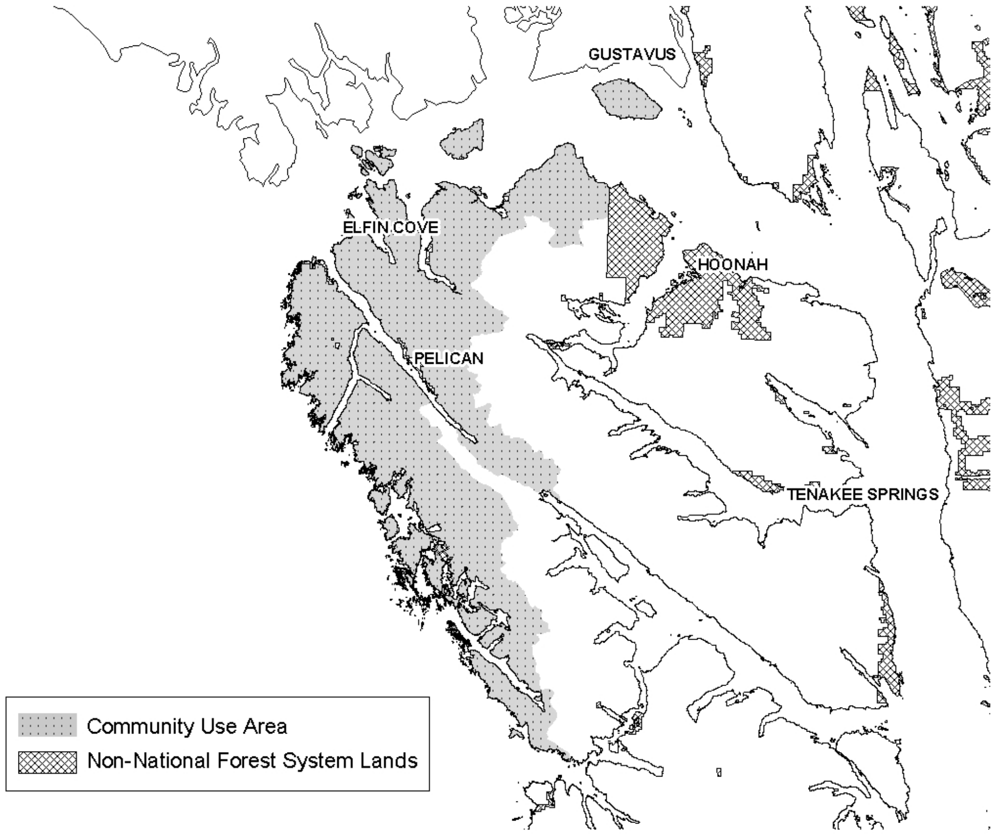


Table 3.23-43
LUD Groups in Pelican's Community Use Area by Alternative

	Alternative						
	1	2	3	4	5	6	7
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	0	972	972	8,063	820	972	8,127
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	245,569	245,569	245,569	245,569	245,569	245,569	245,569
Mostly Natural	243,281	240,434	240,430	218,829	240,602	240,425	218,829
Moderate Development	0	0	0	1,729	0	0	1,729
Intensive Development	0	2,848	2,851	22,723	2,679	2,857	22,723
Total	**488,851**	**488,851**	**488,851**	**488,851**	**488,851**	**488,851**	**488,851**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Economy
Pelican is primarily a commercial fishing and seafood processing town. Employment within the community is expected to remain stable as long as the Pelican Seafoods plant continues to operate. Commercial fishing is not expected to be significantly affected under any of the alternatives.

Subsistence
In terms of subsistence use, Lisianski Inlet, Icy Strait, northwest Chichagof, and Yakobi Island are the most important areas to Pelican. These areas are presently legislatively withdrawn from timber harvest as either Wilderness or LUD II or allocated to the Mostly Natural LUDs. Therefore, it is unlikely that subsistence use in Pelican would be directly affected under any of the alternatives.

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 63 percent of the total edible pounds of subsistence resources harvested by Pelican households (Kruse and Frazier, 1988). Marine resources (fish and marine invertebrates) accounted for 64 percent of per capita subsistence harvest in Pelican in 1987.

The 1988 TRUCS study found that deer account for 30 percent of the total edible pounds of subsistence resources harvested by Pelican households (Kruse and Frazier, 1988). Deer accounted for 30 percent of per capita subsistence harvest by Pelican residents in 1987 (ADF&G 2006).

The WAAs used by Pelican residents for hunting deer lie within Game Management Unit (GMU) 4. Deer harvest in GMU 4 is considered very high relative to other areas of Southeast Alaska, which is indicative of relatively high deer populations (ADF&G 2005). Over 1997-2004, there has been no significant trend in the number of deer harvested or in the number of hunters (ADF&G 2005). As noted above, the number of residents in Pelican decreased by 29 percent from 2000 to 2005.

Pelican residents take the majority (94 percent) of their deer from three WAAs on northwestern Chichagof Island (3417, 3418, and 3419). As shown in Table 3.23-44, these WAAs would not be affected by any of the alternatives because they are in wilderness, LUD II areas, or are in other Non-development LUDs.

Table 3.23-44
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Pelican Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Pelican Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
3418	37	62	70	100	100	100	100	100	100	100	100
3419	35	35	47	100	100	100	100	100	100	100	100
3417	28	100	159	100	100	100	100	100	100	100	100

*Calculated based on harvest where location is known.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted in the Pelican community use area by Pelican residents, all rural hunters, and all hunters in the short term and long term.

In summary, use of most subsistence resfources (fish and marine invertebrates) by Pelican residents is not expected to be affected under any of the alternatives. In addition, subsistence use of deer by Pelican households would not be directly affected by any of the alternatives as the areas most heavily used by Pelican. Marine resources (fish and marine invertebrates) accounted for 64 percent of per capita subsistence harvest in Pelican in 1987.

Petersburg and Kupreanof

Petersburg is located on the northern tip of Mitkof Island across Wrangell Narrows from Kupreanof Island. It lies midway between Juneau and Ketchikan, about 120 miles from either community. According to the 2000 Census, Petersburg had a 2000 population of 3,224, with Alaska Natives comprising 7 percent of the total (U.S. Census Bureau 2001). The community of Kupreanof, with a population of 23 in 2000, is located less than one mile from Petersburg, on Kupreanof Island. This settlement is economically tied to Petersburg, where most residents find employment, purchase goods, and attend school (ADF&G 1994).

Prior to Petersburg's development by homesteaders and fishermen around 1900, Tlingit use of the area occurred at many small settlements (ADF&G 1994). The community of Petersburg was founded by Norwegian Peter Buschmann in 1899 and incorporated in 1906. More Norwegians followed and settled into a Scandinavian-style community. Petersburg has a local Fish and Game Advisory Committee, which takes an active interest in resource management issues (ADF&G 1994).

The population of Petersburg, which increased by 57 percent between 1970 and 1990, increased by less than 1 percent between 1990 and 2000. The population decreased by 69 people or 2 percent between 2000 and 2005. Total estimated population was 3,129 in Petersburg in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	2,042	2,821	3,207	3,224	3,155	3,129

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

The Petersburg economy is primarily based on the commercial fishing (469 residents have commercial fishing permits) and timber industries and, unlike the rest of Southeast Alaska, has escaped the severe swings in economic cycles. Estimated gross fishing revenues of local residents was almost $22 million in 2000. Petersburg is among the top-ranked ports in the United States for quality and value of fish landed. The city includes several processors operating cold storage, canneries, and custom packing services and the state-run Crystal Lake salmon hatchery. Petersburg also provides supplies and services for many of the area logging camps. While there is no deep water dock suitable for cruise ships, there is independent sportsmen and tourist visitation (Alaska DCED, 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 10 percent of the labor force in Petersburg was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $49,028, compared to a regional median of $44,118 (Alaska DCED, 2002).

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Petersburg and Kupreanof are part of the Petersburg community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record.

Non-federal government and seafood processing were the main employers in the Petersburg community group in 1999, accounting for 25 and 24 percent of total employment, respectively. Employment in the wood products sector declined by 93 percent between 1990 and 1999, with just 5 people employed in this sector in 1999. Three sawmills, The Mill, Alaska Fibre, and Southeast Alaska Wood Products, were identified in Petersburg in the mill survey conducted for the Forest Service in 2006. The mill survey noted that Alaska Fibre sold its primary processing equipment in 2005, but reportedly has plans to purchase and install new equipment (Juneau Economic Development Council 2007). According to the 2006 mill survey, The Mill and Southeast Alaska Wood Products had respective installed production capacities of 8.5 MMBF and 4.5 MMBF, and together processed approximately 250 MBF in 2006 and employed 2 people (Juneau Economic Development Council 2007).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	301	20
Construction	75	5
Manufacturing	136	9
Wholesale Trade	6	0
Retail Trade	165	11
Transportation, Warehousing & Utilities	111	7
Information	60	4
Finance, Insurance, Real Estate, Rental & Leasing	25	2
Professional, Scientific, Management, Administrative & Waste Mgmt	39	3
Education, Health & Social Services	268	18
Arts, Entertainment, Recreation, Accommodation & Food Services	128	8
Other Services (Except Public Admin)	96	6
Public Administration	118	8
Total Employment	**1,528**	**100**

Source: Alaska DCED 2002

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Petersburg in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-22. This area contains 742,197 acres of National Forest System land (among other land ownerships). Table 3.23-45 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for about 40 percent of the total acreage within the Petersburg community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 30 percent under Alternative 5 (No Action) to 58 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-45). Alternatives 4 and 7 would increase the acreage in development LUDs.

Figure 3.23-22
Petersburg's Community Use Area

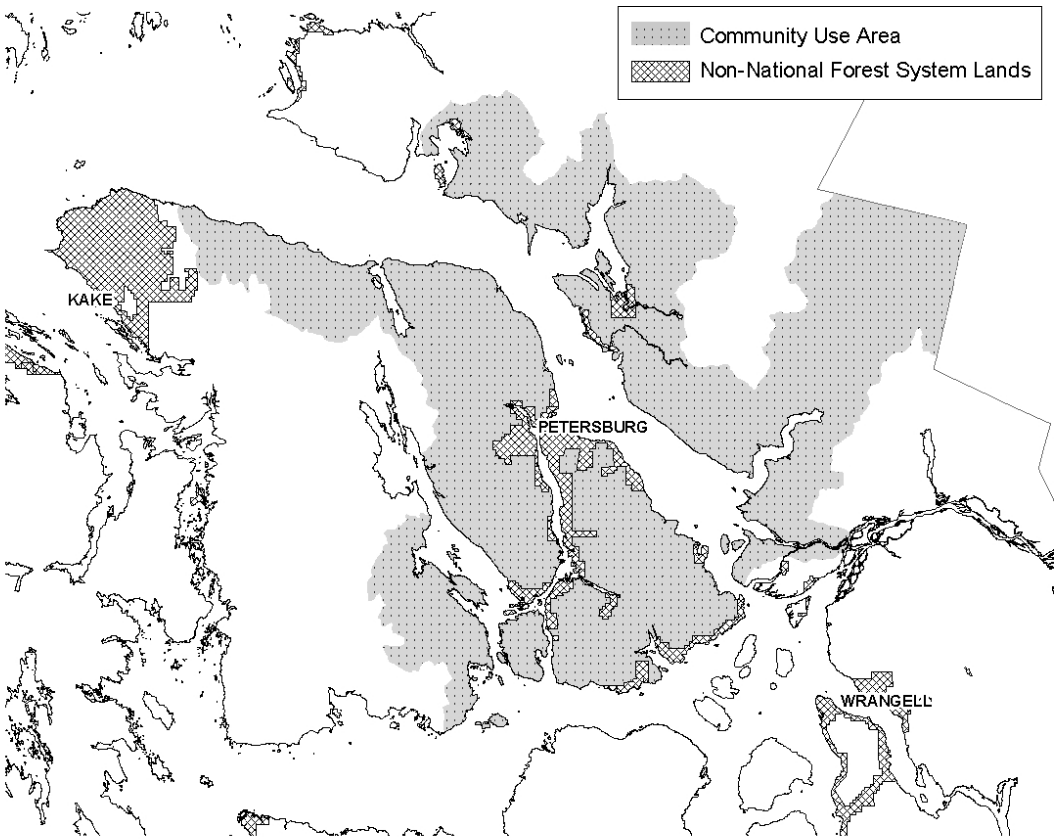


Table 3.23-45
LUD Groups in Petersburg's Community Use Area by Alternative

	Alternative						
	1	2	3	4	5	6	7
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	37,346	64,756	80,848	99,068	86,229	86,177	115,610
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	223,285	223,285	223,285	223,285	223,285	223,285	223,285
Mostly Natural	432,243	336,442	251,709	170,174	223,095	233,287	125,381
Moderate Development	45,518	100,014	147,536	195,479	162,219	160,680	220,238
Intensive Development	41,151	82,456	119,667	153,259	133,598	124,946	173,300
Total	**742,197**	**742,197**	**742,197**	**742,198**	**742,198**	**742,197**	**742,205**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Development LUDs would account for 47 percent and 53 percent under Alternatives 4 and 7, respectively, compared to 40 percent under Alternative 5.

Total suitable acres would range from 5 percent under Alternative 1 to 16 percent under Alternative 7, compared to 12 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Economy

Commercial fishing is particularly important to Petersburg. Commercial fisheries employment is not likely to be affected under any of the alternatives. Southeast Alaska Wood Products had 1.7 MMBF under contract with the Forest Service in August 2006. This volume would not be affected under any of the alternatives. Approximately 20.6 MMBF is presently under contract in the Petersburg Ranger District in August 2006. About 4.6 MMBF of this volume would be affected under Alternative 1, which would maintain all Inventoried Roadless Areas on the Tongass in a natural condition and not permit timber harvest in these areas. None of the other alternatives would affect this volume. These data provide an indication of potential impacts, actual impacts would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales were cancelled as part of the decision.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 52 percent of the total edible pounds of subsistence resources harvested by Petersburg households (Kruse and Frazier, 1988). Marine resources (fish and marine invertebrates) accounted for 65 percent of per capita subsistence harvest in Petersburg in 1987.

The 1988 TRUCS study found that deer accounted for 21 percent of the total edible pounds of subsistence resources harvested by Petersburg households (Kruse and Frazier 1988). Deer accounted for 22 percent of per capita subsistence harvest by Petersburg residents in 1987 (ADF&G 2006).

Petersburg residents harvest deer on and around Mitkof and Kupreanof Islands, with the majority of harvest occurring within GMUs 3 and 4. Deer harvest in GMU 3 declined between 1998-2002 and increased between 2002-2004. The number of deer hunters declined between 2000-2002 and slightly increased between 2002-2004 (ADF&G 2005). Deer harvest in GMU 4 is considered very high relative to other areas of Southeast Alaska, which is indicative of relatively high deer populations (ADF&G 2005). Over 1997-2004, there has been no significant trend in the number of deer harvested or in the number of hunters (ADF&G 2005). As noted above, the human population of Petersburg declined by an estimated 2 percent between 2000 and 2005. Petersburg had an estimated human population of 3,155 in 2005.

Eight WAAs account for the majority (78 percent) of deer harvest by Petersburg residents. As shown in Table 3.23-46, the Petersburg portion represents about three-quarters of the total and rural hunter harvest in these WAAs.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted by Petersburg residents in the short term and long term. There was also sufficient habitat capability for deer hunted in the Petersburg community use area by all rural hunters in both the short term and long

Table 3.23-46
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Petersburg Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Petersburg Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
2007	143	143	143	79	74	68	67	62	66	65	58
1905	115	400	400	77	72	67	67	59	66	65	57
3939	88	114	125	100	100	100	100	100	100	100	100
1605	52	54	42	76	76	71	64	57	63	63	56
3938	44	52	102	100	100	100	100	100	100	100	100
5138	40	47	49	88	79	70	69	64	68	68	59
5133	36	38	38	98	97	97	96	82	84	85	80
3940	34	75	77	92	92	92	92	92	92	92	92

*Calculated based on harvest where location is known.

term. Projected deer harvest for all hunters would exceed 10 percent habitat capability, the level that the analysis assumed would provide a reasonably high level of hunter success for their effort, in the long term. The Final EIS analysis concluded that at some point a restriction in hunting might be necessary.

In summary, use of most subsistence resources by Petersburg residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer in some of the WAAs hunted by Petersburg residents may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its general lack of Non-Development LUDs within the Petersburg use area, and lower under the other six alternatives. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within Petersburg's subsistence use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters.

Point Baker

Point Baker is located on the northern tip of Prince of Wales Island, 101 air miles northwest of Ketchikan. Point Baker received its name in 1793 from Captain George Vancouver. According to the 2000 Census, Point Baker had a 2000 population of 35, with Alaska Natives comprising 3 percent of the total (U.S. Census Bureau 2001).

Native settlement of the area was already established during Vancouver's time. Tlingits used fish camps at Point Baker to participate in both customary trade and subsistence fishing. Commercial fishing at Point Baker began in the early 1900s, when the area was used as the site of a floating fish packer. Land sales in Point Baker accounted for part of an increase in year-round residents, the majority being non-Native (ADF&G 1994).

Point Baker is accessible by floatplane and skiff. Point Baker is not an incorporated city, nor is it within any other local government jurisdiction. It is not part of any

Native organization and has no traditional council. The town is not recognized under the Alaska Native Claims Settlement Act. Residents of Point Baker are members of the Sumner Strait Fish and Game Advisory Committee (ADF&G 1994).

The population of Point Baker, which decreased by about a half between 1970 and 1990, was fairly constant between 1990 and 2000. The population decreased by an estimated 13 people or 37 percent between 2000 and 2005. Total estimated population was 16 in Point Baker in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	80	90	39	35	22	16

Source: USDA Forest Service, 1997a; U.S. Census Bureau, 2001; Alaska DOL, 2007a

The Point Baker economy is heavily dependent on the fishing industry, with three quarters of the population holding commercial fishing permits (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. These data are an extrapolation based on information from a sample of residents. An extrapolation of a small sample may have inaccuracies but should provide a general indication of the distribution of employment. The 2000 U.S. Census estimated that 15 residents are employed. While no adults in Point Baker were identified as unemployed and seeking work in 2000, 58 percent of the population was identified as not employed and not seeking work. Median household income was $28,000, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	6	40
Construction	0	0
Manufacturing	0	0
Wholesale Trade	0	0
Retail Trade	2	13
Transportation, Warehousing & Utilities	0	0
Information	0	0
Finance, Insurance, Real Estate, Rental & Leasing	0	0
Professional, Scientific, Management, Administrative & Waste Mgmt	0	0
Education, Health & Social Services	5	33
Arts, Entertainment, Recreation, Accommodation & Food Services	0	0
Other Services (Except Public Admin)	0	0
Public Administration	2	13
Total Employment	**15**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Point Baker is part of the North Prince of Wales community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record. Wood products employment in the North Prince of Wales community group declined by 186 jobs or 69 percent between 1990 and 1999. Wood products employment accounted for 83 jobs or 23 percent of total employment in this community group in 1999.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Point Baker in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-23. This area contains 842,636 acres of National Forest System land (among other land ownerships). Table 3.23-47 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 43 percent of the total acreage within the Point Baker community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 48 percent under Alternative 5 (No Action) to 64 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-47). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 52 percent and 61 percent under Alternatives 4 and 7, respectively, compared to 43 percent under Alternative 5.

Total suitable acres would range from 13 percent under Alternative 1 to 25 percent under Alternative 7, compared to 17 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Economy

Commercial fisheries and subsistence use are important to Point Baker. Commercial fisheries employment is not likely to be affected under any of the alternatives.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 59 percent of the total edible pounds of subsistence resources harvested by Point Baker households (Kruse and Frazier, 1988). Marine resources (fish and marine invertebrates) accounted for 79 percent of per capita subsistence harvest in Point Baker in 1996.

The 1988 TRUCS study found that deer account for 27 percent of the total edible pounds of subsistence resources harvested by Point Baker households (Kruse and Frazier 1988). Deer accounted for 16 percent of per capita subsistence harvest by Point Baker residents in 1996 (ADF&G 2006).

Point Baker residents harvest deer on north Prince of Wales Island and Kupreanof Island, which are included in GMUs 2 and 3, respectively. Deer harvest and hunter effort in GMU 2 generally increased during 1997-2000 and subsequently declined during 2000-2004; however, no change has been noted in the average number of hunter-days required to harvest a deer (ADF&G 2005). Deer harvest in GMU 3 declined between 1998-2002 and increased between 2002-2004. The number of deer hunters declined between 2000-2002 and slightly increased between 2002-2004 (ADF&G 2005). Point Baker had a total estimated population of 22 people in 2005, 13 fewer people than in 2000.

Figure 3.23-23
Point Baker's Community Use Area

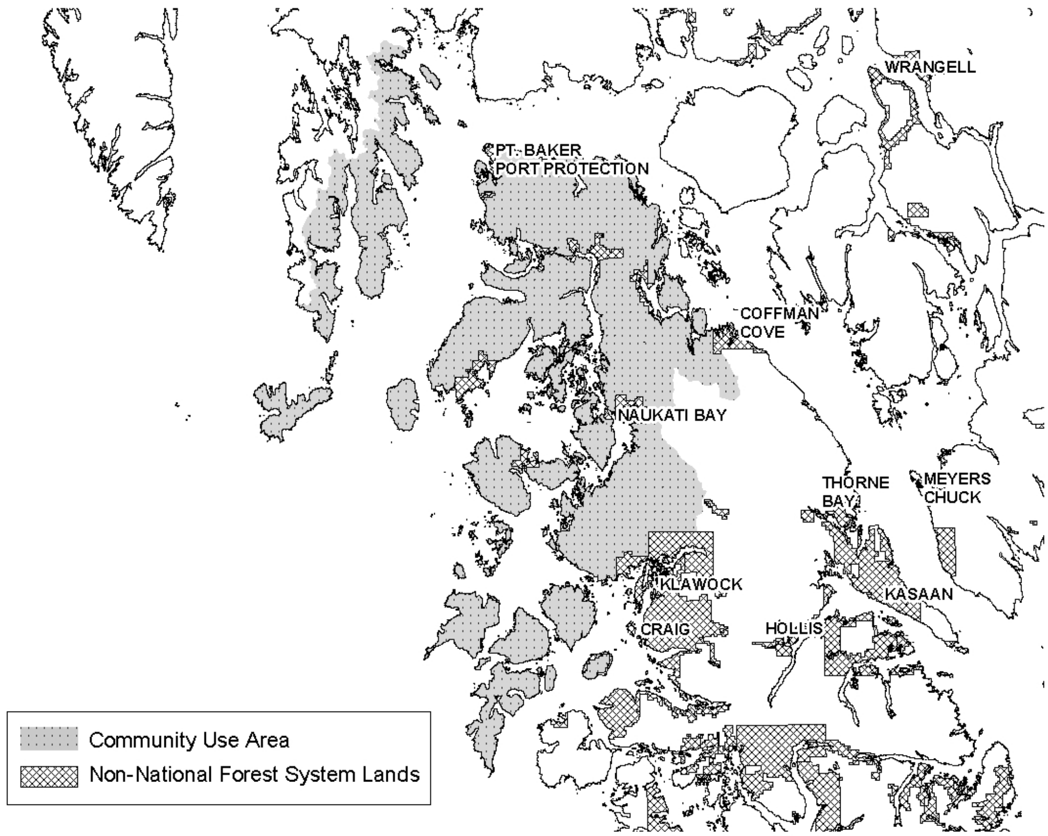


Table 3.23-47
LUD Groups in Point Baker's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	112,293	123,969	130,724	161,202	146,330	141,600	211,416
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	78,757	78,757	78,757	78,757	78,757	78,757	78,757
Mostly Natural	542,684	481,817	446,696	322,317	404,971	411,024	247,568
Moderate Development	47,608	57,686	78,121	98,590	93,354	94,718	133,755
Intensive Development	173,586	224,376	239,064	342,975	265,556	258,138	382,556
Total	**842,635**	**842,636**	**842,638**	**842,638**	**842,638**	**842,636**	**842,636**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Residents of Point Baker harvest the majority (72 percent) of their deer from two WAAs on north Prince of Wales Island (1529) and Kupreanof Island (5134). As shown in Table 3.23-48, the Point Baker portion ranges from 6 percent to 19 percent of the total harvest and from 3 percent to 16 percent of the rural hunter harvest in these WAAs. About 41 percent of the combined harvest in these WAAs is by non-rural hunters, suggesting that there is a harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, selected alternative (Alternative 11 in the 1997 Forest Plan EIS) should be able to provide sufficient habitat capability for deer hunted by Point Baker residents in the short term and long term. There was also sufficient habitat capability for deer hunted in the Point Baker community use area by all rural hunters in both the short term and long term. Projected deer harvest for all hunters would exceed 10 percent habitat capability, the level that the analysis assumed would provide a reasonably high level of hunter success for their effort, in the long term. The Final EIS analysis concluded that at some point a restriction in hunting might be necessary.

In summary, use of most subsistence resources by Point Baker residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer on Prince of Wales Island may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its general emphasis on Development LUDs within the Point Baker use area, and lower under the other six alternatives. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within Point Baker's subsistence use areas on Prince of Wales Island could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters. The level of road development is already relatively high in one of the WAAs most used by Point Baker residents (1529), with an existing open and total road densities of 0.9 and 1.5 miles per square mile, respectively. Road densities are very low in the other WAAs (5014 and 5134) important to Point Baker subsistence deer hunters. Long-term (100+ years) road development would vary by alternative and would result in estimated

Table 3.23-48
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Point Baker Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Point Baker Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
1529	7	122	226	73	63	61	60	56	59	59	50
5134	6	33	39	92	92	92	89	83	87	87	83
5014	2	4	4	96	96	96	96	70	75	75	64

*Calculated based on harvest where location is known.

maximum total road densities ranging from 0.1 to 1.7 mile per square mile in these three WAAs under Alternative 1, to 0.3 to 2.5 miles per square mile in these WAAs under Alternative 7 (for all ownerships combined).

Port Alexander

Port Alexander is located on the southern tip of Baranof Island about 85 miles south of Sitka. According to the 2000 Census, Port Alexander had a 2000 population of 81, with Alaska Natives comprising 4 percent of the total (U.S. Census Bureau 2001).

Port Alexander was named in 1849 by the governor of the Russian American colonies. In 1913, salmon trollers discovered the rich fishing grounds in the area, and two floating processors arrived soon after. By 1916, there was a fishing supply store, a shore station, and a bakery at Port Alexander. During the 1920s and 1930s, a prosperous fishing fleet evolved, and houses, stores, restaurants, and a school were constructed. The 1940s and 1950s saw a steep decline in Port Alexander's population. Today, people choose Port Alexander as a home because of its independent, subsistence lifestyle, and commercial fishing opportunities, as well as its remote setting. There are no roads in Port Alexander; travel within the community is by skiff, boardwalks, and footpaths (ADF&G 1994). The community has a local Fish and Game Advisory Committee.

Port Alexander's population, which was three times larger in 1990 than it was in 1970, decreased by 32 percent (39 residents) between 1990 and 2000. The population stayed relatively constant between 2000 and 2005, decreasing by an estimated 6 people over this period. Total estimated population was 64 in Port Alexander in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	36	86	119	81	75	64

Source: USDA Forest Service 1997a; U.S. Census Bureau 2001; Alaska DOL 2007a

The economy of Port Alexander is largely based on commercial fishing and subsistence use of marine and forest resources. More than 40 percent of the population hold commercial fishing permits (35 residents). The City, the school, and post office provide the only full time employment in the area (Alaska DCED 2002).

Employment by industry data for Port Alexander is not included since it was based on a very small sample size and may not be a good indicator of the economy as a whole. The 2000 U.S. Census identified 29 residents of Port Alexander as being employed out of a potential work force (aAge 16+) of 48. Approximately 9 percent of the labor force in Port Alexander was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $31,563 compared to a regional median of $44,118 (Alaska DCED 2002).

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Port Alexander is part of the Kuiu Island community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record. Logging employment accounted for 91 percent of total employment (77 jobs) in this community group in 1990. There was no logging employment in this community group in 1999, and the non-federal government sector accounted for 13 of the 14 recorded jobs.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Port Alexander in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-24. This area contains 86,828 acres of National Forest System land (among other land ownerships). Table 3.23-49 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

None of Port Alexander's community use area is presently allocated to development LUDs and this would be the case under all the alternatives evaluated in this EIS. There would be no change in the LUD allocation for this community under any of the alternatives.

Economy

Port Alexander is primarily a commercial fishing town. Commercial fishing and subsistence use are important to the community. Commercial fishing is not expected to be significantly affected under any of the alternatives.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 55 percent of the total edible pounds of subsistence resources harvested by Port Alexander households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 55 percent of per capita subsistence harvest in Port Alexander in 1987.

Deer account for 36 percent of the total edible pounds of subsistence resources harvested by Port Alexander households (Kruse and Frazier, 1988). Deer accounted for 35 percent of per capita subsistence harvest by Port Alexander residents in 1987 (ADF&G 2006).

Port Alexander residents take the majority (95 percent) of their deer from one WAA (3734) on the south end of Baranof Island. This WAA is located within GMU 4. Deer harvest in GMU 4 is considered very high relative to other areas of Southeast Alaska, which is indicative of relatively high deer populations (ADF&G 2005). Over 1997-2004, there has been no significant trend in the number of deer harvested or in the number of hunters (ADF&G 2005). Port Alexander's human population declined slightly between 2000 and 2005.

As shown in Table 3.23-50, WAA 3734 would not be affected under any of the alternatives.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted in the Port Alexander community use area by Port Alexander residents, all rural hunters, and all hunters in the short term and long term.

Figure 3.23-24
Port Alexander's Community Use Area

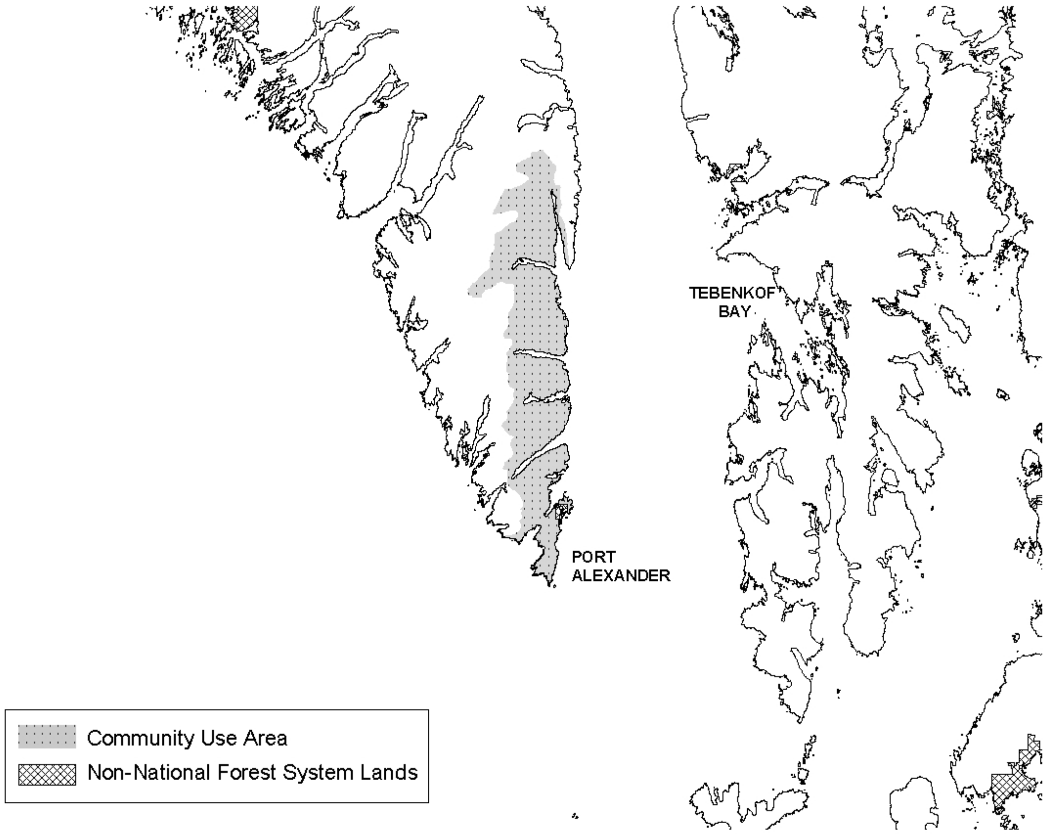


Table 3.23-49
LUD Groups in Port Alexander's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	**0**	**0**	**0**	**0**	**0**	**0**	**0**
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	17,972	17,972	17,972	17,972	17,972	17,972	17,972
Mostly Natural	68,856	68,856	68,856	68,793	68,856	68,856	68,856
Moderate Development	0	0	0	0	0	0	0
Intensive Development	0	0	0	63	0	0	0
Total	**86,828**	**86,828**	**86,828**	**86,828**	**86,828**	**86,828**	**86,828**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Table 3.23-50
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Port Alexander Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Port Alexander Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
3734	38	74	85	100	100	100	100	100	100	100	100

*Calculated based on harvest where location is known.

In summary, use of most subsistence resources (fish and marine invertebrates) by Port Alexander residents is not expected to be affected under any of the alternatives. In addition, subsistence use of deer by Port Alexander households would not be directly affected by any of the alternatives as the area most heavily used by Port Alexander residents is in Non-development LUDs. It is also unlikely that Port Alexander residents would be affected by increased competition or access because of the limited access and the lack of activities under the alternatives in this area.

Port Protection

Port Protection, located on the northern end of Prince of Wales Island in a quiet bay facing Sumner Strait, is only accessible by air and water. The nearby logging camp site at Labouchere Bay, however, is a roaded port. The community's setting along the waterfront of the cove requires skiff travel for most purposes (ADF&G 1994).

Port Protection is not an incorporated city, nor is it within any local government jurisdiction. Residents of Port Protection are members of the Sumner Strait Fish and Game Advisory Committee (ADF&G 1994). According to the 2000 Census, Port Protection had a 2000 population of 63, none of whom were Alaska Natives (U.S. Census Bureau 2001).

Port Protection was first reported to the western world by the English explorer George Vancouver in 1793. Signs of earlier indigenous occupation of the northern shoreline of Prince of Wales Island include stone and wooden stake fish weirs and traps, as well as shell middens of edible marine invertebrates (ADF&G 1994).

A scow served as a fish-buying station until it was replaced in 1946 by a trading post. A long float dock accommodated many fishing boats at the post (ADF&G 1994).

The population of Port Protection, which increased by approximately 50 percent between 1980 and 1990, was approximately the same in 2000 as it was in 1990. The population decreased by an estimated 9 people or 14 percent between 2000 and 2005. Total estimated population was 59 in Port Protection in 2006 (Alaska DOL 2007a).

Year	1980	1990	2000	2005	2006
Population	40	62	63	54	59

Source: USDA Forest Service, 1997a; U.S. Census Bureau, 2001; Alaska DOL, 2007a

The Port Protection economy peaks during the fishing season in summer and fall. Fourteen residents hold a commercial fishing permit and some residents provide sport fishing charters. Local residents depend on subsistence for year-round support (Alaska DCED 2002; 2006).

The 2000 U.S. Census identified a potential work force of 61 residents and total employment of 34. Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. These data is extrapolated from a sample of the city population. Because the sample size was small, the extrapolation is not accurate in detail, but should provide a general indication of distribution of employment. While no adults in Port Protection were unemployed and seeking work in 2000, 44 percent were unemployed and not seeking work. Median household income was $10,938, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	5	5
Construction	5	5
Manufacturing	0	0
Wholesale Trade	2	2
Retail Trade	8	9
Transportation, Warehousing & Utilities	5	5
Information	4	4
Finance, Insurance, Real Estate, Rental & Leasing	7	8
Professional, Scientific, Management, Administrative & Waste Mgmt	2	2
Education, Health & Social Services	27	30
Arts, Entertainment, Recreation, Accommodation & Food Services	3	3
Other Services (Except Public Admin)	7	8
Public Administration	16	18
Total Employment	**91**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Port Protection is part of the North Prince of Wales community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record. Wood products employment in the North Prince of Wales community group declined by 186 jobs or 69 percent between 1990 and 1999. Wood products employment accounted for 83 jobs or 23 percent of total employment in this community group in 1999.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Port Protection in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-25. This area contains 706,627 acres of National Forest System land (among other land ownerships). Table 3.23-51 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 49 percent of the total acreage within the Port Protection community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan.

Figure 3.23-25
Port Protection's Community Use Area

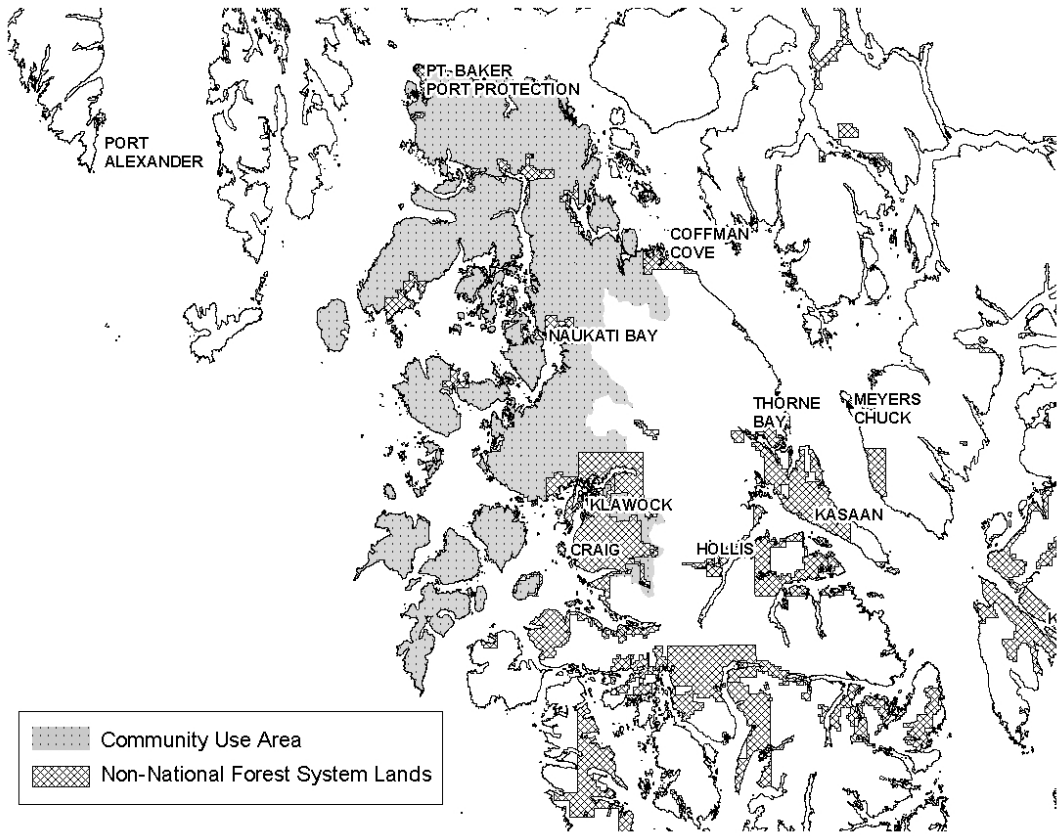


Table 3.23-51
LUD Groups in Port Protection's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	108,469	120,049	127,290	135,243	134,817	129,563	180,164
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	17,019	17,019	17,019	17,019	17,019	17,019	17,019
Mostly Natural	474,390	407,001	367,958	320,675	345,451	353,087	245,932
Moderate Development	48,236	58,268	78,759	81,614	81,785	82,807	116,805
Intensive Development	166,980	224,338	242,892	287,321	262,373	253,714	326,871
Total	**706,625**	**706,626**	**706,628**	**706,629**	**706,628**	**706,626**	**706,627**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 49 percent under Alternative 5 (No Action) to 64 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-51). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 53 percent and 64 percent under Alternatives 4 and 7 compared to 49 percent under Alternative 5.

Total suitable acres would range from 17 percent under Alternative 1 to 25 percent under Alternative 7, compared to 19 percent under Alternative 5 (No Action).

Economy

Port Protection's economy primarily depends upon commercial fishing. Subsistence use is also important in this community. Commercial fisheries employment is not likely to be affected under any of the alternatives.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. Marine resources (fish and marine invertebrates) accounted for 69 percent of per capita subsistence harvest in Port Protection in 1996.

Deer accounted for 21 percent of per capita subsistence harvest by Port Protection residents in 1996 (ADF&G 2006).

Port Protection residents take the majority (95 percent) of their deer from one WAA (1529) on the north end of Prince of Wales Island. This WAA is located within GMU 2. Deer harvest and hunter effort in GMU 2 generally increased during 1997-2000 and subsequently declined during 2000-2004; however, no change has been noted in the average number of hunter-days required to harvest a deer (ADF&G 2005). Port Protection's population declined slightly between 2000 and 2005.

As shown in Table 3.23-52, the Port Protection portion of harvest represents about 4 percent of the total harvest and about 8 percent of the rural hunter harvest in WAA 1529. About 46 percent of the harvest in this WAA is by non-rural hunters, suggesting that there is a harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

WAA 1529 occurs in an area with substantial past harvest and, therefore, deer habitat capabilities are currently estimated to be considerably below 1954 levels (Table 3.23-52). Under each of the alternatives, additional harvest would occur that would reduce habitat capabilities after 100+ years to 50-63 percent of 1954 levels (Table 3.23-52).

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted by Port Protection residents and by all hunters in the short-term. In the long-term, the affected WAAs may not be able to provide deer for all hunters.

Table 3.23-52
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Port Protection Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Port Protection Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
1529	10	122	226	73	63	61	60	56	59	59	50

*Calculated based on harvest where location is known.

In summary, use of most subsistence resources by Port Protection residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its general emphasis on Development LUDs within the Port Protection use area, and lower under the other six alternatives. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within Port Protection's subsistence use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters. The level of road development is already relatively high in this WAA. Existing open road density is 0.9 mile per square mile and existing total road density is 1.5 miles per square mile, respectively (all ownerships combined). Long-term (100+ years) road development would vary by alternative and would result in an estimated maximum total road density of 1.7 mile per square mile under Alternative 1, to 2.0 miles per square mile under Alternative 7 (for all ownerships combined).

Saxman

Saxman is located on west Revillagigedo Island on the Tongass Highway, about three miles south of Ketchikan. According to the 2000 Census, Saxman had a 2000 population of 431, with Alaska Natives comprising 66 percent of the total (U.S. Census Bureau 2001).

In 1894, Tlingits from the old Cape Fox and Tongass villages chose Saxman as the site for a new village in which to locate a government school and a new Presbyterian church. The Saxman people are also known as the Cape Fox people or Sanya in the earlier ethnographies. Saxman was incorporated in 1929 and was certified by the federal government as a second class municipal corporation. Three years later, the federal government issued a patent to 365 acres of land to the townsite trustee for Saxman (ADF&G 1994).

When the Ketchikan Gateway Borough was formed in 1963, Saxman was included within its boundaries. In 1971 and 1973, respectively, Saxman was recognized and then certified as a Native village under the Alaska Native Claims Settlement Act. An elected mayor and six city council members constitute the governing body of the municipality as organized under state law. The community has a local Fish and Game Advisory Committee (ADF&G 1994).

When the Tlingits left their old villages to move to Saxman, they abandoned houses, totems, carvings, and other cultural and ceremonial artifacts. In 1938, the Civilian Conservation Corps retrieved and brought to Saxman original totems from the abandoned villages and cemeteries of Tongass, Cat, and Pennock Islands, and Cape Fox. The Totem Park in Saxman has become a major attraction for Ketchikan area visitors (ADF&G 1994).

The population of Saxman, which more than doubled between 1970 and 1990, increased by 17 percent between 1990 and 2000. The population decreased by 26 people or 6 percent between 2000 and 2005. Total estimated population was 422 in Saxman in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	135	273	369	431	405	422

Source: USDA Forest Service, 1997a; U.S. Census Bureau, 2001; Alaska DOL, 2007a

Most employment opportunities for Saxman residents are in the city of Ketchikan. The City of Saxman, the Saxman Seaport, and the Cape Fox Corporation provide employment for a number of local residents. The Saxman Totem Park with a tribal house, a carving center, and a cultural hall for traditional Tlingit dance, has become an attraction for Ketchikan area visitors (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 26 percent of the labor force in Saxman was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $44,375, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	8	5
Construction	19	13
Manufacturing	7	5
Wholesale Trade	0	0
Retail Trade	19	13
Transportation, Warehousing & Utilities	13	9
Information	3	2
Finance, Insurance, Real Estate, Rental & Leasing	18	12
Professional, Scientific, Management, Administrative & Waste Mgmt	2	1
Education, Health & Social Services	16	11
Arts, Entertainment, Recreation, Accommodation & Food Services	17	11
Other Services (Except Public Admin)	8	5
Public Administration	21	14
Total Employment	**151**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Saxman is located in the Ketchikan Ranger District and is part of the Ketchikan community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Saxman in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-26. This area contains 1,975,123 acres of National Forest System land (among other land ownerships). Table 3.23-53 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 21 percent of the total acreage within the Saxman community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 and 2. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 31 percent under Alternative 5 (No Action) to 48 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-53). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 32 percent and 33 percent under Alternatives 4 and 7, respectively, compared to 21 percent under Alternative 5.

Total suitable acres would range from 2 percent under Alternative 1 to 10 percent under Alternative 7, compared to 6 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Economy

Saxman, a traditional native community, could be affected primarily by changes in recreation and tourism use, commercial fishing, timber processing, and subsistence opportunities.

Approximately 42.8 MMBF was under contract in the Ketchikan Ranger District in August 2006. About 75 percent (32.1 MMBF) of this volume could be potentially affected under Alternative 1, which would maintain all Inventoried Roadless Areas on the Tongass in a natural condition and not permit timber harvest in these areas. None of the other alternatives would affect this volume. These data provide an indication of potential impacts, actual impacts would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales were cancelled as part of the decision.

Commercial fisheries employment is not likely to be affected under any of the alternatives. Recreation and tourism in Saxman is also unlikely to be affected under any of the alternatives.

Subsistence

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 68 percent of the total edible pounds of subsistence resources harvested by Saxman households (Kruse and Frazier, 1988). Marine resources (fish and marine invertebrates) accounted for 71 percent of per capita subsistence harvest in Saxman in 1987.

Figure 3.23-26
Saxman's Community Use Area

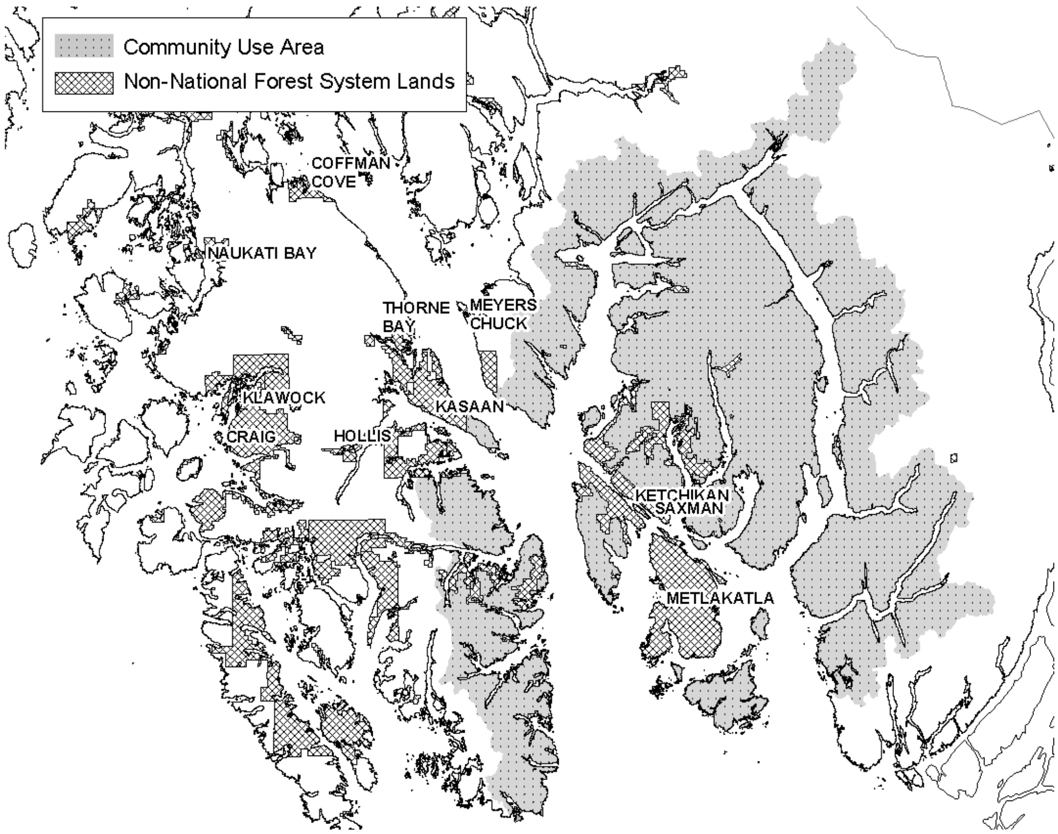


Table 3.23-53
LUD Groups in Saxman's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	47,897	90,739	111,299	176,699	127,271	124,987	204,834
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	934,620	934,619	934,619	934,616	934,620	934,619	934,619
Mostly Natural	943,733	764,232	665,107	417,910	618,698	615,905	396,436
Moderate Development	36,231	82,362	88,211	187,083	100,554	97,706	199,418
Intensive Development	60,538	193,909	287,185	435,514	321,252	326,892	444,655
Total	**1,975,122**	**1,975,122**	**1,975,122**	**1,975,123**	**1,975,123**	**1,975,122**	**1,975,129**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

The 1988 TRUCS study found that deer accounted for 19 percent of the total edible pounds of subsistence resources harvested by Saxman households (Kruse and Frazier 1988). Deer accounted for 18 percent of per capita subsistence harvest by Saxman residents in 1987 (ADF&G 2006).

Data were not provided separately for Saxman in the ADF&G deer harvest reports for 1996 to 2002. The majority of deer harvest by Saxman residents likely takes place in GMU 1A. Deer harvest in GMU 1A generally declined from 1997 to 2004, with the number of hunters and hunter effort also decreasing over this period (ADF&G 2005). As noted above, the population of Saxman decreased by an estimated 6 percent between 2000 and 2005. Saxman had an estimated population of 405 residents in 2005. Marine resources (fish and marine invertebrates) accounted for 71 percent of per capita subsistence harvest in Saxman in 1987.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide habitat capability for deer hunted in the Saxman community use area by Saxman residents, all rural hunters, and all hunters in the short term. This alternative was also estimated to provide sufficient habitat capability for Saxman residents and all rural hunters in the long term. However, projected deer harvest for all hunters was estimated to exceed 10 percent habitat capability, the level that the analysis assumed would provide a reasonably high level of hunter success for their effort, in the long term.

In summary, use of most subsistence resources by Saxman residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7, and second highest under Alternative 4 because of their lower use of Non-Development LUDs compared with the other alternatives. Alternatives 1, 2, and 3 would have the lowest risk and Alternatives 5 and 6 would be intermediate.

Sitka

Located on the west side of Baranof Island, Sitka is the only community in Southeast Alaska that fronts the open sea. According to the 2000 Census, Sitka had a 2000 population of 8,835, with Alaska Natives comprising 19 percent of the total (U.S. Census Bureau 2001).

Present-day Sitka was originally inhabited by a major tribe of Tlingits who called the village “Shee Atika.” Traditionally, the Tlingits used a wide area surrounding the community for hunting, fishing, and gathering wild resources. The site became “New Archangel” in 1799, the capital of Russian America (ADF&G 1994).

Sitka became the focal point of Russian fur trade in North America beginning in 1741. During the mid-1800s, Sitka was the major port on the north Pacific coast, with ships calling from many nations. After the purchase of Alaska by the United States in 1867, it remained the capital of the Territory until 1906, when the seat of government moved to Juneau. During the early 1900s gold mines contributed to its growth, and during World War II the town was fortified. After the war, the Bureau of Indian Affairs converted some of the buildings to a boarding school for Alaska Natives (ADF&G, 1994). The APC pulp mill operated in Sitka from 1959 through 1993, employing almost 400 people at the time of closure.

The population of Sitka, which grew by 41 percent between 1970 and 1990, increased by just 3 percent between 1990 and 2000, and 1 percent or an estimated 112 residents between 2000 and 2005. Total estimated population was 8,833 in Sitka in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	6,109	7,803	8,588	8,835	8,947	8,833

Source: USDA Forest Service, 1997a; U.S. Census Bureau, 2001; Alaska DOL, 2007a

Sitka has a diversified economy, with tourism, fishing, fish processing, government, health care services, transportation, and retail all contributing to its base. A total of 586 residents hold commercial fishing permits. Cruise ships contribute an estimated $11 million dollars to the local economy and residents realized an estimated $20 million in gross fishing revenue in 2002. Sound Seafood and Seafood Producers Co-op are major employers of local residents. Regional health care services and the U.S. Forest Service also employ a number of people (Alaska DCED 2002; 2006).

A study conducted by the Alaska DOL in 2003 suggested that Sitka's economy appears to have survived the downturn in its economy caused by the pulp mill closure, in large part because it has a relatively diversified economy (Gilbertson 2003). While the community of Sitka does not appear to have been as negatively affected by the closure of the pulp mill as some predicted, the effects have been felt by the workers who lost their jobs. By 2001, 57 percent of the former pulp mill labor force were no longer employed in Alaska, 43 percent had left the State, and 14 percent were in the State but had left the workforce, most likely retired. Only 25 percent of the former pulp mill workers were still living and working in Sitka (Gilbertson 2003).

Nature-based tourism in Sitka is less dominated by large cruise ships than in the other coastal communities with independent travelers making up a larger share of total visitors (Dugan et al. 2006). Multi-day fishing packages and kayaking and hunting are popular nature-based tourist activities operating from Sitka. An estimated 267,000 cruise ship passengers were scheduled to visit Sitka in 2006. There is no deepwater dock in Sitka so cruise ships anchor offshore and transport passengers to Sitka on smaller vessels.

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 8 percent of the labor force in Sitka was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $51,901, compared to a regional median of $44,118 (Alaska DCED 2002).

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	407	9
Construction	253	6
Manufacturing	189	4
Wholesale Trade	54	1
Retail Trade	476	11
Transportation, Warehousing & Utilities	245	6
Information	72	2
Finance, Insurance, Real Estate, Rental & Leasing	148	3
Professional, Scientific, Management, Administrative & Waste Mgmt	191	4
Education, Health & Social Services	1,414	32
Arts, Entertainment, Recreation, Accommodation & Food Services	354	8
Other Services (Except Public Admin)	292	7
Public Administration	257	6
Total Employment	**4,352**	**100**

Source: Alaska DCED 2002

Sitka is part of the Sitka community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record.

Wood products employment declined from 404 in 1990 (10 percent of total employment) to 0 in 1999 in the Sitka community group. Services, non-federal government, and retail trade accounted for 31, 22, and 17 percent of total employment in 1999, with recreation-related activities accounting for 10 percent. A total of 206,279 cruise ship passengers visited Sitka in 2001, approximately 18 percent less than the number of passengers in 1996.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Sitka in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-27. This area contains 425,121 acres of National Forest System land (among other land ownerships). Table 3.23-54 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 22 percent of the total acreage within the Sitka community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 and 2. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 74 percent under Alternative 5 (No Action) to 96 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-54). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 59 percent of community use area acres under both of these alternatives compared to 22 percent under Alternative 5.

Total suitable acres would range from no acreage under Alternative 1 to 12 percent under Alternative 7, compared to 5 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Economy

Commercial fishing, recreation and tourism, and subsistence are important to Sitka residents. Commercial fishing is not expected to be significantly affected under any of the alternatives. None of the alternatives are expected to affect recreation and tourism-related employment in Sitka.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 69 percent of the total edible pounds of subsistence resources harvested by Sitka households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 68 percent of per capita subsistence harvest in Sitka in 1996.

Figure 3.23-27
Sitka's Community Use Area

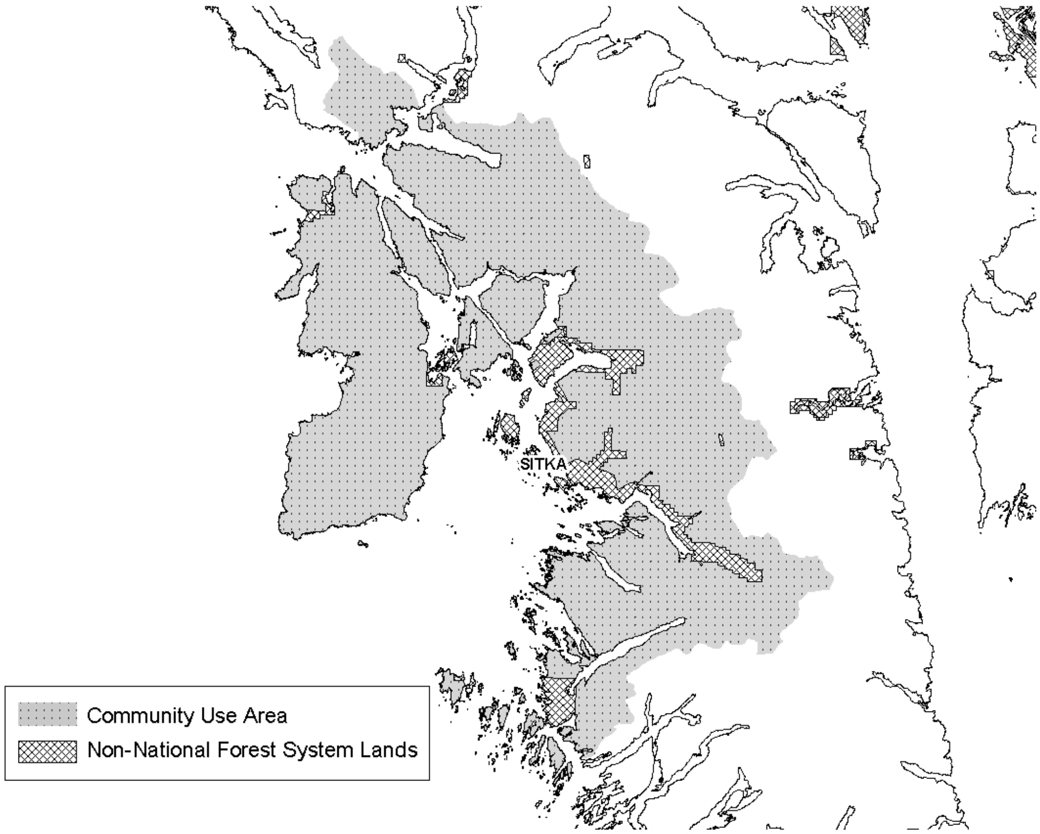


Table 3.23-54
LUD Groups in Sitka's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	0	14,966	21,677	48,130	22,339	21,691	51,992
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	16,471	16,471	16,471	16,471	16,471	16,471	16,471
Mostly Natural	408,650	339,984	317,611	156,419	315,416	317,453	156,221
Moderate Development	0	23,960	40,025	55,097	40,851	40,360	55,257
Intensive Development	0	44,706	51,014	197,133	52,383	50,837	197,172
Total	**425,121**	**425,121**	**425,121**	**425,120**	**425,121**	**425,121**	**425,120**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

The 1988 TRUCS study found that deer accounted for 27 percent of the total edible pounds of subsistence resources harvested by Sitka households (Kruse and Frazier, 1988). Deer accounted for 22 percent of per capita subsistence harvest by Sitka residents in 1996 (ADF&G 2006).

Sitka residents mainly harvest deer on Baranof Island, which is included in GMU 4. Deer harvest in GMU 4 is considered very high relative to other areas of Southeast Alaska, which is indicative of relatively high deer populations (ADF&G 2005). Over 1997-2004, there has been no significant trend in the number of deer harvested or in the number of hunters (ADF&G 2005). As noted above, the human population of Sitka increased by an estimated 1 percent between 2000 and 2005. Sitka had an estimated population of 8,947 in 2005.

Eleven WAAs account for the majority (76 percent) of deer harvest by Sitka residents. As shown in Table 3.23-55, the Sitka portion represents over 95 percent of the rural hunter harvest and almost 90 percent of the total harvest in these WAAs. About 6 percent of the combined harvest in these WAAs is by non-rural hunters, suggesting that there is very little harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, would not be able to provide sufficient habitat capability for deer hunted in the Sitka community use area by Sitka residents, all rural hunters, and all hunters in the short term. Sitka residents were identified as harvesting 15 percent of habitat capability a year, which exceeds 10 percent habitat capability, the level that the analysis assumed would provide a reasonably high level of hunter success for their effort. The Final EIS analysis concluded that at some point a restriction in hunting might be necessary.

In summary, use of most subsistence resources by Sitka residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer in some of the WAAs hunted by Sitka residents may be affected to the point that some restriction in hunting might be necessary over the

Table 3.23-55
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Sitka Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Sitka Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
3001	414	422	431	81	81	79	79	72	78	79	71
3002	314	318	329	69	69	68	68	67	68	68	67
3104	166	177	193	73	73	69	68	65	68	68	64
3003	121	121	129	85	84	83	80	73	79	80	72
3313	120	130	141	65	64	57	56	50	52	53	48
3310	118	127	140	93	93	93	93	93	93	93	93
3207	118	120	130	100	100	100	100	100	100	100	100
3733	118	145	158	100	100	100	100	100	100	100	100
3314	110	110	124	88	88	87	87	73	87	87	73
3105	97	97	103	99	99	99	98	97	97	97	97
3311	97	99	103	97	97	97	97	88	89	91	86

*Calculated based on harvest where location is known.

long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its general lack of Non-Development LUDs within the Sitka use area, and lower under the other six alternatives. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within Sitka's subsistence, use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters.

Skagway

Skagway is located in northern Southeast Alaska at the head of Taiya Inlet, 95 air miles north of Juneau. It is the end-of-the line for the Alaska Marine ferry and the entrance to the Klondike Highway. According to the 2000 Census, Skagway had a 2000 population of 862, with Alaska Natives comprising 3 percent of the total (U.S. Census Bureau 2001).

Prior to the founding of the community, the area was settled by Chilkoot Tlingit who called it "Skagua," or "the place where the north wind blows." The Chilkoots controlled access into the interior along what has become known as the Chilkoot Trail, which follows along the Taiya River and over the Chilkoot Pass. The Chilkoot Trail was a major trade route for the Chilkoot Tlingit, interior Tlingit, and Athabaskans (ADF&G 1994).

Settlement began in Skagway in 1887 when a seafarer named William Moore decided to develop a trading and mining route into the Yukon Territory using the Chilkoot Trail. As the Klondike gold rush hit the area in 1896, the Chilkoot and White Pass trails became the major routes into the Interior. Within a few years, the trails were superseded by the adjacent White Pass and Yukon Railway. The railway continued to function as a supply and shipping route between Skagway and Whitehorse until 1982 (ADF&G 1994). The railway currently operates as a tourist attraction.

Skagway is incorporated as a first class city. The community participates in the Upper Lynn Canal Fish and Game Advisory Committee (ADF&G 1994). A total of 610,145 cruise ship passengers visited Skagway in 2001, more than double the number in 1996.

The population of Skagway, which declined between 1980 and 1990, increased by 170 people or 25 percent between 1990 and 2000. The population decreased by an estimated 28 residents or 3 percent between 2000 and 2005. Total estimated population was 854 in Skagway in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	675	814	692	862	834	854

Source: USDA Forest Service, 1997a; U.S. Census Bureau, 2001; Alaska DOL, 2007a

Skagway has a strong base in the tourism industry. It is a port of call for cruise ships and a transfer site for interior rail and bus tours. The State ferry also connects travelers to the rest of Southeast Alaska. More than 600,000 cruise ship passengers and numerous State ferry travelers visit Skagway each year. Skagway is also the site of trans-shipment of lead/zinc ore, fuel, and freight via the Port and Klondike Highway to and from Canada (Alaska DCED 2002; 2006).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	2	0
Construction	69	15
Manufacturing	0	0
Wholesale Trade	5	1
Retail Trade	68	14
Transportation, Warehousing & Utilities	114	24
Information	6	1
Finance, Insurance, Real Estate, Rental & Leasing	14	3
Professional, Scientific, Management, Administrative & Waste Mgmt	26	5
Education, Health & Social Services	52	11
Arts, Entertainment, Recreation, Accommodation & Food Services	74	16
Other Services (Except Public Admin)	13	3
Public Administration	32	7
Total Employment	**475**	**100**

Source: Alaska DCED 2002

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 14 percent of the labor force in Skagway was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $49,375 compared to a regional median of $44,118 (Alaska DCED 2002).

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Skagway is part of the Skagway community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record. The retail trade, services, and non-federal government sectors were the major employers in the Skagway community group in 1999, accounting for 32, 20, and 17 percent of total employment, respectively. Recreation-related activities (lodging, restaurants, and recreation services) accounted for 25 percent of total employment, illustrating the importance of recreation and tourism for this area.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Skagway in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-28. This area contains 199,938 acres of National Forest System land (among other land ownerships). Table 3.23-56 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3. Only 4 percent of the acres in the Skagway community use area would be allocated to development LUDs under Alternative 5 (No Action) and Alternative 6 (Proposed Action). There would be no acres allocated to development LUDs under Alternatives 1 and 2, and approximately 5 percent under Alternatives 4 and 7, with approximately 4 percent under Alternative 3. There would be no suitable acres under any of the alternatives.

Figure 3.23-28
Skagway's Community Use Area

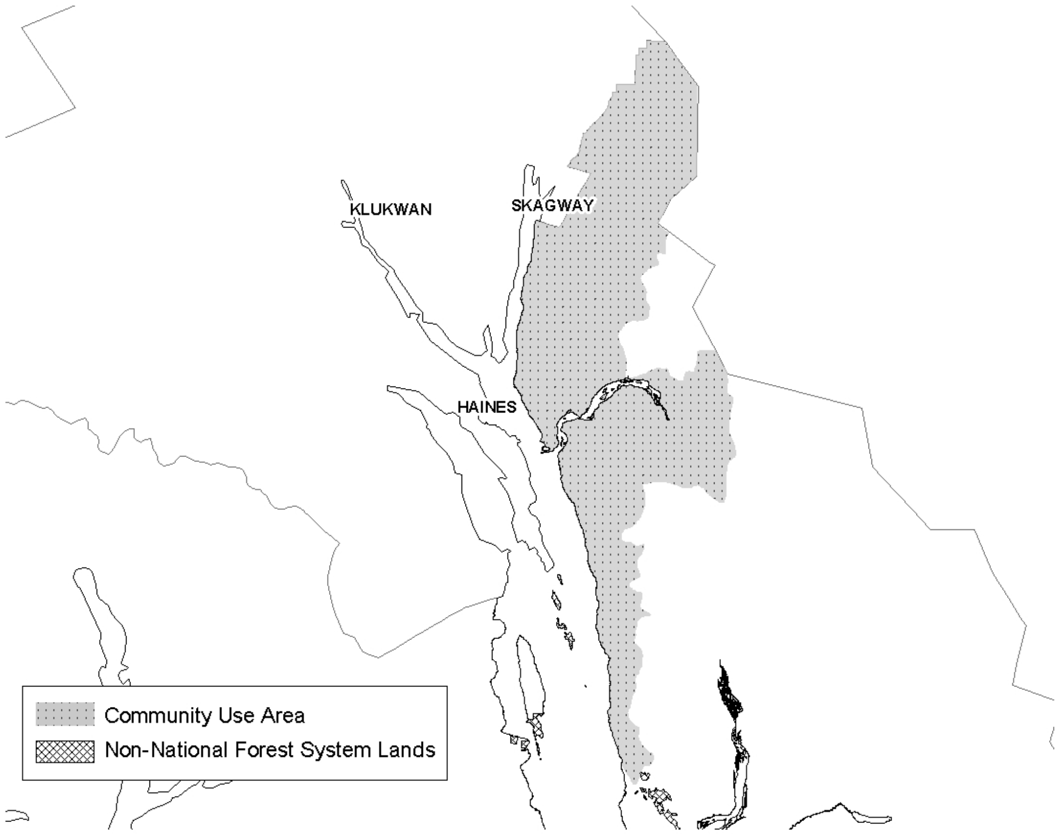


Table 3.23-56
LUD Groups in Skagway's Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	0	0	168	386	171	168	511
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	0	0	0	0	0	0	0
Mostly Natural	199,938	199,938	192,699	190,804	192,402	192,699	190,804
Moderate Development	0	0	7,239	9,135	7,537	7,239	9,135
Intensive Development	0	0	0	0	0	0	0
Total	**199,938**	**199,938**	**199,938**	**199,939**	**199,938**	**199,938**	**199,939**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

There are no acres within the Skagway Community Use Area allocated to Wilderness/National Monument LUDs under any of the alternatives.

Economy

Recreation, tourism, and subsistence use are important to the community of Skagway. None of the alternatives are expected to affect recreation and tourism-related employment in Skagway.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 88 percent of the total edible pounds of subsistence resources harvested by Skagway households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 88 percent of per capita subsistence harvest in Skagway in 1987.

The 1988 TRUCS study found that deer account for only a small fraction of the total edible pounds of subsistence resources harvested by Skagway households (Kruse and Frazier, 1988). Deer accounted for 7 percent of per capita subsistence harvest by Skagway residents in 1987 (ADF&G 2006).

Skagway residents harvested very few deer from 1996-2002 (Table 3.23-57). Residents harvested an annual average of more than one deer in just four WAAs over this period. Three of these WAAs are located in GMU 4; the other is located in GMU 1C. Deer harvest in GMU 4 is considered very high relative to other areas of Southeast Alaska, which is indicative of relatively high deer populations (ADF&G 2005). Over 1997-2004, there has been no significant trend in the number of deer harvested or in the number of hunters (ADF&G 2005). GMU 1C has been characterized from 1997-2004 by substantial annual variation in deer harvest, with no evident long-term trend in harvest levels (ADF&G 2005).

Skagway residents take the majority (68 percent) of their deer from four WAAs: two on Baranof Island, one on south Chichagof Island, and one on Douglas Island (Table 3.23-57). These numbers are, however, somewhat misleading due to the overall low deer harvest levels.

Table 3.23-57
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Skagway Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Skagway Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
2722	3	5	261	100	100	100	100	88	100	100	100
3001	2	422	431	81	81	79	79	72	78	79	71
3002	2	318	329	69	69	68	68	67	68	68	67
3308	2	98	158	66	64	59	57	53	56	57	51

*Calculated based on harvest where location is known.

Three of the WAAs identified in Table 3.23-57 are in areas with substantial past harvest and deer habitat capabilities are currently estimated to be considerably below 1954 levels. Under each of the alternatives, additional harvest would further reduce habitat capabilities. Reductions would be smallest under Alternatives 1 and 2 and greatest under Alternative 7 in WAAs 3001, 3002, and 3308. There would only be a reduction in habitat capability under Alternative 4 in the other WAA (2722), used relatively heavily by Skagway residents.Marine resources (fish and marine invertebrates) accounted for 88 percent of per capita subsistence harvest in Skagway in 1987.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted by Skagway residents and all rural hunters in the short term. However, it concluded that demand would exceed the capability of the habitat to produce deer populations sufficient to avoid effects on hunter success for all hunters in the long term.

In summary, use of most subsistence resources by Skagway residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1.

Tenakee Springs

Tenakee Springs is located 50 miles northeast of Sitka on the north shore of Tenakee Inlet (east Chichagof Island). According to the 2000 Census, Tenakee Springs had a 2000 population of 104, with Alaska Natives comprising 3 percent of the total (U.S. Census Bureau 2001). Tenakee Springs, accessible only by floatplane or boat, is a stop on the Alaska Marine Highway ferry system.

A Tlingit winter village site was located in the vicinity of the present-day harbor and a summer village was located across the Inlet at Kadashan Bay (ADF&G 1994). Early prospectors and fishermen came to the site to wait out the winters and enjoy the natural hot springs in Tenakee. Around 1895, a large tub and building were constructed to provide a warm bathing place. The 108-degree sulfur springs is the social focus of the community, with bathing times scheduled for men and women.

In 1904, E. Snyder bought a tract of land from a Tlingit resident, including a house located near the public bathhouse. The post office, established in 1903, used the name Tenakee. In 1928, the community's name was changed to Tenakee Springs. The community has a local Fish and Game Advisory Committee, and many residents practice a subsistence lifestyle, actively exchanging resources with neighbors (ADF&G 1994).

Tenakee Springs' population increased slightly between 1990 and 2000, and decreased slightly between 2000 and 2005. Total estimated population was 109 in Tenakee Springs in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	86	138	94	104	98	109

Source: USDA Forest Service, 1997a; U.S. Census Bureau, 2001; Alaska DOL, 2007a

While Tenakee Springs is often considered a retirement community, commercial fishing (18 residents have permits), and tourism are important sources of income. The City and local store are the primary employers (Alaska DCED 2002).

An estimated 25 percent of the homes in Tenakee Springs are second homes. Tourism activities are limited to two family-run marine charters and Tenakee Springs residents have been vocal in their opposition to tourism development (Dugan et al. 2006). The Chichagof Conservation Council commenting on the Draft EIS noted that small-scale, locally-owned businesses catering to independent travelers are a large part of the Tenakee Springs economy. Local residents opposed cruise ship development, not all tourism development.

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 14 percent of the labor force in Tenakee Springs was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $33,125, compared to a regional median of $44,118 (Alaska DCED 2002).

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Tenakee Springs is part of the Chatham Strait community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record. The non-federal government, wood products, and services sectors were the major employers in the Chatham Strait community group in 1999, accounting for 49, 18, and 17 percent of total employment, respectively. The wood products employment was entirely in the logging sector.

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	5	11
Construction	2	5
Manufacturing	0	0
Wholesale Trade	0	0
Retail Trade	5	11
Transportation, Warehousing & Utilities	8	18
Information	0	0
Finance, Insurance, Real Estate, Rental & Leasing	0	0
Professional, Scientific, Management, Administrative & Waste Mgmt	4	9
Education, Health & Social Services	4	9
Arts, Entertainment, Recreation, Accommodation & Food Services	2	5
Other Services (Except Public Admin)	3	7
Public Administration	11	25
Total Employment	**44**	**100**

Source: Alaska DCED 2002

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Tenakee Springs in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-29. This area contains 196,031 acres of National Forest the System land (among other land ownerships). Table 3.23-58 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 60 percent of the total acreage within the Tenakee Springs community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 40 percent under Alternative 5 (No Action) to 93 percent under

Figure 3.23-29
Tenakee Springs' Community Use Area

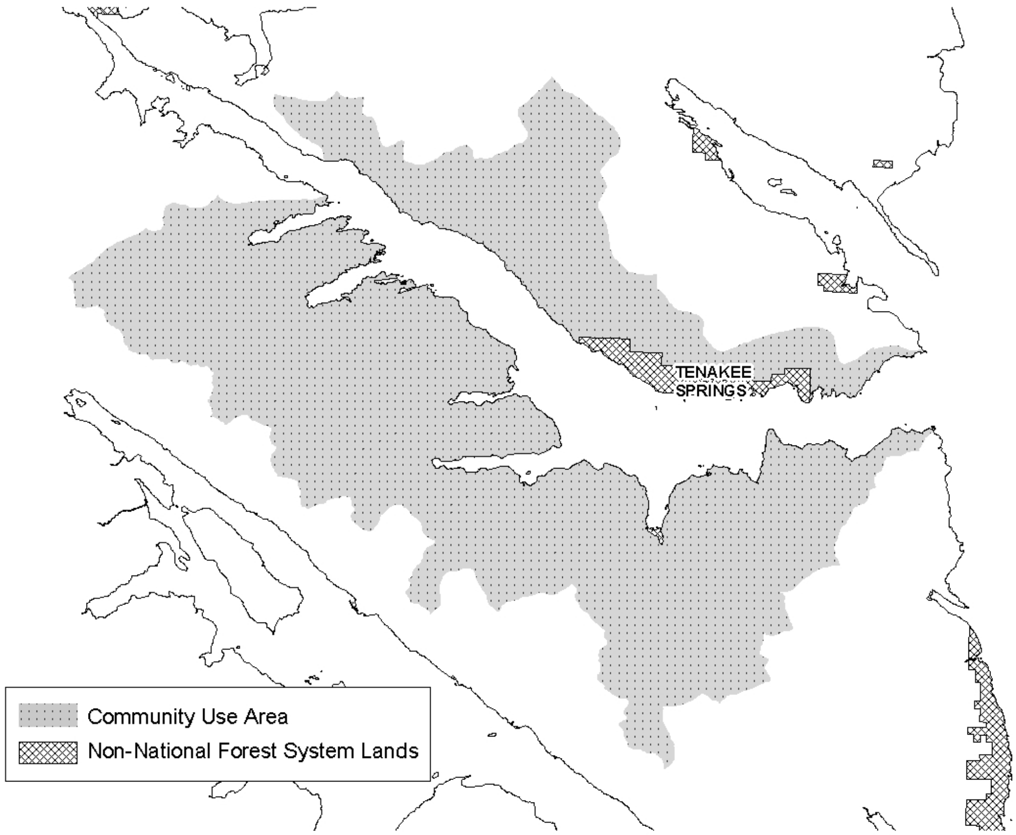


Table 3.23-58
LUD Groups in Tenakee Springs' Community Use Area by Alternative

	Alternative						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	5,693	14,034	20,040	34,158	26,547	25,726	40,971
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	0	0	0	0	0	0	0
Mostly Natural	181,878	153,699	126,906	57,489	78,488	94,892	45,536
Moderate Development	1,369	3,803	4,604	10,039	4,457	5,152	13,096
Intensive Development	12,784	38,528	64,520	128,503	113,085	95,987	137,398
Total	**196,031**	**196,031**	**196,031**	**196,031**	**196,031**	**196,031**	**196,031**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-58). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 71 percent and 77 percent under Alternatives 4 and 7, respectively, compared to 60 percent under Alternative 5.

Total suitable acres would range from 3 percent under Alternative 1 to 21 percent under Alternative 7, compared to 14 percent of the total community use area under Alternative 5 (No Action) and 13 percent under Alternative 6 (Proposed Action).

Economy

Tenakee Springs is primarily a commercial fishing, subsistence, and retirement community. The lands along Tenakee Inlet are some of the most important to the community. Kadashan and Trap Bay watersheds are legislated LUD II areas. These areas were designated in the Tongass Timber Reform Act, in part, because of their high value for subsistence use for Tenakee Springs residents.

Commercial fishing is not expected to be significantly affected by Forest Service activities during the next 10 years.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 55 percent of the total edible pounds of subsistence resources harvested by Tenakee Springs households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 53 percent of per capita subsistence harvest in Tenakee Springs in 1987.

The 1988 TRUCS study found that deer accounted for 39 percent of the total edible pounds of subsistence resources harvested by Tenakee Springs households (Kruse and Frazier, 1988). Deer accounted for 41 percent of per capita subsistence harvest by Tenakee Springs residents in 1987 (ADF&G 2006). The WAAs used by Tenakee Springs residents for hunting deer lie within GMU 4. Deer harvest in GMU 4 is considered very high relative to other areas of Southeast Alaska, which is indicative of relatively high deer populations (ADF&G 2005). Over 1997-2004, there has been no significant trend in the number of deer harvested or in the number of hunters (ADF&G 2005). However, as shown above, Tenakee Springs' human population decreased slightly from 2000 to 2005, with an estimated 98 residents identified in 2005.

Tenakee Springs residents take the majority (67 percent) of their deer from two WAAs on Chichagof Island (3627 and 3526). As shown in Table 3.23-59, the Tenakee Springs portion represents about 35 percent and 20 percent of the total harvest and about 72 percent and 74 percent of the rural hunter harvest in these WAAs, respectively. About 64 percent of the combined harvest in these WAAs is by non-rural hunters, suggesting that there is a harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

WAAs 3627 and 3526 occur in an area with substantial past harvest and, therefore, deer habitat capabilities are currently estimated to be below 1954 levels (Table 3.23-59). Under each of the alternatives, additional harvest would occur that would reduce habitat capabilities after 100+ years to 61-70 percent of 1954 levels in WAA 3627 and 60-77 percent in WAA 3526.

Table 3.23-59
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Tenakee Springs Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	**Tenakee Springs Residents**	**All Rural Hunters**	**All Hunters**	**2005**	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**	**Alt 7**
3627	25	35	72	76	70	67	65	62	64	65	61
3526	23	31	115	81	77	73	72	69	72	72	60
3629	11	16	43	91	91	89	85	75	79	80	73

*Calculated based on harvest where location is known.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability over the short term for deer hunted by Tenakee Springs residents, all rural hunters, and all hunters. However, it concluded that all alternatives may have future inadequate habitat capability for the total deer hunter and at some point a restriction in hunting may be necessary.

In summary, use of most subsistence resources by Tenakee Springs residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7, and lower under the other six alternatives. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area.

Thorne Bay

Thorne Bay is located at the head of Thorne Bay on eastern Prince of Wales Island, approximately 40 air miles northwest of Ketchikan. According to the 2000 Census, Thorne Bay had a 2000 population of 557, with Alaska Natives comprising 16 percent of the total (U.S. Census Bureau 2001).

Petroglyphs and other archaeological remains indicate occupation and use of the area by Alaska Natives dating back at least 3,000 years. Post-contact development began in the early 1900s with construction of a saltery on the south shore of Thorne Bay (ADF&G 1994).

In 1960, a floating logging camp was built in Thorne Bay, and, in 1962, a shop, barge terminal, log sort yard, and camp were built to replace facilities at Hollis. Thorne Bay was incorporated as a second class city in 1982, making it one of Alaska's newest cities. Thorne Bay is accessible by road, water, or floatplane. Three air carriers serve the community with six to ten flights daily, and the Alaska Marine Highway system is accessed by the road system to Hollis (ADF&G 1994).

Thorne Bay's population decreased by 4 percent between 1990 and 2000. Population in Thorne Bay decreased further between 2000 and 2005, with an estimated net loss of 71 residents or 13 percent of the community's population in 2000. Total estimated population was 482 in Thorne Bay in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	443	377	581	557	486	482

Source: USDA Forest Service, 1997a; U.S. Census Bureau, 2001; Alaska DOL, 2007a

The Thorne Bay economy is primarily based on the timber industry and the U.S. Forest Service management of the National Forest. Logging operations in the area are generally seasonal (March to November) and include a major log transfer site for Prince of Wales Island. The 2006 mill survey conducted for the USDA Forest Service identified three active timber processors in Thorne Bay: Porter Lumber Company, Thuja Plicata Lumber Company, and Thorne Bay Wood Products. These mills had a combined installed production capacity of 25 MMBF and together processed approximately 1.2 MMBF in 2006 and employed about 8 people (Juneau Economic Development Council 2007). Northern Star Cedar Products, also located in Thorne Bay, was recently subdivided and sold as three separate operations, with each part now under new ownership.

Commercial fishing (22 residents hold permits), tourism, and government also provide employment (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 15 percent of the labor force in Thorne Bay was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $45,625, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	53	20
Construction	33	12
Manufacturing	16	6
Wholesale Trade	3	1
Retail Trade	25	9
Transportation, Warehousing & Utilities	15	6
Information	3	1
Finance, Insurance, Real Estate, Rental & Leasing	2	1
Professional, Scientific, Management, Administrative & Waste Mgmt	13	5
Education, Health & Social Services	61	23
Arts, Entertainment, Recreation, Accommodation & Food Services	8	3
Other Services (Except Public Admin)	6	2
Public Administration	31	12
Total Employment	**269**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Thorne Bay is part of the North Prince of Wales community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record. Wood products employment in the North Prince of Wales community group declined by 186 jobs or 69 percent between 1990 and 1999. Wood products employment accounted for 83 jobs or 23 percent of total employment in this community group in 1999.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Thorne Bay in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-30. This area contains 1,000,251 acres of National Forest System land (among other land ownerships). Table 3.23-60 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 54 percent of the total acreage within the Thorne Bay community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 40 percent under Alternative 5 (No Action) to 61 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-60). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 62 percent and 78 percent under Alternatives 4 and 7, respectively, compared to 55 percent under Alternative 5.

Total suitable acres would range from 17 percent under Alternative 1 to 31 percent under Alternative 7, compared to 21 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Economy

Thorne Bay is primarily a logging community and as such would be directly affected by the amount of logging opportunities on north Prince of Wales Island, as well as elsewhere on the Tongass. The mill survey conducted by the Forest Service in 2000 identified four sawmills operating in Thorne Bay. Three of these mills were also identified in the survey conducted for 2006 (Juneau Economic Development Council 2007). Approximately 6.5 MMBF was under contract in the Thorne Bay Ranger District in August 2006. This volume would not be affected under any of the alternatives. These data provide an indication of potential impacts, actual impacts would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales were cancelled as part of the decision.

The 1997 Forest Plan EIS indicated that several small timber operators produce value-added products in Thorne Bay. These value added products include music wood, cabinets, and other products. They need relatively low volumes of timber, but of specific species and grades to meet their needs. All alternatives should meet these needs.

The lodges located near the community would not be affected under any of the alternatives.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 75 percent of the total edible pounds of subsistence resources harvested by Thorne Bay households (Kruse and Frazier 1988). Marine resources (fish and marine

Figure 3.23-30
Thorne Bay's Community Use Area

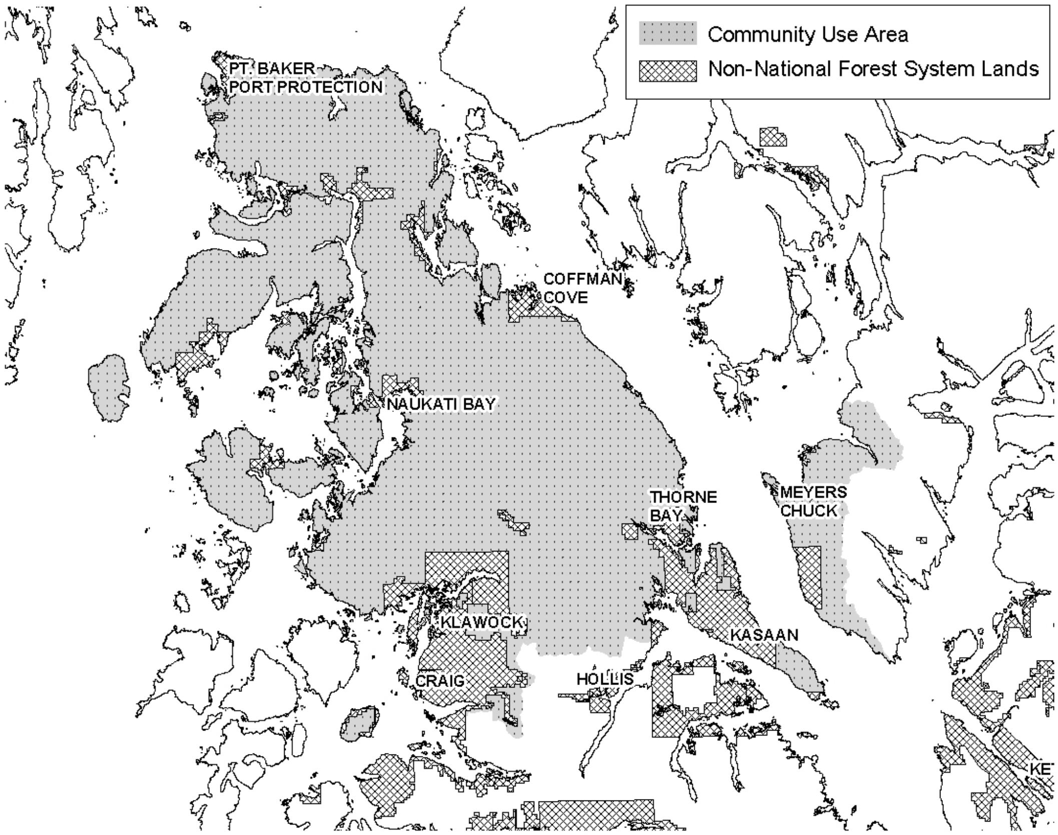


Table 3.23-60
LUD Groups in Thorne Bay's Community Use Area by Alternative

	Alternative						
	1	2	3	4	5	6	7
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	168,118	183,297	194,535	229,341	212,196	205,531	309,814
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	51,176	51,176	51,176	51,176	51,176	51,176	51,176
Mostly Natural	610,703	521,333	462,782	328,739	404,829	415,260	172,901
Moderate Development	95,974	112,481	139,418	168,888	160,346	159,286	265,649
Intensive Development	242,395	315,259	346,875	451,449	383,900	374,528	510,523
Total	**1,000,248**	**1,000,249**	**1,000,251**	**1,000,252**	**1,000,251**	**1,000,249**	**1,000,249**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

invertebrates) accounted for 54 percent of per capita subsistence harvest in Thorne Bay in 1998.

The 1988 TRUCS study found that deer accounted for 20 percent of the total edible pounds of subsistence resources harvested by Thorne Bay (Kruse and Frazier 1988). Deer accounted for 27 percent of per capita subsistence harvest by Throne Bay residents in 1998 (ADF&G 2006).

Thorne Bay residents harvest deer almost entirely on Prince of Wales Island, which is included in GMU 2. Deer harvest and hunter effort in GMU 2 generally increased during 1997-2000 and subsequently declined during 2000-2004; however, no change has been noted in the average number of hunter-days required to harvest a deer (ADF&G 2005). As noted above, Thorne Bay's human population declined by an estimated 13 percent between 2000 and 2005, with an estimated 2005 population of 486.

Residents of Thorne Bay harvest the majority (79 percent) of their deer from two WAAs in north-central Prince of Wales Island (1319 and 1315). As shown in Table 3.23-61, the Thorne Bay portion represents about 56 percent and 42 percent of the total harvest and about 70 percent and 65 percent of the rural hunter harvest in these WAAs, respectively. About 28 percent of the combined harvest in these WAAs is by non-rural hunters, suggesting that there is a limited harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

WAAs 1319 and 1315 occur in an area with substantial past harvest and, therefore, deer habitat capabilities are currently estimated to be below 1954 levels (Table 3.23-61). Under each of the alternatives, additional harvest would occur that would reduce habitat capabilities after 100+ years to 54-69 percent of 1954 levels in WAA 1319 and 41-50 percent in WAA 1315.

Table 3.23-61
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Thorne Bay Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Thorne Bay Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
1319	123	177	220	74	69	67	66	59	64	64	54
1315	115	175	270	55	50	49	47	44	47	47	41

*Calculated based on harvest where location is known.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability over the long term for deer hunted by Thorne Bay residents. Projected deer harvest in the Thorne Bay community use area by all rural hunters and all hunters is estimated to exceed 10 percent habitat capability, the level that the analysis is assumed would provide a reasonably high level of hunter success for their effort, in the short and long term.

In summary, use of most subsistence resources by Thorne Bay residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives.

However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its general lack of Non-Development LUDs throughout most of Prince of Wales Island, and second highest under Alternative 4 because of its lower use of Non-Development LUDs than the other alternatives. Alternatives 1, 2, and 3 would have the lowest risk and Alternatives 5 and 6 would be intermediate. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within Thorne Bay's subsistence use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters. The level of road development is already relatively high in these WAAs. Existing open road densities are 0.6 and 1.5 miles per square mile and existing total road densities are 1.2 and 2.0 miles per square mile in WAAs 1319 and 1315, respectively (all ownerships combined). Long-term (100+ years) road development would vary by alternative and would result in estimated maximum total road densities of 1.3 and 2.7 miles per square mile in these two WAAs under Alternative 1, to 1.7 and 2.9 miles per square mile in these two WAAs under Alternative 7 (for all ownerships combined).

Whale Pass

Whale Pass is a dispersed unincorporated community located on the northeast coast of Prince of Wales Island. According to the 2000 Census, Whale Pass had a 2000 population of 58, with Alaska Natives comprising one percent of the total (U.S. Census Bureau 2001).

Whale Pass was originally established as a logging camp by Ketchikan Pulp Company in the early 1960s. According to local residents, a float camp housed loggers and their families in this location for almost 30 years. In 1982, the float camp was removed and many of the logging families left. Others moved to trailer pads on land at the head of the cove. That same year, Whale Pass became the site of a State land sale, which brought renewed population growth and the founding of a homeowners association. The community has been connected to the road system on Prince of Wales Island since 1981. A log transfer station remains on the southwest side of the bay (ADF&G, 1994).

The population of Whale Pass decreased by 17 residents between 1990 and 2000. Population has increased by an estimated 18 residents or 31 percent since 2000. Total estimated population was 61 in Whale Pass in 2006 (Alaska DOL 2007a).

Year	1980	1990	2000	2005	2006
Population	90	75	58	76	61

Source: USDA Forest Service, 1997a; U.S. Census Bureau, 2001; Alaska DOL, 2007a

Whale Pass is primarily dependent on the timber industry, with logging operations and the local school being the only employers in the area (Alaska DCED 2002).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. These data are extrapolated from a sample of the city population. Since the sample size was small, the extrapolation may not be exact but should provide a general indication of the distribution of employment. The 2000 U.S. Census identified a potential work force of 37 residents and total employment of 14. While no adults in Whale Pass were identified as unemployed and looking for work in 2000, 62 percent were identified as unemployed and not looking for work. Median household income was $62,083, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	9	64
Construction	0	0
Manufacturing	0	0
Wholesale Trade	0	0
Retail Trade	3	21
Transportation, Warehousing & Utilities	0	0
Information	0	0
Finance, Insurance, Real Estate, Rental & Leasing	0	0
Professional, Scientific, Management, Administrative & Waste Mgmt	2	14
Education, Health & Social Services	0	0
Arts, Entertainment, Recreation, Accommodation & Food Services	0	0
Other Services (Except Public Admin)	0	0
Public Administration	0	0
Total Employment	**14**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Whale Pass is located in the Thorne Bay Ranger District and is part of the North Prince of Wales community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record. Wood products employment in the North Prince of Wales community group declined by 186 jobs or 69 percent between 1990 and 1999. Wood products employment accounted for 83 jobs or 23 percent of total employment in this community group in 1999.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Whale Pass in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-31. This area contains 1,000,251 acres of National Forest System land (among other land ownerships). Table 3.23-62 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for 54 percent of the total acreage within the Whale Pass community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 through 3. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 40 percent under Alternative 5 (No Action) to 61 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-62). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 62 percent and 78 percent under Alternatives 4 and 7, respectively, compared to 54 percent under Alternative 5.

Figure 3.23-31
Whale Pass' Community Use Area

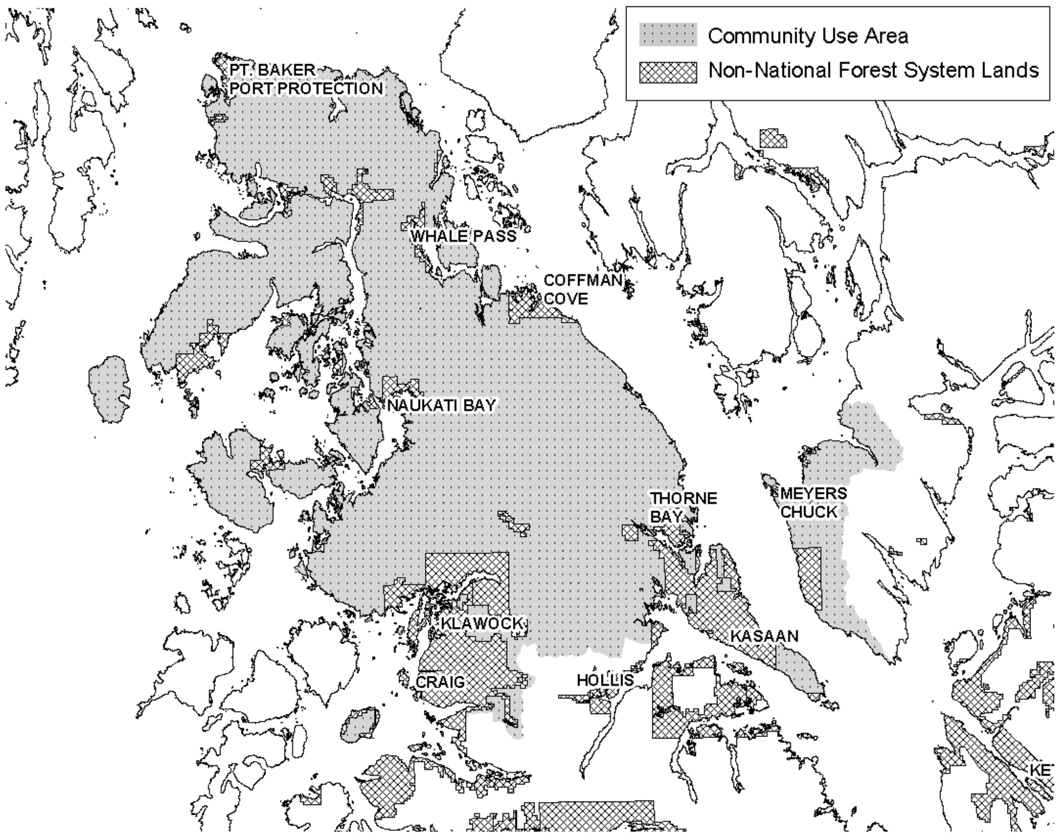


Table 3.23-62
LUD Groups in Whale Pass' Community Use Area by Alternative

	Alternative						
	1	2	3	4	5	6	7
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	168,118	183,297	194,535	229,341	212,196	205,531	309,814
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	51,176	51,176	51,176	51,176	51,176	51,176	51,176
Mostly Natural	610,703	521,333	462,782	328,739	404,829	415,260	172,901
Moderate Development	95,974	112,481	139,418	168,888	160,346	159,286	265,649
Intensive Development	242,395	315,259	346,875	451,449	383,900	374,528	510,523
Total	**1,000,248**	**1,000,249**	**1,000,251**	**1,000,252**	**1,000,251**	**1,000,249**	**1,000,249**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Total suitable acres would range from 17 percent under Alternative 1 to 31 percent under Alternative 7, compared to 21 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Economy

Residents of Whale Pass could be potentially affected by changes in timber harvest, karst protection, recreation and tourism, and subsistence opportunities. Members of several speliological societies derive a portion of their income from cave and karst analysis and exploration in the vicinity. The Whale Pass Resort and a retail store are located in Whale Pass.

Approximately 6.5 MMBF was under contract in the Thorne Bay Ranger District in August 2006. This volume would not be affected under any of the alternatives. These data provide an indication of potential impacts, actual impacts would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales were cancelled as part of the decision.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 60 percent of the total edible pounds of subsistence resources harvested by Whale Pass households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 65 percent of per capita subsistence harvest in Whale Pass in 1998.

The 1988 TRUCS study found that deer account for 27 percent of the total edible pounds of subsistence resources harvested by Whale Pass households (Kruse and Frazier, 1988). Deer accounted for 27 percent of per capita subsistence harvest by Whale Pass residents in 1998 (ADF&G 2006).

The majority of deer harvest by Whale Pass residents occurs on Prince of Wales Island, which is included in GMU 2. Deer harvest and hunter effort in GMU 2 generally increased during 1997-2000 and subsequently declined during 2000-2004; however, no change has been noted in the average number of hunter-days required to harvest a deer (ADF&G 2005). As noted above, the human population of Whale Pass increased by and estimated 31 percent from 2000 to 2005, with an estimated 2005 population of 76, which roughly matches the community’s 1990 population level.

Residents of Whale Pass harvest the majority (83 percent) of their deer from two WAAs in north Prince of Wales Island (1530 and 1529). As shown in Table 3.23-63, the Whale Pass portion represents about 12 percent and 2 percent of the total harvest and about 21 percent and 3 percent of the rural hunter harvest in these WAAs, respectively. About 46 percent of the combined harvest in these WAAs is by non-rural hunters, suggesting that there is a harvest buffer that could be restricted, if necessary, before restrictions are placed on rural harvests.

WAAs 1530 and 1529 occur in an area with substantial past harvest and, therefore, deer habitat capabilities are currently estimated to be below 1954 levels (Table 3.23-63). Under each of the alternatives, additional harvest would occur that would reduce habitat capabilities after 100+ years to 50-58 percent of 1954 levels in WAA 1530 and 50-63 percent in WAA 1529.

Table 3.23-63
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Whale Pass Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Whale Pass Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
1530	17	80	147	62	58	57	55	54	55	55	50
1529	4	122	226	73	63	61	60	56	59	59	50

*Calculated based on harvest where location is known.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability over the long term for deer hunted by Whale Pass residents. Projected deer harvest in the Whale Pass community use area by all rural hunters and all hunters is estimated to exceed 10 percent habitat capability, the level that the analysis assumed would provide a reasonably high level of hunter success for their effort, in the short term and long term.

In summary, use of most subsistence resources by Whale Pass residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7 because of its general lack of Non-Development LUDs throughout most of Prince of Wales Island, and second highest under Alternative 4 because of its lower use of Non-Development LUDs than the other alternatives. Alternatives 1, 2, and 3 would have the lowest risk and Alternatives 5 and 6 would be intermediate. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within the Whale Pass subsistence use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters. The level of road development is already relatively high in these WAAs. Existing open road densities are 1.1 and 0.9 miles per square mile and existing total road densities are 1.7 and 1.5 miles per square mile in WAAs 1530 and 1529, respectively (all ownerships combined). Long-term (100+ years) road development would vary by alternative and would result in estimated maximum total road densities of 1.9 and 1.7 miles per square mile in these two WAAs under Alternative 1, to 2.0 miles per square mile in both WAAs under Alternative 7 (for all ownerships combined).

Wrangell

Wrangell is located on the north end of Wrangell Island, near the mouth of the Stikine River, an historic trade route to the Canadian interior. According to the 2000 Census, Wrangell had a 2000 population of 2,308, with Alaska Natives comprising 16 percent of the total (U.S. Census Bureau 2001).

Wrangell began as an important Tlingit site primarily because of its proximity to the Stikine River. Wrangell clans held a monopoly of trading rights along the Stikine. In 1811, the Russians began fur trading with area Tlingits and built a stockade named

Redoubt Saint Dionysius in 1834. In 1867, a military post named Fort Wrangell was established as part of the Alaska Territory. The community continued to grow because of its strategic location as a military fur trading center, and as an outfitter for gold prospectors between 1861 and the 1930s (ADF&G 1994; Alaska DCED 2006).

Wrangell is incorporated as a home rule municipality and has maintained its historic cultural diversity. The community has a local Fish and Game Advisory Committee. In a move to emphasize the importance of subsistence, the Wrangell Indian Reorganization Act Council has formed its own local Fish and Game Advisory Committee (ADF&G 1994).

The Silver Bay sawmill is located in Wrangell. According to the 2006 mill survey conducted for the USDA Forest Service, this mill, which has an installed production capacity of 65 MMBF, processed approximately 6 MMBF in 2006 and employed 30 people (Juneau Economic Development Council 2007).

Wrangell's population, which increased 22 percent between 1970 and 1990, decreased by 171 residents or 7 percent between 1990 and 2000. The population decreased by a further estimated 334 residents or 14 percent from 2000 to 2005. Total estimated population was 1,911 in Wrangell in 2006 (Alaska DOL 2007a).

Year	**1970**	**1980**	**1990**	**2000**	**2005**	**2006**
Population	2,029	2,184	2,479	2,308	1,974	1,911

Source: USDA Forest Service, 1997a; U.S. Census Bureau, 2001; Alaska DOL, 2007a

The Wrangell economy is primarily based on commercial fishing (250 residents hold permits), fish processing, and the timber industry. Estimated gross fishing earnings of local residents approached $5 million in 2000. A dive fishery, including for urchins, sea cucumbers, and geoducks, is developing. The Alaska Pulp Corp. sawmill, closed in 1994, was sold to Silver Bay Logging and reopened in April 1998. Wrangell also has a tourist business attracted by sportfishing in Stikine River and by a deep-water port for docking large and small cruise ships (Alaska DCED 2002; 2006).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 9 percent of the labor force in Wrangell was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $43,250, compared to a regional median of $44,118 (Alaska DCED 2002).

Employment by Industry	**Number**	**Percent of Total**
Agriculture, Forestry, Fishing & Hunting, Mining	176	16
Construction	98	9
Manufacturing	78	7
Wholesale Trade	7	1
Retail Trade	89	8
Transportation, Warehousing & Utilities	77	7
Information	27	3
Finance, Insurance, Real Estate, Rental & Leasing	23	2
Professional, Scientific, Management, Administrative & Waste Mgmt	51	5
Education, Health & Social Services	238	22
Arts, Entertainment, Recreation, Accommodation & Food Services	69	6
Other Services (Except Public Admin)	38	4
Public Administration	108	10
Total Employment	**1,079**	**100**

Source: Alaska DCED 2002

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Wrangell is part of the Wrangell City community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record.

Sawmill employment decreased by 62 percent in the Wrangell City community group between 1990 and 1999, a reduction from 162 to 62 jobs. The wood products sector accounted for 9 percent of total employment in the Wrangell City community group in 1999. The main employers in 1999 were the non-federal government and retail trade sectors, which accounted for 24 and 18 percent of total employment, respectively.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Wrangell in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-32. This area contains 819,240 acres of National Forest System land (among other land ownerships). Table 3.23-64 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for about 36 percent of the total acreage within the Wrangell community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in the community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 and 2. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 20 percent under Alternative 5 (No Action) to 45 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-64). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 48 percent under both of these alternatives compared to 36 percent under Alternative 5.

Total suitable acres would range from 5 percent under Alternative 1 to 16 percent under Alternative 7, compared to 11 percent of the total community use area under Alternative 5 (No Action) and Alternative 6 (Proposed Action).

Economy

Commercial fishing, timber processing, recreation and tourism, and subsistence opportunities are particularly important to Wrangell. Wrangell is one of the stop-over points for visitors traveling to the Stikine River and the Stikine-LeConte Wilderness.

Commercial fisheries employment and recreation and tourism activities are not likely to be affected under any of the alternatives.

Approximately 26.2 MMBF of timber was under contract in the Wrangell Ranger District in August 2006. About 58 percent (15.2 MMBF) of this volume could be potentially affected under Alternative 1, which would maintain all Inventoried Roadless Areas on the Tongass in a natural condition and not permit timber harvest in these areas. None of the other alternatives would affect this volume. These data

Figure 3.23-32
Wrangell's Community Use Area

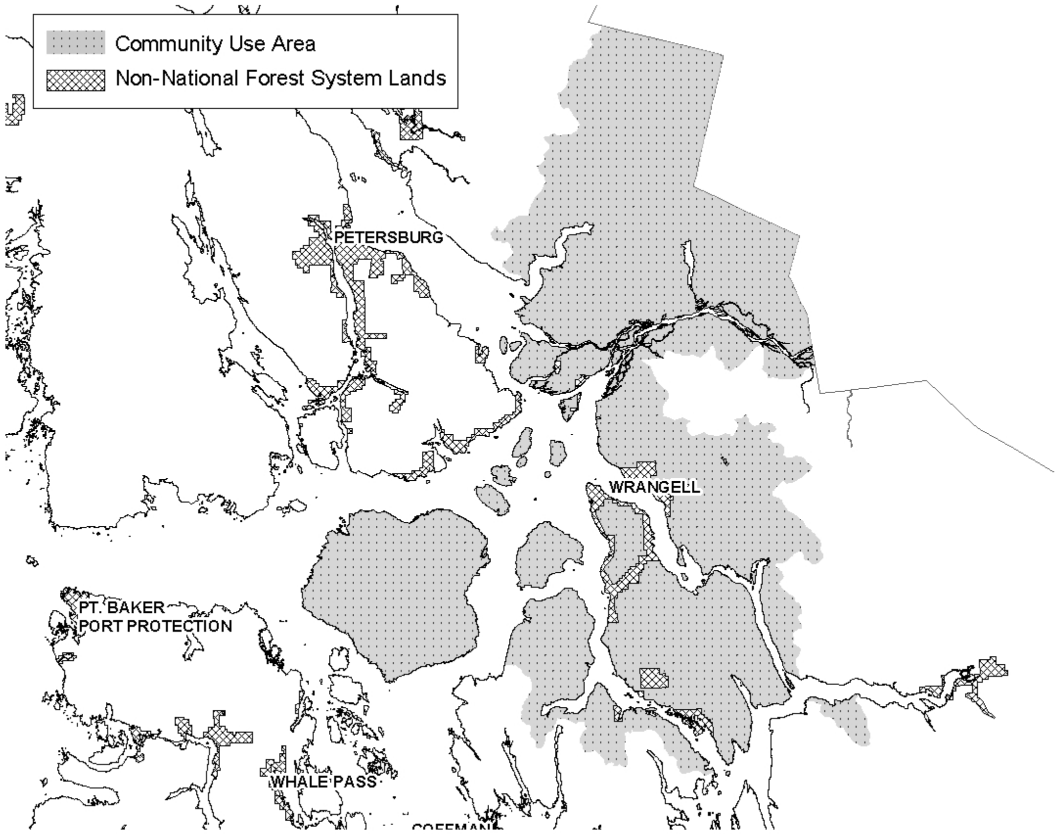


Table 3.23-64
LUD Groups in Wrangell's Community Use Area by Alternative

	Alternative						
	1	2	3	4	5	6	7
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	38,268	65,753	87,283	116,010	87,266	87,628	128,413
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	363,146	363,146	363,146	363,146	363,146	363,146	363,146
Mostly Natural	367,625	254,848	162,305	61,076	161,015	161,265	60,538
Moderate Development	36,970	76,979	149,387	228,846	150,577	149,950	229,418
Intensive Development	51,498	124,268	144,403	166,173	144,503	144,880	166,139
Total	**819,240**	**819,240**	**819,240**	**819,241**	**819,241**	**819,240**	**819,240**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

provide an indication of potential impacts, actual impacts would depend on the volume that is under contract when the decision is implemented and whether potentially affected existing sales were cancelled as part of the decision.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 52 percent of the total edible pounds of subsistence resources harvested by Wrangell households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 84 percent of per capita subsistence harvest in Wrangell in 1987.

The 1988 study found that deer account for 21 percent of the total edible pounds of subsistence resources harvested by Wrangell households (Kruse and Frazier 1988). Deer accounted for a small amount of per capita subsistence harvest by Wrangell residents in 1987 (ADF&G 2006).

Wrangell residents mainly harvest deer on Wrangell and surrounding islands, with the majority of harvest occurring in GMU 3. Deer harvest in GMU 3 declined between 1998-2002 and increased between 2002-2004. The number of deer hunters declined between 2000-2002 and slightly increased between 2002-2004 (ADF&G 2005). As noted above, the human population of Wrangell decreased by an estimated 14 percent between 2000 and 2005. Wrangell had an estimated population of 1,974 in 2005.

Deer harvest by Wrangell residents is spread over many WAAs, but the majority (76 percent) of their deer are from five WAAs located on Wrangell and surrounding islands. Zarembo Island (WAA 1905) alone accounts for about half (51 percent) of Wrangell deer harvest. The Wrangell portion of the harvest in these five WAAs represents about 72 percent of the total harvest and about 80 percent of the rural hunter harvest (Table 3.23-65).

The majority of the WAAs used heavily by Wrangell residents are in areas with substantial past harvest and deer habitat capabilities are currently estimated to be considerably below 1954 levels (Table 3.23-65). Under each of the alternatives, additional harvest would further reduce habitat capabilities after 100+ years. Reductions would be smallest under Alternative 1 and highest under Alternative 7.

Table 3.23-65
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Wrangell Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Wrangell Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
1905	283	400	400	77	72	67	67	59	66	65	57
1903	60	60	60	86	80	73	72	63	71	71	60
1901	30	31	38	91	87	80	78	70	77	77	64
1530	26	80	147	62	58	57	55	54	55	55	50
1906	17	17	20	59	55	55	55	55	55	55	53

*Calculated based on harvest where location is known.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted in the Wrangell community use area by Wrangell residents, all rural hunters, and all hunters in the short term. This is also estimated to be the case for Wrangell residents and all rural hunters in the long term. Projected deer harvest by all hunters is, however, estimated to exceed 10 percent habitat capability, the level that the analysis assumed would provide a reasonably high level of hunter success for their effort, in the long term.

In summary, use of most subsistence resources by Wrangell residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. The risks of this occurring are greatest under Alternative 7, and second highest under Alternative 4. Alternatives 1, 2, and 3 would have the lowest risk and Alternatives 5 and 6 would be intermediate. The risk of hunting restrictions would be reduced somewhat, through more intensive management (e.g., thinning) of the existing and future closed-canopy, young-growth forests in this area. Indirect effects associated with increased competition for deer within Wrangell's subsistence use areas could also occur under all alternatives due to displacement of hunters from other communities due to timber harvest activity. Additional road development under the alternatives would improve access but may increase competition with other non-local hunters. The level of road development is already relatively high in most of these WAAs. Existing open road densities range from 0.3 to 1.1 miles per square mile and existing total road densities range from 0.3 to 1.7 miles per square mile in the five most important WAAs for Wrangell deer harvest). Long-term (100+ years) road development would vary by alternative and would result in estimated maximum total road densities ranging from 0.4 to 1.9 miles per square mile in these WAAs under Alternative 1, to 1.1 to 2.0 miles per square mile under Alternative 7 (for all ownerships combined).

Yakutat

Yakutat is located in the lowlands along the northern Gulf of Alaska, 212 miles northwest of Juneau at the mouth of Yakutat Bay. According to the 2000 Census, Yakutat had a 2000 population of 680, with Alaska Natives comprising 47 percent of the total (U.S. Census Bureau 2001).

Yakutat, which means "the place where the canoes rest," has a diverse cultural history. The original settlers, believed to have been Eyak people from the Copper River area, were later conquered by the Tlingits. Intensive contact with European explorers came in the late 1700s when a Russian fur trading company moved into the Yakutat area. By the mid-1800s, foreign traders were well established along the coast. The contemporary town grew up around "the old village," which was established in 1889 by missionaries (ADF&G 1994).

Incorporated as a first-class city in 1948, Yakutat is governed by a mayor and a city council. Yakutat Borough, incorporated in 1992, expanded the original city boundaries to include a large section of the Gulf Coast north of Cape Fairweather. Yakutat has a local Fish and Game Advisory Committee. Yakutat is accessible by jet service from Juneau and Anchorage. Wrangell-Saint Elias National Park, Russell Fiords Wilderness, and Glacier Bay National Park are located northwest, northeast, and southeast of Yakutat, respectively.

The population of Yakutat, which almost tripled between 1970 and 1990, increased by 27 percent between 1990 and 2000. Population in Yakutat has, however, decreased since 2000, with an estimated net loss of 62 residents or 9 percent of the

2000 population. Total estimated population was 609 in Yakutat in 2006 (Alaska DOL 2007a).

Year	1970	1980	1990	2000	2005	2006
Population	190	449	534	680	618	609

Source: USDA Forest Service, 1997a; U.S. Census Bureau, 2001; Alaska DOL, 2007a

The Yakutat economy is primarily dependent on fishing, fish processing, and government. A total of 162 residents hold commercial fishing permits. Fishing opportunities in the area, both freshwater in the Situk River and saltwater, are considered world class, and 25 percent of the local residents have commercial fishing licenses. North Pacific Processors is the major private employer (Alaska DCED 2002; 2006).

Employment by industry data compiled by the Alaska DCED from the 2000 Census are summarized in the table below. Approximately 8 percent of the labor force in Yakutat was identified as unemployed and seeking work in 2000, compared to 7 percent for Southeast Alaska as a whole. Median household income was $46,786, compared to a regional median of $44,118 (Alaska DCED 2002).

Please refer to the 1997 Forest Plan EIS for further details on the history, economy, and subsistence use of this community.

Yakutat is part of the Yakutat community group (see Table 3.23-6). Detailed employment data are available for this community group by economic sector for 1990, 1995, and 2000 in the planning record.

Employment by Industry	Number	Percent of Total
Agriculture, Forestry, Fishing & Hunting, Mining	136	31
Construction	32	7
Manufacturing	25	6
Wholesale Trade	0	0
Retail Trade	21	5
Transportation, Warehousing & Utilities	64	15
Information	5	1
Finance, Insurance, Real Estate, Rental & Leasing	9	2
Professional, Scientific, Management, Administrative & Waste Mgmt	0	0
Education, Health & Social Services	62	14
Arts, Entertainment, Recreation, Accommodation & Food Services	43	10
Other Services (Except Public Admin)	13	3
Public Administration	30	7
Total Employment	**440**	**100**

Source: Alaska DCED 2002

The services and non-federal government sectors were the main employers in the Yakutat community group in 1999, accounting for 24 and 21 percent of total employment, respectively. Seafood processing accounted for 17 percent and recreation and tourism-related activities (lodging, restaurants, and recreation services) accounted for 19 percent of total employment. Wood products (logging) employment decreased by 65 percent between 1990 and 1999 and accounted for just 3 percent of total employment in 1999.

Potential Effects

Community Use Area

The general area commonly used or related to by many of the residents of Yakutat in their local day-to-day work, recreational, and subsistence activities is shown on Figure 3.23-33. This area contains 250,271 acres of National Forest System land (among other land ownerships). Table 3.23-66 shows how the lands within this community use area would be distributed among the LUD groups by alternative. The LUD groups are explained in the introduction to Chapter 3.

Development LUDs presently account for just 15 percent of the acreage in the Yakutat community use area. Alternatives 5 and 6 would not have a significant effect on existing LUD allocations in this community use area because the acreage by LUD group would remain the same as under the existing Forest Plan. The acreage allocated to Wilderness/National Monument LUDs would remain constant under all alternatives. The amount of acreage allocated to Mostly Natural LUDs would increase under Alternatives 1 and 2. The largest increase would occur under Alternative 1, with the acreage allocated to Mostly Natural LUDs increasing from 47 percent under Alternative 5 (No Action) to 62 percent under Alternative 1, with a commensurate reduction in development LUDs (Table 3.23-66). Alternatives 4 and 7 would increase the acreage in development LUDs. Development LUDs would account for 18 percent of the Yakutat Community Use Area under both of these alternatives compared to 15 percent under Alternative 5.

Total suitable acres would range from no acreage under Alternative 1 to 8 percent under Alternatives 4 and 7, compared to 7 percent of the total community use area under Alternative 5 (No Action).

Economy

Commercial fishing and subsistence are important to Yakutat. Oil exploration may begin again in the Pacific Ocean close to Yakutat. The Yakutat Forelands are some of the community's most important subsistence use areas. Commercial fishing is not expected to be affected under any of the alternatives.

Subsistence

No significant effect on salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. These resources account for 82 percent of the total edible pounds of subsistence resources harvested by Yakutat households (Kruse and Frazier 1988). Marine resources (fish and marine invertebrates) accounted for 74 percent of per capita subsistence harvest in Yakutat in 2000.

Moose are more important than deer as a subsistence meat source for Yakutat residents. Moose availability would not be significantly affected under any of the alternatives.

The 1988 TRUCS study found that deer account for only a small fraction of the total edible pounds of subsistence resources harvested by Yakutat households (Kruse and Frazier, 1988). Deer accounted for 1 percent of per capita subsistence harvest by Yakutat residents in 2000 (ADF&G 2006).

Figure 3.23-33
Yakutat's Community Use Area

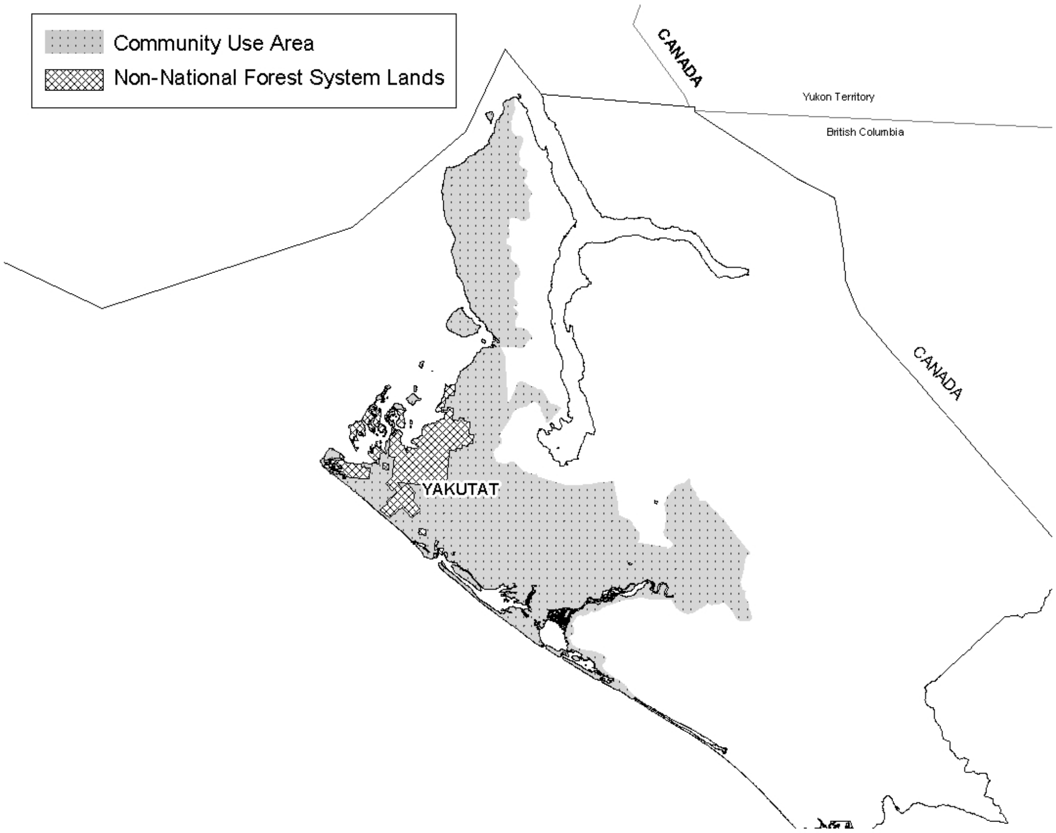


Table 3.23-66
LUD Groups in Yakutat's Community Use Area by Alternative

	Alternative						
	1	2	3	4	5	6	7
	Suitable National Forest System Acres for Timber Management						
Suitable Acres	0	9,089	18,548	20,170	18,548	18,548	20,267
LUD Groups	**Acres of National Forest System Land per LUD Group**						
Wilderness/National Monument	95,871	95,871	95,871	95,871	95,871	95,871	95,871
Mostly Natural	154,401	138,784	117,169	108,175	117,168	117,168	108,893
Moderate Development	0	13,514	20,667	19,029	20,668	20,668	18,077
Intensive Development	0	2,103	16,565	27,195	16,565	16,565	27,431
Total	**250,271**	**250,271**	**250,271**	**250,270**	**250,271**	**250,271**	**250,272**

[1] See the accompanying large LUD map for the distribution of existing LUDs and the Alternative Maps for the distribution of LUDs by alternative.

Yakutat residents harvested very few deer from 1996-2002, harvesting an annual average of more than one deer in just two WAAs over this period (Table 3.23-67). One of these WAAs is located in GMU 4; the other is located in GMU 5A. Deer harvest in GMU 4 is considered very high relative to other areas of Southeast Alaska, which is indicative of relatively high deer populations (ADF&G 2005). Over 1997-2004, there has been no significant trend in the number of deer harvested or in the number of hunters (ADF&G 2005). The human population of Yakutat declined by an estimated 9 percent between 2000 and 2005, with an estimated 2005 population of 618 residents.

Yakutat residents take the majority (78 percent) of their deer from two WAAs (Table 3.23-67). These numbers are, however, somewhat misleading due to the overall low deer harvest levels. In addition, deer harvest only occurred in WAA 4252, which is some distance from Yakutat near Hoonah, during one year.

Table 3.23-67
Deer Harvest (1996 to 2002) and Deer Habitat Capability on NFS Lands in 2005 and After 100+ Years of Full Implementation under Each Alternative, Expressed as a Percent of 1954 Habitat Capability, for the WAAs where Yakutat Residents Obtain Approximately 75% of their Average Annual Deer Harvest*

	Average Deer Harvest from 1996 to 2002			Deer Habitat Capability in 2005 and after 100+ Years of Full Implementation Under Each Alternative, Expressed as a Percent of the 1954 Habitat Capability							
WAA	Yakutat Residents	All Rural Hunters	All Hunters	2005	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
4252	4	75	99	92	92	78	78	70	77	76	69
4504	3	3	4	100	100	100	100	100	100	100	100
3835	1	4	218	100	100	100	100	100	100	100	100

*Calculated based on harvest where location is known.

The Deer Availability and Anticipated Demand analysis completed for the 1997 Forest Plan EIS determined that the 1997 Alternatives 2, 6, and 11, which are similar to the four highest harvest alternatives in this EIS, should be able to provide sufficient habitat capability for deer hunted in the Yakutat community use area by Yakutat residents, all rural hunters, and all hunters in the short term. This is also estimated to be the case for Yakutat residents and all rural hunters in the long term. Projected deer harvest by all hunters is, however, estimated to exceed 10 percent habitat capability, the level that the analysis assumed would provide a reasonably high level of hunter success for their effort, in the long term.

In summary, use of most subsistence resources by Yakutat residents (fish and marine invertebrates) is not expected to be affected by any of the alternatives. However, subsistence use of deer may be affected to the point that some restriction in hunting might be necessary over the long term, even under Alternative 1. With the exception of WAA 4252, the highest use areas for Yakutat households are within Wilderness and LUD II designations that will not change by alternative.

Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires each federal agency to make the achievement of environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The Order further stipulates that the agencies conduct their programs and activities in a manner that does not have the effect of excluding persons from participating in, denying persons the benefits of, or subjecting persons to discrimination under such programs, policies, and activities because of their race, color, or national origin.

Race and ethnicity are shown by borough in Table 3.23-68. These data show that 68 percent of the population of Southeast Alaska identified as White in the 2000 census. American Indian and Alaska Native was the largest minority group, accounting for 17 percent of the total Southeast Alaska population. Table 3.23-68 indicates that there are relatively large proportions of Alaska Natives in the Yakutat Borough and Prince of Wales-Outer Ketchikan and Skagway-Hoonah-Angoon Census Areas. The populations of Haines and Juneau, in contrast, have relatively low proportions of Alaska Natives, below the Southeast Alaska average of 17 percent.

Alaska Native populations are identified as a percentage of total population by community in Table 3.23-8. This information is presented graphically in Figure 3.17-1 (in the *Subsistence* section). These data indicate that 13 of Southeast Alaska's 32 communities have Alaska Native populations that comprise a larger share of total population than the regional average (17 percent). Alaska natives comprised a particularly large share of total population in Angoon (82 percent), Hoonah (61 percent), Hydaburg (85 percent), Kake (67 percent), Klawock (51 percent), Metlakatla (82 percent), and Saxman (66 percent), all considered traditional Native communities.

Table 3.23-68
Race/Ethnicity by Borough/Census Area, 2000

	2000 Population	Percent White	Percent American Indian and Alaska Native	Percent Two or More Races	Percent Other[1]	Percent Hispanic or Latino[2]
Northern Boroughs						
Haines Borough	2,392	83	12	5	1	1
Juneau Borough	30,711	75	11	7	7	3
Sitka Borough	8,835	69	19	8	5	3
Skagaway-Hoonah-Angoon CA	3,436	57	36	6	2	2
Yakutat Borough	808	50	40	8	2	1
Southern Boroughs						
Ketchikan Gateway Borough	14,070	74	15	5	5	3
Prince of Wales-Outer Ketchikan CA	6,146	53	39	7	1	2
Wrangell-Petersburg CA	6,684	73	16	8	3	2
Southeast Alaska	**73,082**	**68**	**17**	**7**	**8**	**3**
Alaska	626,932	69	16	5	10	4

[1] The "Other" category presented here includes respondents identifying as Black or African American, Asian, Native Hawaiian and Other Pacific Islander, and Other. These categories have been combined for ease of presentation and because they comprise small percentages of local populations.
[2] "Hispanic" can be of any race.
Source: U.S. Census Bureau, 2001.

The percent of households below the poverty line and the median household income in 2000 are also identified by community in Table 3.23-8. The percent of households below the poverty line in Alaska as a whole was 7 percent in 2000. Median household income was approximately $51,571. The U.S. Census identified 14 communities in Southeast Alaska with a larger percent of households below the poverty line than the state average. These communities include Klawock, Hoonah, Edna Bay, Hydaburg, Port Alexander, and Angoon, as well as Hyder and Port

Protection. Median household incomes ranged from $36,048 in Haines Borough to $49,924 in the City and Borough of Juneau (U.S. Census Bureau 2001). All but four of the communities identified in Table 3.23-8 had median household incomes below the state average. Communities with median household income below the regional average included Port Protection, Hyder, Point Baker, Edna Bay, Angoon, and Hydaburg.

The potential effects of the alternatives on the economic and social environment of Southeast Alaska are discussed in the *Economic and Social Environment* section of this document. The principal regional effects would be those associated with changes in the timber industry and recreation and tourism. There could also be potential effects upon subsistence use and heritage resources that have particular significance for Alaska Native populations.

The effects of the alternatives on communities are discussed by community in the preceding part of this section. These community assessments include a discussion of potential timber harvesting within each community's use area and the potential effects to the subsistence resources and the land base used by each community.

Wood products employment is projected to be higher than current levels under all of the alternatives, except Alternative 1. Projected increases for the other alternatives ranging from 1.8 times the 2005 harvest level under Alternative 2 to 3.9 times under Alternative 7. The slight increases in projected employment under Alternative 2 when compared to 2005 harvest levels is still a decrease when compared to projected employment levels under Alternative 5 (No Action). Further, it could be argued that the alternatives that do not emphasize timber production represent a possible foregone opportunity for increased employment in the wood products sector. Even viewed in terms of a comparison of alternative projections, relative reductions in employment would be unlikely to have a disproportionately high effect on low-income and minority communities or groups. Relative reductions in sawmill employment would be concentrated in Ketchikan, Wrangell, and Craig. Reductions in logging employment would likely be distributed throughout Southeast Alaska, depending upon the alternative.

The mix of available recreation opportunities would vary by alternative based on the allocation of the Forest to different LUD groups. However, viewed in terms of projected recreation and tourism employment over the next decade, there would be very little difference between the alternatives. Recreation and tourism-related economic impacts are not expected to disproportionately affect minority or low-income populations.

Subsistence issues are discussed for the region as a whole in the *Subsistence* section and for each of Southeast Alaska's 32 communities in the preceding part of this section. The deer analysis presented in the 1997 Tongass Forest Plan Final EIS indicated that deer habitat capabilities in several portions of the Tongass may not be adequate to sustain the current levels of deer harvests, which may result in restrictions on subsistence use at some point in the future.

The potential effects of the alternatives upon heritage resources are expected to be the same or lower than under the current Forest Plan. Because of the protection offered by Forest-wide standards and guidelines, effects on heritage resources are expected to be low under all the alternatives.

CHAPTER 4
LIST OF PREPARERS

List of Preparers

Provided below are brief biosketches of the preparers from Tetra Tech and the primary reviewers and contributors from the Forest Service. Other Forest Service, Tetra Tech, and other agency staff, who contributed to various sections through an extensive internal review process, or in other ways, are also listed.

Lee Kramer, Forest Service Project Manager

Education

B.S., Forest Management, Auburn University, 1979

A.A., Degree from Eastern Wyoming College, 1975

Experience

Thirty years of Forest Service experience, including various Ranger District staff positions in Alabama, Virginia, Oklahoma, and New Mexico.

Forest Planning or Forest Staff positions in Colorado, Wyoming, and Montana.

Larry Lunde, Tongass Planning Staff Officer – Forest Service

Education

B.S., Forest Management, Washington State University, 1973

Experience

Twenty-eight years of Forest Service experience.

Tongass National Forest, Environmental Coordinator and Planner.

Previous experience in forest and multiple-use management positions as District Resource Staff and District Ranger, including Nez Perce National Forest in Idaho, Eldorado National Forest in California, Gifford Pinchot National Forest in Washington, and Mount Hood and Fremont National Forests in Oregon.

Patricia O'Connor – Tongass Wildlife and Subsistence Staff Officer

Education

M.S., Natural Resource Management, Humboldt State University, 1988

B.S., Biology, Cornell University, 1983

Experience

Nineteen years of Forest Service experience, including several years as a staff wildlife biologist on the Mt. Hood National Forest in Oregon and on the Lolo National Forest in Montana. Five years as the Yukatat District Ranger on the Tongass National Forest.

Randal Fairbanks, Interdisciplinary Team Leader, Project Manager – TtEC

Education

M.S., Forest Resources, University of Washington, 1979

B.S., Wildlife Science, University of Washington, 1972

Experience

Thirty-three years of experience in design, conduct, and management of ecological and forest inventory and research, impact assessments, and mitigation plans.

Project manager or interdisciplinary team leader for 11 major forest management-related EIS/EA efforts.

Major contributor to dozens of other EISs, EAs, and Environmental Reports.

Joe Iozzi, Silviculturist/Forester, Asst. Project Manager – TtEC

Education

Silviculture Institute, University of Washington, 1984 to 1985

B.S., Forest Management, Rutgers University, 1977

Experience

Twenty-seven years of experience in silviculture and natural resource management, primarily on Forest Service and NEPA projects.

Thirteen years as a certified silviculturist for the Forest Service.

Nine years of experience working on timber sale and transportation management projects on the Tongass National Forest, project manager for the Forest-wide roads analysis and several NEPA projects.

Matt Dadswell, Senior Social Scientist/Economist – TtEC

Education

Ph.D., Candidate, Geography, University of Washington

M.A., Geography, University of Cincinnati, 1990

B.A., Economics and Geography, Portsmouth Polytechnic, 1988

Experience

Fifteen years of experience conducting economic, social, and environmental regulatory analysis on a variety of natural resource projects, including Forest Service and NEPA projects.

Ten years of experience working on Forest Service projects, including projects on the Tongass National Forest.

John Knutzen, Senior Fisheries Biologist/Aquatic Ecologist – TtEC

Education

M.S., Fisheries, University of Washington, 1977

B.A., Biology, Western Washington State College, 1972

Experience

Twenty-nine years of experience evaluating developmental activity impacts to lakes, rivers, and stream water quality and aquatic resources in the Pacific Northwest, with emphasis on salmonids.

Experience working on more than 60 projects in the Pacific Northwest, including assessing effects of federal actions on endangered fish species.

Provided scientific evaluation on more than 25 NEPA documents, including Forest Service EISs for the Tongass National Forest.

Steve Negri, Wildlife Biologist – TtEC

Education

M.S., Wildlife Ecology, Michigan State University, 1995

B.S., Business Finance, University of Missouri, 1985

Experience

Thirteen years of experience as a wildlife biologist, including work on three EISs for the Tongass National Forest and more than a dozen Forest Service-related projects.

Experience working on approximately 15 EISs and other NEPA documents in the Pacific Northwest and Alaska.

Previous experience includes working 5 years as threatened and endangered species biologist for the Washington Department of Fish and Wildlife.

Brita Woeck, Wildlife Biologist – TtEC

Education

M.S., Wildlife Ecology and Management, University of Missouri, Columbia, 2003

BS, Wildlife Science, University of Washington, 1999

Experience

Seven years of experience conducting all phases of ecological research.

Experience includes ecological study development and coordination, data collection and analysis, results interpretation and presentation, and NEPA analysis.

Work experience focuses on population dynamics, resource selection and space use patterns, and community ecology; with responsibility for vegetation and wildlife population surveys, radiotelemetry, and wildlife capture and immobilization.

Mary Jo Russell, GIS Analyst – TtEC

Education

B.S., Computer Information Systems, Menlo College

Experience

Fourteen years of experience as a GIS analyst specializing in creating complex riparian models, surface models, habitat models, perspective scene analysis, aerial photo interpretation of logging units, preparation of field maps, and final production of maps for numerous timber sale EISs.

Experience includes serving as lead GIS analyst on more than a dozen Forest Service projects, including four EIS projects specific to Southeast Alaska and the Tongass National Forest.

Mary Clare Schroeder, Wetland Scientist /Botanist – TtEC

Education

B.A., Botany, University of Washington, 2000

MBA, University of Chicago, 1993

Experience

Six years of experience working on EIS and NEPA documents.

Field experience performing wetland delineation; wetland mitigation; planning and monitoring; and national, state, and local project permitting.

Experience conducting wetland and plant surveys on the Tongass National Forest.

Stephanie Phippen, PG, Geoscientist – TtEC

Education

M.S., Geology/Watershed Science, Colorado State University, 2000

B.A., Geology, Carleton College, 1996

Professional Geologist, UT, Number 5557302-2250

Experience

Seven years of experience in siting, environmental assessment of impacts to watersheds and water resources.

Field of expertise is geomorphology (fluvial, colluvial, and glacial), with supporting strengths in hydrology (surface and groundwater), soil science, and statistics.

Experience completing analyses of water quality, road networks, geomorphology, soils, hydrology, geology, and cumulative effects for EIS, EA, landscape and watershed assessment, geologic risk assessment, and geomorphic mapping projects. Published original research that quantifies the impacts of roads and other forms of land management on stream-channel equilibrium, sediment movement, and watershed stability.

Dave Cox, Hydrologist/Minerals Specialist – TtEC

Education

B.S., Geology, Western Washington University, 2000

Experience

Six years of experience in hydrology, geomorphology, and natural resource management, primarily on Forest Service and NEPA projects.

Field of expertise is hydrology, geomorphology, and regulatory compliance with supporting strengths in soil science.

Previous experience working on three National Forests, including four years on the Tongass National Forest as project manager, hydrologist, and minerals administrator for projects including mine development, hydropower, transportation, and recreation.

Susan Corser, Landscape Architect/Recreation Planner – Ernst Corser Associates

Education

M.U.P., Urban Planning, University of Washington, 1989

M.A., Landscape Design, Conway School of Landscape Design, 1983

B.A., Geography and Environmental Studies, Macalester College, 1977

Experience

Twenty-one years of experience conducting visual analyses, recreation demand studies, urban planning, and public meeting facilitation. Conducted visual, recreation, and land use impact analyses for hydropower, mine, landfill, ski area, and water supply projects.

Ten years of experience working on environmental analyses on Forest Service or BLM lands, including two years experience working on NEPA projects within the Tongass National Forest.

Marcy Rand, Public Involvement Coordinator – TtEC

Education

B.A., Journalism and Mass Communications, Washington and Lee University, 1992

Experience

Thirteen years of writing/editing/public involvement experience.

Extensive writing/editing/public involvement experience with NEPA and Forest Service documents, including 10 EISs/EAs.

Experience includes developing, writing, and producing factsheets, brochures, newsletters, news releases and advertisements; public outreach plan development and implementation; scoping and public comment coordination; and public meeting assistance.

Maggie Huffer, Technical Editor/Public Involvement Coordinator – TtEC

Education

B.A., Journalism/Public Relations, Western Washington University, 2000

Experience

Seven years of experience writing, editing, and coordinating numerous environmental reports, including multi-volume EISs and other NEPA documents.

Experience working on four Forest Service EISs specific to Southeast Alaska and the Tongass National Forest.

T. Weber Greiser, Heritage Resource Specialist/Archaeologist

Education

M.A., Anthropology, University of New Mexico, 1972

B.A., Anthropology, University of New Mexico, 1969

Experience

Twenty-seven years of experience as Project Manager and/or Principal Investigator on heritage resource projects in Alaska and throughout the Western U.S. Experience includes prehistoric and historic archaeological predictive modeling; heritage resource surveys, testing projects, and excavations; laboratory analysis of artifacts and faunal remains; and ethnographic investigations and oral interviews of native inhabitants regarding land use, water use, and sacred lands.

Heritage resource Principal Investigator for background research, cultural resource survey, preparation of specialist report, and/or preparation of EA or EIS cultural resource sections for nine projects since 1993 on the Tongass.

Eric Henderson, SPECTRUM Model Analyst – USDS Forest Service, Region 9

Education

M.S., Forest Management (2003), University of Minnesota

B.B.A., Business Administration (2000), University of Iowa

Experience

Four years of experience as Forest Service Analyst/Planner, specializing in landscape planning models, growth and yield models, historic vegetation analysis, and computer programming languages.

Other Contributors

Forest Service

Rick Abt – Land Management Planner
Richard Aho – Forest Fisheries Biologist
Susan J. Alexander – Regional Economist
John Autrey – Tribal Government Relations Specialist
Jim Baichtal – Karst Specialist
Gabriele Bosch – GIS Database Manager
Jeff Defreest – Minerals
Karen Dillman – Ecologist

4 List of Preparers

Pam Fletcher – Invasive Species Coordinator
Colleen Grundy – Regional Silviculturist
Bob Housley – Timber Valuation – Regional Office
John Inman – Tongass Contracting Officer
Karen Iwamoto – Land Management Planner
Susan Jennings – Tongass Document Coordinator
Steve Kessler – Regional Subsistence – Program Manager
Patti Krosse – Forest Ecologist
Dennis Landwehr – Soil Scientist
Jan Lerum – Regional Planner
Mark McCallum – Archaeologist
Dom Monaco – Forest Landscape Architect
Dennis Neill – Partnership and Public Affairs Staff Officer
Jack Oien – Supervisory Engineer
Eric Ouderkirk – Forest Plan Adjustment COR
Steve Paustian – Hydrology Program Manager
Betsy Rickards – Alaska Region Environmental Coordinator
Jim Russell – Silviculture Program Manager
Jim Schramek – Senior GIS Analyst
Carol Seitz – Warmuth, Monitoring
Cynthia Sever – Timber Planning
JT Stangl – Wildlife Biologist
Barbara Stanley – Lands
Julianne Thompson – Hydrologist
Bill Tremblay – Wilderness/Developed Rec/Rec Special Uses
Erin Uloth – Ecosystem Services
Betty Wilt – Highway Engineer

Office of General Council
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Jack E. Phelps – Office of Economic Development
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Marty Freeman – Department of Natural Resources
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Dale Rabe – Department of Fish and Game
Tina Cunning – Department of Fish and Game
Tom Brookover – Department of Fish and Game

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Chris Spagnuolo – GIS Analyst
Wayne Watson – GIS Analyst
Andrea Slusser – Project Record

Judy Brown – Desktop Publishing
Dawn Stuart – Desktop Publishing
Steve Flegel – Desktop Publishing
Josh Breen – Desktop Publishing

Consultants
John Hendee – Technical Review: Wilderness
Tom Aley – Technical Review: Karst Resources

4 List of Preparers

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CHAPTER 5
LIST OF DOCUMENT RECIPIENTS

List of Document Recipients

Federal Agencies

Bureau of Land Management, Alaska State Office
Bureau of Land Management, Juneau Minerals Information Center
Department of Transportation, Western Federal Lands Highway Division
Federal Aviation Administration, Office of the Regional Administrator
Federal Energy Regulatory Commission, Environmental Compliance Branch
Federal Highway Administration, Division Administrator
Federal Highway Administration, Regional Administrator - Western Region
Federal Railroad Administration, Office of Transportation and Regulatory Affairs
Housing and Urban Development, Alaska Office of Housing and Urban Development
Library of Congress
National Marine Fisheries Service, Alaska Region
National Marine Fisheries Service, Protected Resources Management Division
National Oceanic and Atmospheric Administration, Office of Policy and Strategic Planning
National Park Service, Glacier Bay National Park
National Park Service, Wild and Scenic Rivers Program
Office of Federal Register, National Archives and Records Administration
Point Baker Post Office
Tongass National Forest, Admiralty National Monument
Tongass National Forest, Assistant Forest Supervisor, Alaska Region
Tongass National Forest, Craig Ranger District
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Tongass National Forest, Petersburg Ranger District
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Tongass National Forest, Rocky Mountain Research Station
Tongass National Forest, Sitka Ranger District
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Tongass National Forest, Wrangell Ranger District
Tongass National Forest, Yakutat Ranger District
US Advisory Council on Historic Preservation, Planning and Review
US Army Corps of Engineers, Field Office Manager
US Army Corps of Engineers, Juneau Regulatory Field Office
US Army Corps of Engineers, Northwestern Division
US Army Corps of Engineers, Pacific Ocean Division
US Army Corps of Engineers, Regulatory Office
US Army Engineer District, East Section
US Bureau of Mines
US Coast Guard, Environmental Management CG-443
US Coast Guard, Seventeenth Coast Guard District
US Department of Agriculture, APHIS PPD/EAD

5 List of Document Recipients

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US Department of Energy, Office of NEPA Policy and Compliance
US Department of the Interior, Office of Environmental Policy and Compliance
US Department of the Interior, Office of the Secretary
US Department of the Interior, US Geological Survey
US Department of Transportation, Environmental Division
US Environmental Protection Agency, Alaska Operations
US Environmental Protection Agency, Geo. Imp. Unit
US Environmental Protection Agency, Office of Federal Activities
US Environmental Protection Agency, Region 10
US Fish and Wildlife Service, Office of Subsistence Management
US Fish and Wildlife Service, Refuge Planning
US Navy, Environmental Protection Division
US Navy, Naval Oceanography Division
US Navy, Office of Chief of Navy Operations
US Navy, US Naval Air Systems Command
US Senate, Public Land and Forest Subcommittee
US Small Business Administration
USDA Forest Service, Alaska Region
USDA Forest Service, Chugach National Forest
USDA Forest Service, Director of Ecosystem Planning and Budget
USDA Forest Service, Division of Forest Management
USDA Forest Service, Ecosystem Management Coord. Staff
USDA Forest Service, Forestry Sciences Laboratory
USDA Forest Service, Forestry Services Library
USDA Forest Service, Hiawatha National Forest
USDA Forest Service, Office of the Chief
USDA Forest Service, Region 10, Regional Office
USDA Forest Service, Region 9, Regional Office
USDA Forest Service, SE Regional Subsistence Advisory Council
USDA Forest Service, Supervisor's Office

State and Federal Congressional Representatives

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Sander Levin, U.S. Representative
Steven Rothman, U.S. Representative
Michael McNulty, U.S. Representative
Jim Marshall, U.S. Representative
Richard J Durbin, U.S. Senator
Lisa Murkowski, U.S. Senator
Ted Stevens, U.S. Senator
Albert Kookesh, State Senator
Peggy Wilson, State Representative

Alaska Native Tribes and Corporations

Aboriginal Rights Committee
Alaska Federation of Natives
Alaska Native Brotherhood
Alaska Native Brotherhood, Camp #01
Alaska Native Brotherhood, Camp #03
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Alaska Native Sisterhood, Camp #90
Angoon Advisory Committee
Angoon Tlingit and Haida Community Council
Angoon Traditional Council
Cape Fox Corporation
Central Council Tlingit and Haid Tribes of Alaska
Chilkat Indian Village (Klukwan)
Chilkoot Indian Association IRA

5 List of Document Recipients

Chugach Alaska Corporation
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Craig Tlingit and Haida Community Council
Douglas Indian Association
Edna Bay Advisory Committee
Elfin Cove Community, Chairperson
Gathering Council of Kake
Gustavus Community Association
Haida Corporation
Haida Society
Haida Tribe
Hollis Community Action Council
Hoonah Tlingit and Haida Community Council
Huna Totem Corporation
Hydaburg Cooperative Association
Kadin Corporation
Kake Tribal Corporation
Ketchikan Advisory Committee
Ketchikan Indian Community
Klawock Cooperative Association
Klawock Heenya Corporation
Klawock Tlingit and Haida Community Council
Klawock Tribal Government
Klukwan Tlingit and Haida Community Council
Kootznoowoo Inc.
Kuiu Thlingit Nation
Metlakatla Indian Community
Metlakatla Tlingit and Haida Community Council
Meyers Chuck Community Association
Native American Fish and Wildlife Society
Native Forest Network
Native Subsistence Commission
Native Village of Kasaan
Organized Village of Kake IRA
Organized Village of Kasaan
Organized Village of Saxman
Pelican Tlingit and Haida Community Council
Petersburg Indian Association
Point Baker Community Council
Port Tongass Village Association
Saanya Kwan -– Tei Kweidi
Saxman Advisory Committee
SE AK Regional Subsistence Council
Sitka Advisory Committee
Sitka Tlingit and Haida Community Council
Sitka Tribe of Alaska
Skagua Traditional Council
Skagway Village IRA
Southeast Alaska Conservation Council
Southeast Native Subsistence Commission
Southeast Regional Advisory Council
Sumner Strait Advisory Committee
Tanana Chiefs Council
Tlingit and Haida Community Council
Tlingit and Haida Indians, CBJ
Tongass Tribe
Tsimpshian
Tsimpshian Tribal Council
Wrangell Advisory Committee
Wrangell Cooperative Association
Wrangell Resource Council
Yak-Tat Kwaan, Inc.
Yakutat Native Association
Yakutat Tlingit Tribe

State Agencies

Alaska Coastal Management Program, OPMP
Alaska Department of Commerce and Economic Development
Alaska Department of Environmental Conservation
Alaska Department of Fish and Game, Alaska Board of Game
Alaska Department of Fish and Game, ANILCA
Alaska Department of Fish and Game, Boards Support
Alaska Department of Fish and Game, Division of Commercial Fisheries
Alaska Department of Fish and Game, Division of Habitat and Restoration
Alaska Department of Fish and Game, Division of Subsistence
Alaska Department of Fish and Game, Division of Wildlife Conservation
Alaska Department of Fish and Game, Special Areas Planner
Alaska Department of Fish and Game, Sport Fish Division
Alaska Department of Fish and Game, Wildlife Division
Alaska Department of Labor
Alaska Department of Natural Resources, Office of Habitat Management and Planning

Alaska Department of Natural Resources, State Preservation Office
Alaska Department of Natural Resources, Division of Forestry
Alaska Department of Natural Resources, Division of Mining, Land and Water
Alaska Department of Natural Resources, Office of Program Management
Alaska Department of Transportation and Public Facilities
Alaska Division of Telecommunication Operations
Alaska Energy Authority
Alaska Mental Health Trust
Alaska Natural Heritage Program
Alaska State Department of Labor
Alaska State Parks Advisory Board
Office of the Governor, State of Alaska
Resource Development Council of Alaska

City and Borough Agencies, Libraries, and Schools

Alaska Court System, Juneau Law Library
Alaska Court System, Ketchikan Law Library
Alaska State Library
Angoon Public School Library
Bruce Hill School
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City of Klawock
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Ketchikan Gateway Borough
Ketchikan High School Library
Ketchikan Public Library
Ketchikan Visitors Bureau
Kettleson Memorial Library
Klawock Public Library
Legislative Reference Library
Mendenhall Valley Public Library
Metlakatla Centennial Library
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Northwestern University, Urban Affairs and Policy Research
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Port Protection School
Prince of Wales Chamber of Commerce
Prince of Wales Community Advisory Council

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University of Alaska - Southeast, William A. Egan Library
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University of Alaska at Fairbanks, School of Natural Resources and Agricultural Sciences, Palmer Research Center
University of Alaska Land Management
University of Minnesota, Forestry Library
USDA National Agriculture Library
Utah State University, College of Natural Resources
Virginia Polytechnic Inst. and State Univ, Dept Fish and Wildlife
Whale Pass School
Wrangell Chamber of Commerce
Wrangell Public Library
Yakutat School District Library

Other Organizations

3-D Logging
Adam Baskett's Equip. Repair
Adams Alaskan Safari
Admiralty Bears Association
Admiralty Tours
Adventure Alaska Southeast
Age Cedar Products
Ahtna Incorporated
Alaska Quiet Rights Coalition
Alaska Angling
Alaska Association for Historic Preservation
Alaska Biological Research
Alaska Board of Fish
Alaska Center for the Environment
Alaska Chapter Sierra Club, Auke Bay Group
Alaska Charter & Adventures
Alaska Charter Service
Alaska Coalition
Alaska Coastal Adventures
Alaska Coastal Guiding
Alaska Coastal Hunting
Alaska Coastal Outfitters
Alaska Conservation Alliance
Alaska Conservation Foundation
Alaska Discovery
Alaska Environmental Lobby
Alaska Fibre
Alaska Fish Tales
Alaska Fly N Fish Charters
Alaska Forest Association
Alaska Forest Products
Alaska Island Adventures
Alaska Loggers Association
Alaska Longline Fishermen's Association
Alaska Miners Association
Alaska Natural History Association
Alaska Outdoor Adventures
Alaska Pacific Logging, Inc.
Alaska Pacific Powder Co.
Alaska Pacific Trading Company
Alaska Passages
Alaska Peak & Seas
Alaska Power & Telephone Co.
Alaska Public Radio Network
Alaska Rainforest Campaign
Alaska Scenic Charters
Alaska Scenic Waterways
Alaska Ship & Drydock, Inc.
Alaska Society of Forest Dwellers
Alaska Timber Wolf
Alaska Timberland Corporation
Alaska Travel Adventures
Alaska Travel Industry Association
Alaska Trollers Association
Alaska Tugboat Tours
Alaska Vistas
Alaska Waters, Inc / Leslie Cutters, Inc
Alaska Wilderness League
Alaska Wildlife Alliance
Alaska Women in Timber
Alaska Woods Service Company
Alaska Wyldewind
Alaska Yacht Adventures
Alaskan Natural Mystic
Alaskan Star Charters
Alaskan Yacht Charters
Alaskans for Responsible Resource
Alcan Forest Products
All Aboard Yacht Charters
Allweather Industries / The Roadhouse Lodge

Alpine Communications
Alsek River Lodge
American Forest & Paper Association
American Safari Cruises, Inc.
American Society of American Foresters
American Society of American Foresters Juneau Chapter
Anahootz Alaskan Adventure
Anderson & Associates
Annette Natural Resource Center
AP&T
Applied Sociocultural Research
Aqua Sports Enterprises
Associates in Pathology
Atelier PS
Atterbury Consultants, Inc.
Audubon Alaska
Aurora Films
Baja Alaskan Experience
Baltar Consulting
Baranof Expeditions
Baranof Wilderness Lodge
Bear Creek Outfitters
Bear Valley Lodge
BearDown Adventures
Big “R” Manufacturing
Blackwell Log
Blue Heron Inn
Bluewater Adventures, Ltd.
Bluewater Outfitter
Boardwalk Wilderness Lodge
Brabazon Expeditions
Bravo Venture Group, Inc.
Breakaway Adventures
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Coast Alaska Engineering Support Group
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Concerned Alaskans for Resource and Environment
Concerned Citizens for Wise Use
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Cook Inlet Regional Incorporated
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Crossings
Cruise West
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CT Sierra Club
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Deer Creek Cottages
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Italio River Adventures
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Kavilco Inc.
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Ketchikan Charter Boats, Incorporated
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Ketchikan Outdoor Recreation and Trails Coalition
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Ketchikan Sportfishing
Kettle Range Conservation Group
KFSK Public Radio
KHNS – FM
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KINY – AM, KSUP – FM, Juneau
KJNO – AM, KTKU – FM, Juneau
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Klawock IRA
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Koncor Forest Products
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Monti Bay Foods
MSM Resource
Muskeg Excursions
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The Camp Fire Club of America / Committee on Conservation of Forests and Wildlife
The Fishermen's Inn
The Louisiana Forestry Association
The Mill Inc
The Nature Conservancy of Alaska
The Presidio of San Francisco
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Unforgettable Charters
United Fishermen of Alaska
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WO Development
Wood Product Committee
WR Jones & Son Lumber Co.
Wrangell Historical Society
Wrangell Research Associates

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Yakutat Bay & River Charters
Yakutat Marine & Supply, Inc.
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Individuals

The Final Environmental Impact Statement was also sent to approximately 2,700 individuals.

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CHAPTER 6
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CHAPTER 7
GLOSSARY

Glossary

The Glossary for the Final EIS is located in Chapter 7 of the Final Land and Resource Management Plan volume.

7 Glossary

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CHAPTER 8
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APPENDICES

Appendices

The following appendices are included in Volume II:

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Photograph taken looking northeast with Lindenberg Peninsula on Kupreanof Island and the mouth of Petersburg Creek (front cover) in the foreground, Petersburg Mountain (front cover) in the middleground, and Frederick Sound and the mainland in the background.

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Tongass Land and Resource Management Plan

Final Environmental Impact Statement

Plan Amendment

Volume II - Appendices

Tongass National Forest
Land and Resource Management Plan

Final Environmental Impact Statement
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APPENDIX A
ISSUE IDENTIFICATION

Appendix A

Issue Identification

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Appendix A
Issue Identification

Introduction

This Environmental Impact Statement (EIS) responds to the August 2005 U.S. Ninth Circuit Court Decision that found inadequacies primarily relating to the National Environmental Policy Act (NEPA) process for the 1997 Land and Resource Management Plan (Forest Plan or Plan). The Court directed the Forest Service to prepare an EIS that evaluates and considers timber demand, the range of alternatives related to the timber demand, and the cumulative analysis related to activities on non-National Forest System (NFS) lands. This is discussed further in Chapter 1 of the EIS. This EIS responds to the Court and the 5-Year Review by analyzing six alternatives for amending the Plan in addition to the No-Action alternative. Appendix A of the 1997 Final EIS discusses the issue identification process used in the Tongass National Forest planning process.

Identification of issues helps define or predict what resources or uses could be most affected by the planning alternatives under consideration. These issues are then used as a basis to formulate alternatives or to measure differences between alternatives. The following sections describe the process used to identify the issues for this EIS and the key issues identified.

The scope of this EIS was initially determined by the Court in its 2005 ruling, and by the 5-Year Plan Review (completed in January 2005) that indicated the need to amend the current Tongass Forest Plan. Additional information was considered to help clearly define the issues and for use in the development and analysis of alternatives. For this EIS, comments and information from a wide variety of public inputs that were related to amending the Forest Plan were considered. This information included:

- Public comments generated during the 1997 Tongass Forest Plan Revision process;
- Tongass Forest Plan Revision appeals;
- Public input specific to the Tongass National Forest on the Forest Service's 2001 National Roadless Area Conservation Rule;
- Public comments generated relative to the 2003 Supplemental EIS, Roadless Area Evaluation for Wilderness Recommendations;
- Public input expressed during project-level NEPA analyses over approximately the past 10 years; and
- Public input received in response to the Notice of Intent and the Web site for this EIS.

This record of public input on the management of the Tongass covers a period of almost 2 decades.. Of special note are the extensive public meetings held in Southeast Alaska for the 1997 Forest Plan Revision, the 2001 National Roadless Area Conservation Rule, and the 2003 Supplemental EIS.

Past Planning Efforts

Tongass Forest Plan Revision

Appendix L of the 1997 Final EIS presents summaries of all substantive comments received during the three public comment periods for the Tongass Forest Plan Revision, as well as presents Forest Service responses to these comment summaries. All public comment periods held during the Tongass Forest Plan Revision were announced in the Federal Register, by news release, in local newspapers, and through newsletters. Informational meetings and open houses, followed by hearings, were held in most Southeast Alaska communities during each comment period. More than 3,000 individuals, organizations, interest groups, and agencies provided written or oral input on the 1990 Draft EIS, and more than 7,000 and 21,000 responses were received on the 1991 Supplement and the 1996 Revised Supplement, respectively.

Comments summarized in Appendix L were identified by location and issue and entered into a database that had more than 850 entries. Information developed through this review was used to help identify public interest in specific roadless areas, as well as in the issue identification process.

Tongass Forest Plan Revision Appeals

A total of 23 appeals were received on the 1997 Tongass Land Management Plan Revision Record of Decision (ROD). These appeals were reviewed and comments were summarized by location and issue and entered into a database. Information developed through this review was used to help identify public interest in specific roadless areas, as well as in the issue identification process.

National Roadless Area Conservation Rule

More than 1.1 million separate pieces of public input were received on the National Roadless Area Conservation Rule Draft EIS. The results of the Forest Service's content analysis of these comments are presented in Volume 3 of the Roadless Area Conservation Final EIS along with the Forest Service's responses to the identified comment summaries (USDA Forest Service 2000). A portion of these comments specifically pertained to the Tongass. Some of these comments were in support of, and some were against, roadless area conservation on the Tongass. Some stated that roadless areas were important for wildlife and endangered and threatened species, some were concerned about effects on the regional economy, recreation, and subsistence (some indicated that limiting road construction would limit access for subsistence, while others stated that there are already sufficient roads on the Tongass to meet subsistence needs).

Project-Level EIS Analyses

Public input related to timber management, recreation, roadless areas, and other issues that has been expressed during project-level EIS analyses over approximately the past 10 years was considered. This included many recent project-level EISs and EAs completed since 1997, as well as several landscape-level plans. Many of the comments that addressed timber demand, economics, wildlife, subsistence, scenery, tourism, and roadless area issues were made in response to proposals to harvest timber and to build roads.

National Forest Transportation Rule and Policy

Public input on the National Forest Transportation Rule and Policy that pertained specifically to the Tongass was also reviewed as part of this issue identification process.

Supplemental EIS, Roadless Area Evaluation for Wilderness Recommendations

Public input on the Supplemental EIS, Roadless Area Evaluation for Wilderness Recommendations was also reviewed as part of this issue identification process. Approximately 177,000 separate pieces of input were received during the public comment period. Eighteen public hearings were held, 16 in Southeast Alaska, one in Anchorage, and one electronic public hearing (via the internet). Comments were received from all 50 states and at least 11 foreign countries. Comments generally focused on how much roadless area to retain and how this would effect recreation, tourism, timber, wildlife, subsistence, and the local economy. Comment summaries and Forest Service responses are presented in Volume IV of the Final Supplemental EIS, along with letters from agencies, elected officials, and tribal governments.

Public Issues

Identification of issues helps define or predict the resources or uses that could be most affected by the management of NFS lands. These issues are then used as a basis to formulate alternatives or to measure differences between alternatives.

Ten public issues were originally identified in 1988 for the Forest Plan Revision. These original issues included scenic quality, recreation, fish habitat, wildlife habitat, subsistence, timber harvest, roads, minerals, roadless areas, and local economy. The 1991 Forest Plan Revision Supplemental Draft EIS (SDEIS) added an additional concern, identifying and considering rivers for recommendation as Wild, Scenic, and Recreational rivers.

After the release of the 1991 SDEIS, considerable new information pertaining to the Tongass Forest Plan Revision became available. Out of this information emerged five additional issues, determined by the Regional Forester to need more study and evaluation before a final revised Forest Plan could be adopted. Some of these issues were aspects or extensions of the ten public issues previously considered; others were new as issues or had not been considered as issues in themselves. The five issues were wildlife viability, fish habitat, karst and caves, alternatives to clearcutting, and socioeconomic considerations. These issues were assessed in the 1996 Revised SDEIS and the 1997 Tongass Forest Plan Revision Final EIS.

The 2003 Supplemental EIS reviewed and evaluated roadless areas and analyzed alternative groupings of roadless areas for wilderness recommendations. Two broad issue categories, referred to as key issues, were identified as the major issues driving the alternatives and the analysis. They included 1) the long-term protection of roadless areas and associated values, and 2) the social and economic well-being of the communities of Southeast Alaska.

Public Input for this EIS

In addition to the above, extensive public involvement has occurred during the development of this EIS. All public input received has been reviewed and is maintained in the planning record. Comments and responses on the Draft EIS are also included in Appendix H. Public involvement activities have included the following items.

- The Notice of Intent was published in the Federal Register in March 2006.
- A Forest Plan Adjustment Web site was developed in January 2006 and has been maintained to inform and engage the public since then. It is updated as new information is developed or published and provides a mechanism for public input. Several hundred comments and questions were received through the Web site or via emails associated with the Web site in the first few months of operation.
- A Weblog regarding the Forest Plan adjustment effort was established in July 2006 and was continually maintained as another method of public communication.
- In response to the above items, a number of letters were received containing comments regarding the issues and alternatives. These included letters from environmental organizations, the timber industry, Southeast Alaska community organizations, and a number of individuals from Southeast Alaska and across the nation.
- Government-to-government consultation has been conducted throughout the process, and is ongoing, with federally recognized Tribes.
- A number of group-specific meetings have also occurred with various organizations (including Alaska Native groups).
- A variety of news releases were issued relative to the Forest Plan adjustment throughout the process.

- A series of ongoing meetings, hosted by the National Forest Foundation and The Nature Conservancy, known as the Tongass Futures Roundtable, have resulted in considerable discussion of Tongass management issues among a broad spectrum of individuals and groups interested in the future of Southeast Alaska since May 2006.
- The input received prior to issuance of the Draft EIS was reviewed and a summary of this synthesis is presented as Appendix A (Issue Identification) to the Final EIS.
- A Draft EIS and Proposed Forest Plan were released on January 12, 2007. This began a 90-day comment period, which was later extended to 108 days. The comment period closed on April 30, 2007.
- During the comment period, open houses and public hearings were held in 24 Alaska communities. In addition to comments on the Draft EIS, the hearings provided opportunity to hear concerns related to subsistence and Alaska Native issues.
- On March 22, 2007, an open house and public hearing was held on the internet, to solicit public comment in an open forum from individuals living anywhere in the world.
- Over 84,000 comment documents were received, including individual letters, form letters, emails, hearing testimony, and comments submitted directly via the Forest Plan Adjustment Web site. Slightly more than 2,000 of these were classified as individual comment documents and the others were classified as form letters and emails. The individual comment documents were subdivided into approximately 5,500 individual comments. Responses were received from all 50 states and 89 foreign countries. A summary of the substantive comments and Forest Service responses to those comments can be found in Appendix H.

Key Issues

Any alternative that proposes to change the Forest Plan could affect resources and/or outputs relative to the current Forest Plan. Therefore, Chapter 3 of the EIS shows the effects of the various alternatives on all relevant resources and evaluates their effects relative to all of the issues and concerns previously identified during the 1997 plan revision process. However, based on the purpose and need of this EIS and the public input received during the current EIS process, some issues are more likely to influence the comparison among alternatives and represent the major issues to be evaluated. These issues were grouped into three broad issue categories, referred to as the key issues. These key issues are the major issues driving the alternatives and analyses.

Key Issue 1 – Protection of high value roadless areas from road development and timber harvest activity on the Tongass National Forest is of local and national importance, particularly for wildlife and biodiversity, recreation, and tourism.

Many people believe roadless areas should be allowed to evolve naturally through their own dynamic processes and should be afforded protection that ensures this will occur. The Tongass includes very large undeveloped land areas with several portions of the Forest consisting of contiguous roadless areas that exceed 1 million acres and represent large, unfragmented blocks of wildlife habitat. This large scale of roadless lands does not exist on any other National Forest, except the Chugach National Forest in Southcentral Alaska.

Roadless areas are considered important because of their wildlife habitat and recreation values and their importance for tourism. They are also important because of the passive-use and ecosystem services values they provide.

Passive-use values represent values that individuals assign to a resource independent of their use of that resource. Typically this includes existence, option, and bequest values, and represents the value individuals obtain from knowing that expansive roadless areas exist, knowing that they are available to visit in the future should they choose to do so, and knowing that they are available for future generations to inherit. There is interest in preserving large portions of the Tongass because so much of it is in a natural condition, unlike most other national forests, and because the Forest represents a significant portion of the world's remaining temperate rainforests.

Ecosystem services represent the services provided to society by healthy ecosystems. These services and benefits include what some consider to be long-term life support benefits to society as a whole. Examples of ecosystem services include watershed services, soil stabilization and erosion control, improved air quality, climate regulation and carbon sequestration, and biological diversity.

Indicators: Analysis relative to this issue compares the amount and proportion of land protected in non-development Land Use Designations (LUDs); the amount of inventoried roadless areas that would be protected under each alternative; and the amount of productive old-growth forest that would be protected under each alternative. Also, the values of the lands protected are considered. Non-use or passive-use values are discussed qualitatively and with examples provided from other studies.

Key Issue 2 – The Tongass National Forest needs to seek to provide a sufficient timber supply to meet the market demand and help maintain a vibrant economy in Southeast Alaska.

TTRA (Section 101) requires the Forest Service to seek to provide a supply of timber from the Tongass National Forest that meets the annual market demand and the market demand for each planning cycle, consistent with providing for the multiple-use and sustained yield of all renewable resources. With the cancellation of long-term timber contracts and the closure of two Southeast Alaska pulp mills in the 1990s (discussed in detail in Chapter 3 Environment and Effects), current demand for Alaska's National Forest timber depends on markets for sawn wood and the option of exporting manufacturing residues and lower grade logs. Future or planning cycle demand scenarios cover a wide range of issues and depend on rates of economic growth in key markets, conditions faced by competitors, and the rate of investment and innovation in Alaskan manufacturing.

Over the past half a century, the timber industry has been a major component of the economy of Southeast Alaska. However, with the closure of two Southeast Alaska pulp mills and the growth of tourism, timber has played a lesser role. Because the economy of Southeast Alaska is based on relatively few industries, maintaining an active timber industry is important for maintaining a well-diversified economy.

Indicators: Analysis relative to this issue compares the likely demand for timber based on capacity of the local industry and the amount of harvest made available to meet that demand. It also considers the type of wood (sawlogs and utility wood) made available and the usefulness of that wood type to the local industry, as well as the amount of timber that would be available from state and private sources. Finally, it considers the effects on the regional and national economies and the effects on the local communities.

Key Issue 3 – Protection of the wildlife habitat and biodiversity of the Tongass National Forest is of local and national significance and is affected by road development and timber harvest activities.

The Tongass National Forest supports a unique and important assemblage of wildlife including the largest population of brown bears and breeding bald eagles in the world, species of high importance for subsistence (e.g., Sitka black-tailed deer), an extensive array of endemic mammals and other species, and a large number of species that are at least partially dependent on old-growth habitats (e.g., marten and goshawk). Populations of many of these species and the biodiversity of Southeast Alaska are affected by timber harvest and the development of roads.

Although less than 10 percent of the productive old-growth habitat on the Tongass has been converted to young growth, the percentage is much higher for certain types of old growth, such as lowland and large-tree old growth. In addition, a high percentage of non-NFS lands have been harvested at a much higher rate. Therefore, the cumulative effects of harvest and road building on wildlife in Southeast Alaska are greater than the effects for the Tongass by itself.

Indicators: Analysis relative to this issue compares the amount of productive old- growth forest that would be protected under each alternative, as well as the percentages of biogeographic provinces that would be protected in reserves. It also considers the role of the managed lands (development LUDs) in providing wildlife habitat. It rates the alternatives in terms of the expert panel ratings conducted for the 1997 Forest Plan Revision EIS. Habitat changes, as documented by habitat amounts, changes in road densities, and habitat models are also used as indicators. Finally, cumulative harvest and road development on non-NFS lands is quantified and evaluated in conjunction with harvest and road development on NFS lands.

APPENDIX B
MODELING AND ANALYSIS

Appendix B

Modeling and Analysis

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Appendix B
Modeling and Analysis

Planning Situation

The National Forest Management Act of 1976 (NFMA) directs each National Forest to prepare a comprehensive land and resource management plan. The Tongass National Forest produced its first comprehensive Plan in April 1979. The NFMA also directs that these management plans be revised at least every 15 years. The Tongass began the Revision process in 1987, published a Draft Environmental Impact Statement (DEIS) in June 1990, and prepared the Supplement to the DEIS (SDEIS) as a result of the November 1990 Tongass Timber Reform Act (TTRA). The SDEIS was published in August 1991 and the Revised SDEIS (RSDEIS) was published in April 1996. The Final EIS for the Forest Plan Revision was published in 1997 along with a comprehensive Appendix B that detailed the analytical process followed. In 2002 a Draft Supplemental EIS (SEIS) was published and in 2003 a Final SEIS was developed; an Appendix B for modeling and analysis also accompanied the Final SEIS. The purpose of the 2008 Tongass Appendix B is to present a discussion of the major analytical processes and models used in this 2008 Forest Plan Amendment EIS. Due to the magnitude (17 million acres) and complexity (19 land use designations) of the planning process, a number of analytical methods are used. This discussion includes basic assumptions, modeling components and inputs, rules, methods, and constraints. The information supplements the broader, less technical descriptions included in the body of Chapters 2 and 3 of the EIS. Additional information and documents used in the analysis process are contained in the planning record. The planning record in its entirety is incorporated here by reference.

Spectrum Modeling

Analysis-related Changes between the 1997 and 2008 Final EISs

As the assessment, development, and analysis of geographic information is a continuous process, aspects and attributes of existing databases are continually changing. These improvements and additions to the databases often have direct results on models, model results, and the assumptions used within the models themselves. The years between the 1997 FEIS and this EIS saw a number of changes to resource inventories, coefficient development, and model assumptions, all of which played a role in the recalculation of alternative outputs. These changes are:

Development of a Forest-wide Logging System and Transportation Analysis (LSTA)—A complete and consistent Forest-wide LSTA and Integrated Timber Operability analysis were developed. These products resulted in geographic information system (GIS) layers for all potential harvest units and the roads needed to access them under the current Forest Plan. The harvest units were identified within the mapped suitable land base, as defined by the latest GIS layers. The harvest units and roads were mapped by logging engineers and foresters with knowledge and training in the standards and guidelines. Mapping included identification of the most appropriate logging systems, so that the suitable land base could be apportioned into operability classes. Risk factors were also identified that will be used for refinements to the estimated suitable land base.

Recalculation of the Tentatively Suitable Land Base—More accurate information about the landscape has been captured in the Forest's GIS resource layers (e.g., streams, slopes, karst). This information was used to update the tentatively suitable and the suitable land bases. See Appendix A of the Forest Plan and Chapter 3 of this EIS for more detailed information on how more current information was included in the suitability analysis.

Geographic Zone Recognition—Due to recent analysis that showed significant volume differences between five physical geographic zones on the Forest, the decision was made to recognize cost, price, and volume differences according to these zones. The zones recognized were North Islands, South Islands, North Mainland, South Mainland, and Yakutat. This is distinct from past analyses in which three administrative area differences were recognized.

Commercial Thinning—The interdisciplinary team recognized the option of commercially thinning young-growth stands to achieve volume and/or wildlife goals. This prescription was included in the Spectrum model along with thinning volume estimates derived from the Forest Vegetation Simulator (FVS).

Goshawk and Marten and Legacy Standards and Guidelines—For modeling the current Plan, Goshawk and Marten standards and guidelines were included in the Spectrum analysis. In some of the other alternatives, legacy standards and guidelines were incorporated as a way to leave forest structure after harvests.

Changes to Visual Management System—The Forest completely changed over from the Visual Management System (VMS) to the Scenery Management System (SMS). At the same time, all of the scenery GIS layers were updated. This updating began with the mapping and development of a GIS layer for the Visual Priority Routes and Use Areas (see Appendix F in the Forest Plan). Next Seen Areas, based on these Visual Priority Routes and Use Areas, were modeled using digital elevation models (DEMs) and Distance Zones (foreground, middleground, and background) were mapped based on established criteria. Scenic Integrity Objectives were then mapped for each alternative, based on Seen Areas, Distance Zones, and Land Use Designations (LUDs). The Visual Absorption Capability was remodeled and mapped and based on all of these sources. Regulation Class layers (see below) were developed for use in Spectrum modeling.

Land Adjustments—Since 1997, a variety of land adjustments have occurred. These adjustments have been incorporated into the current analysis as they have affected the total National Forest System (NFS) land base as well as the tentatively suitable and suitable forest land bases.

Modeling Implementation Reduction Factors (MIRF)—These factors, used to adjust model results to account for missing and known data inaccuracies, have been recalculated for each alternative. The MIRF changes have occurred as a result of improved information derived from upgraded GIS layers, including streams, slopes, and karst, a reduction in the lands identified as encumbered, and other factors. This calculation is explained in detail later in this appendix.

Inventory and Data—The inventory step of the planning process consists of the collection, development, and documentation of data to address the public issues, management concerns and resource opportunities, and planning criteria. Two basic types of information are needed to facilitate the analysis and development of alternatives. The first consists of information related to the classification of land into categories with unique properties. This classification can be based on any attribute significant to planning issues. This type of information is tied directly to the map base. In the case of the Tongass National Forest, this map base is its GIS database. The second type of information is not directly tied to a map base, but has more to do with the estimation of how land will respond to certain management activities. This type of information comes from many sources: Regional procedural handbooks, research studies, available literature, etc. The most up-to-date and verifiable information available was used for the EIS. Several Forest-wide inventory data sources have been updated and improved for the 2008 EIS. The primary changes and updates to the inventory, data, and modeling include:

- The timber harvest map was updated to reflect timber harvested through 2006.
- A new coverage was created to better estimate timber volumes. The cover was based on the value and degree of operational difficulty of the timber across the forest. Five unique geographic zones were identified; Yakutat, North Island, North Mainland, South Island, and South Mainland. Additionally, a size-density model (SDM) cover was created based on several landscape features incorporating the Common Land Unit (CLU), National Wetlands Inventory, aspect, and existing vegetation map to stratify old growth into seven unique size density classifications for productive old growth (POG). For modeling and yield estimation purposes, the old-growth stratum was derived from a generalization of the SDM into three volume strata (High, Medium, and Low).

These attributes stratified the Forest Inventory and Analysis (FIA) plots on the forest used in old-growth volume estimates.

- Forest Vegetation Simulator (FVS) model runs were conducted to estimate young-growth yields, including commercial thins. These runs were based off of a combination of FIA and forest-level data collected on young-growth stands.
- Forest-wide LSTA and timber operability analysis were developed (noted above).
- Inventoried roadless area boundaries were changed to reflect new road construction and timber harvest that occurred through 2006.
- New roads were added to the roads data base.
- Changes in land ownership due to conveyances to the state and Native corporations and other adjustments have been addressed in the data base (noted above).
- Improvements and updates have been made to most other resource databases, including tentatively suitable lands, streams, slopes, karst, and other data.
- Development of a completely new set of Scenery Management System GIS layers (noted above).

Modeling Changes—Some of the newly derived and updated information required updates to the Spectrum model formulation (see below for more detailed information on Spectrum modeling). The major modeling changes were:

- Analysis Areas were refined and recalculated for alternatives. See "Land Base Analysis Areas" below for further discussion.
- Young-growth stands were classified into 10-year age categories and by whether they had been precommercially thinned.
- All timber values were recalculated to reflect current information.
- Cost information was updated to reflect current information.
- Management intensity regimes (Regulation Classes – see below) were recalculated for each alternative.
- Watershed constraints were recalculated based on the suitable lands in each alternative.
- Model implementation reduction factors (MIRFs – see below) were updated.
- Incorporation of Goshawk/marten standards and/or legacy standards and guidelines into the Spectrum model.
- Addition of new treatment options including commercial thinning and partial cutting.
- Cost, price, and yield differences recognized by geographic zone rather than by administration area.

The Forest Planning Model (Spectrum)

Spectrum is a vegetation management model developed by the Forest Service Ecosystem Management staff in cooperation with the Rocky Mountain Experiment Station to assist in Plan Revision alternative evaluation. It was designed to fulfill the requirements outlined in the 1982 National Forest System Land and Resource Management Planning Act (36 CFR), most importantly Section 219.12(f)(8): "Each alternative shall represent to the extent practicable the most cost efficient combination of management prescriptions examined that can meet the objectives established in each alternative." Spectrum is the primary modeling tool used to ensure that land allocations and output schedules for alternatives are realistic and meet standards and guidelines in a cost-efficient manner. Spectrum enables planners to create a sufficiently detailed linear model with fairly simplistic data entries.

Spectrum is a derivative of the FORPLAN model used for analysis in the 1986 Forest Plan. Spectrum assumes that relationships between outputs and the land base are linear (e.g., twice the number of similar acres yields twice the timber volume). A management objective is specified (e.g., maximize net revenues from harvesting activity) as well as any constraints that may affect that objective (for example, produce a steady supply of timber over time).

The Spectrum solution process involves three steps: 1) create a linear programming (LP) model, 2) find the optimal solution to the LP model, and 3) put the model solution into a more readable form (i.e., interprets the linear programming results). Spectrum's matrix generator portion translates the management objective, constraints and assumptions about the land base into a matrix of numbers that can be solved with a linear programming (LP) solver software package. The Tongass used the C-WHIZ LP solver software package to solve the matrix generated by the Spectrum model. The solver software determines a system of management prescriptions that results in the highest possible management objective value (e.g., Present Net Value) within the constraint parameters (meeting desired conditions and appropriate standards and guidelines). Spectrum's report writer portion then translates the LP output into reports, such as costs, revenues, landscape condition, and long-term sustained yield capacity.

Results from the modeling process are only approximations of what to expect when any given alternative is implemented. The main purpose of modeling is to aid planners in estimating likely future consequences of management prescriptions. A choice between alternatives can be made even though the model may lack precision in describing specific attributes of a given alternative.

An in-depth technical discussion of linear programming and its use in forest management applications can be found in Davis et al. (2001).

The Tongass Spectrum Models

Large Linear Programming models can be difficult or impossible to solve. Initial size estimates of the Tongass model, given the desired level of detail, made it clear that for each alternative, three Spectrum models would be needed; one model for each of the three old Administrative Areas of the Tongass National Forest (Chatham, Ketchikan, Stikine). To further mitigate model size, Spectrum models for the Tongass only analyze land classified as suitable for timber harvest. Those lands considered "unsuitable" for timber harvest were omitted from the models. The process for determining suitability can be found in Appendix A, "Timber Suitability Classification," of the Forest Plan. Results of each of the Administrative Area models were then aggregated to determine Forest-level quantities and impacts presented in the chapters of this EIS.

Spectrum Model Components

A Spectrum model has five main components: 1) the objective function, 2) land base analysis areas, 3) management prescriptions, 4) activities and outputs, and 5) constraints. The objective function is the overall management strategy objective of the model. Examples of typical objective functions are “maximize present net value,” “maximize timber volume,” and “minimize cost.” Only one objective function can be used for each model run; however, forests typically find it beneficial to use the results of one objective function learn about the specific nature of their management problem or to formulate desired conditions used with another objective function. Detailed information on objective functions used by the Tongass is found in the solution process section of this appendix. The last three components of the Spectrum model greatly influence how the second (the land base) will be defined. The Tongass models are designed to analyze the activities and outputs associated with timber harvest scheduling; therefore, the land base is defined by those characteristics significant to the timber resource. Other resources are dealt with through the LUD allocation process and model constraints. The management prescriptions applied to the Forest differ mostly by rotation age and dispersion amount (portion of the trees removed from the stand). The activities (costs) associated with timber harvesting are well documented as are the outputs (benefits) obtained from the wood fiber. The constraints differ by alternative but often refer to a particular timber classification, specific geographic area, activity or output volumes allowed, and management allocation. Constraints are used to ensure desired condition achievement, compliance with appropriate standards and guidelines, and that the resultant management strategy is feasible.

Land Base Analysis Areas

Analysis Areas represent unique combinations of the different Identifiers used to stratify the mapped suitable land base. The mapped suitable land base is different for each alternative and is derived in

Table 3.13-8 of this EIS. Analysis Areas represent between 378,000 and 1.5 million acres, depending on the alternative. It is important to note that they include the unmapped unsuitable lands accommodated for by the Model Implementation Reduction Factor (MIRF – see below for detailed discussion). If information was perfect, and all unsuitable lands could be mapped, the actual suitable would be somewhat less than the land base represented by the Analysis Areas (similar to figures found in line 13 of Table 3.13-8).

An analysis area is an operational aggregation of land resource polygons that have the same characteristics, are expected to have similar responses management prescriptions, and have similar costs and benefits associated with management prescriptions. By an extension of this logic, analysis areas differ from each other in management prescription response and the costs and benefits associated with those prescriptions. Analysis Areas are unique combinations of the Analysis Area Identifies described below.

Analysis Area Identifiers. The 1996 modeling process determined analysis area identifiers that provided a categorization of the timber base consistent with the timber management analysis nature of the harvest scheduling model used for plan revision. These identifiers were re-evaluated for the 2008 EIS and determined to still be relevant for classifying the land base into areas where the land within an area had similar logging costs and timber values. However, the identifiers were updated and expanded when appropriate to reflect new information or additional levels of detail that are relevant to the 2008 EIS process. Six identifiers were used for input into the Spectrum models: 1) Value Comparison Units, 2) logging operability, 3) productivity group, 4) roaded/unroaded classification, 5) timber strata/volume class, and 6) Regulation Class. A summary of each identifier and why it was selected follows. The identifiers are presented by name in Table B-1.

Value Comparison Unit (VCU). In the current Plan, there are 946 unique VCUs. Each of the VCUs provides Spectrum with a level of spatiality the other identifiers cannot. In previous FORPLAN models, the main spatial identifier was Management Area (MA). Moving to VCU as the spatial identifier increased the resolution of mapping by six times. VCUs can be used to recognize spatially-variable costs such as hauling costs to the appropriate mill, road construction costs, and construction of log transfer facilities. VCUs are also used to formulate management constraints such as old growth retention, goshawk/marten, and legacy constraints, watershed constraints, and dispersion constraints (see constraints section of this appendix for further explanation).

Timber Harvest Operability. Operability, or logging system, was a direct product from the LSTA developed for the Tongass National Forest. Suitable acres on the Tongass National Forest were classified into six operability classifications used in Spectrum; ground-based/shovel, short-span cable, long-span cable, short-distance helicopter, mid-distance helicopter, and long-distance helicopter. Slope was a factor in determining the logging system appropriate for each stand. Lands with a slope > 72% were eliminated from the suitable land base and, therefore, cannot be logged. Lands with slope > 67% are generally to be left unroaded (and are mostly harvested by helicopter) unless no practical alternatives exist. Lands between 35% and 67% slope generally cannot use the ground-based/shovel system, and must use the helicopter or cable system. Lands with < 35% slope can generally be harvested with the ground-based/shovel system. It is easy to see how slope has an indirect effect on the cost of removing the timber from the land; generally, ground-based/shovel systems are the least expensive, followed by cable, with helicopter harvests as the most expensive. Therefore, steeper-sloped areas incur a higher timber harvest cost. Operability also correlates quite strongly with elevation and general accessibility.

Productivity Groups. This land classification is based on the site productivity as categorized in the Soil Mapping Unit (SMU) data base. There are three basic groups that indicate the regeneration potential for future timber stands. Group 1 is the highest productivity class with a minimum site index (SI) of 75. Group 2 is lands with an SI less than 75 that are not Group 3. Group 3 is all lands in the following wetland soil types: Karheen, Kaikli, Maybeso, Kitkum, or lithic Cryosaprist. Group 3 ranges from an SI of 40 (Chatham) to 50 (Ketchikan).

Roaded Classification. This identifier specifies whether an area is presently roaded or unroaded. The road/roadless condition of an area influences the cost of harvesting the timber.

Unroaded areas require more costly road construction; roaded areas require less costly road maintenance and repair when harvesting activities are conducted.

Volume Class/Strata. This attribute was used as an identifier due to its relevance to many forest management considerations. Wildlife habitat and most recreational settings correlate with the vegetation types described by this feature. This attribute was relevant in then Spectrum model to distinguish the logging costs and timber benefits associated with the volumes generated from the different volume classes. There are 12 second-growth strata and three old-growth strata used as Spectrum identifiers. Young growth (or “second growth”) stands are categorized into 10-year age classes between 0 to 80 years old and also by whether they have been precommercially thinned. Old-growth strata include low-volume, medium-volume, and high-volume stocking levels. The strata used for this identifier are obtained from a GIS dataset derived from the Tongass National Forest’s recently derived size density model (SDM).

Regulation Class. This identifier distinguishes the three regulation classes recognized in the model. Regulation class is determined by the combination of Scenic Integrity Objective, LUD designation, Distance Zone and Visual Absorption Capacity. Regulation class affects the intensity of potential harvesting activities. See below in this Appendix for a detailed explanation the Regulation Class process.

Table B-1
Spectrum Level Identifiers

Identifier	Possible Attributes
Value Comparison Unit (VCU)	00 through 3950 (Chatham) 5270 through 8670 (Ketchikan) 3980 through 5260 (Stikine)
Logging Operability	Ground-based/Shovel Short-span cable Short-distance helicopter Long-span cable Mid-distance helicopter Long-distance helicopter
Roaded Condition	Roaded Unroaded
Volume Class/Strata	Young Growth Age 0-9 Young Growth Age 10-19 Young Growth Age 20-29 Young Growth Age 30-39 Young Growth Age 40-49 Young Growth Age 50-59 Young Growth Age 60-69 Young Growth Age 70+ Young Gr. w/ Precomm. Thin Age 20-29 Young Gr. w/ Precomm. Thin Age 30-39 Young Gr. w/ Precomm. Thin Age 40-49 Young Gr. w/ Precomm. Thin Age 50+ Low Volume Old growth Medium Volume Old growth High Volume Old growth
Regulation Class	Regulation Class 1 Regulation Class 2 Regulation Class 3

Modeled Analysis Areas. Once the Analysis Area Identifiers were determined, the next step was to estimate the number of possible analysis area combinations. The maximum number possible is the product of the number of unique elements in each identifier:

> 946 VCUs x 6 Operability Classes x 2 road/unroaded x 3 productivity groups x 12 volume strata x 3 regulation classes = 1,226,016 potential Analysis Areas

The Tongass GIS layers of Analysis Area Identifiers were intersected to result in a Forest-wide total of about 87,500 unique polygons (Alternative 6). However, more than 86,000 of these polygons were less than 100 acres in size. Due to size considerations of the Spectrum model and the fact that, on an operational level, very small areas of land would not be independently managed, it was necessary to generalize smaller polygons and lump them with similar larger ones. Through a process of trial-and-error, an 80-acre threshold was used to create a manageable model size, while still preserving model integrity at a strategic planning level. In other words, all polygons less than 80 acres and within certain guidelines were aggregated into a larger analysis area.

A four-step algorithm was used to take small polygons and lump them with larger ones to create a manageable number of analysis areas. Step 1 combined polygons regardless of size. Steps 2 through 4 generalized only polygons less than 80 acres in size (they could be lumped into an analysis area larger or smaller than 80 acres).

Step 1: Match on all attributes
Some polygons were geographically distinct but not distinct based upon analysis area identifiers. Therefore, the first generalization was that if all identifiers matched between two or more polygons (initial analysis areas), they were combined into one for analysis purposes.

Step 2: Ignore the roaded/unroaded classification
If two Analysis Areas were in the same VCU, had the same operability, regulation class, volume strata, and productivity class, the smaller one was lumped with the larger one.

Step 3: Ignore roaded/unroaded classification and operability classification
After step 2, if two Analysis Areas were in the same VCU, had the same regulation class, volume strata, and productivity class, the smaller one was lumped with the larger one.

Step 4: Ignore volume strata
After step 3, if two Analysis Areas were in the same VCU, had the same operability, roaded/unroaded classification, regulation class, and productivity class, but different volume strata classification, the smaller one was lumped with the larger one. The exception was that old growth was not lumped with young growth and young growth was not lumped with old growth.

Finally, if the analysis area could not be generalized and it was less than 5 acres in size, it was left out of the model. The final number of analysis areas for the Tongass was 5403 (Alternative 6).

A note on the effects of model generalization
As with any model, the Spectrum model is a landscape planning model that relies heavily on generalizations and assumptions. There are many generalizations used in the Spectrum model that affect exactness of the outcome. These factors include generalizations in the GIS maps used to create the analysis areas, aggregation and averaging of FIA stand inventories used to calculate per-acre yields, statistical inference used in calculating the value of harvested logs, statistical inference and generalizations in determining costs of logging, road construction, miles of roads to construct, etc., and simplifying assumptions about the uncertainty of future costs and commodity prices. Analysis Area aggregation is simply another generalization technique used to make the model a manageable size. It is simply not possible without further detailed study to isolate the effect of Analysis Area aggregation on the true value for any given land area/prescription or for the Forest as a whole. It is assumed that the level of detail maintained in the model is accurate enough to give managers enough information to make informed decisions about the alternatives evaluated in this Forest Plan.

Management Prescriptions

A prescription is a management practice or group of management practices applied to a specific land area. The planning process involves assignment of the land base to the available prescriptions. This is facilitated by the Spectrum model. The solution process of Spectrum assigns land to prescriptions based on forest constraints, the given management alternative, and the objective function.

Prescriptions were developed by the interdisciplinary team to represent the full range of possible management activities and outputs. Since the Tongass models are concerned primarily with timber harvest scheduling, only prescriptions related to timber harvest were modeled. The interdisciplinary team quantified the outputs, costs, and benefits that would occur when these timber prescriptions were applied to a given analysis area. This quantification process produced the output, cost, and benefit coefficients that are used in Spectrum yield and economic tables. The interdisciplinary team, during its development of standards and guidelines for all prescriptions, ensured that the specific management requirements set forth in 36 CFR 219.27 would be met in accomplishing the goals and objectives for the Tongass.

Spectrum prescriptions were developed to allow consideration of a full range of management activities in the analysis areas. A minimum level or no-harvest prescription was created for each analysis area as well as several different harvest options. The only criterion used to eliminate timber options from the models was technical feasibility. For example, ground-based/shovel logging was not considered on slopes greater than 35 percent. Consideration of timber prescriptions for any given Analysis Area was not directly limited by economic efficiency, in order to allow they may be chosen in efficient fulfillment of a forest-wide desired condition (CFR 219.14(f)(8)). Available timber options were not eliminated from consideration because they produced a negative Present Net Value (PNV) or even a lesser PNV than some other timber option. A full range of timber options with varying levels of economic efficiency was available to the model, and the Spectrum model was able to consider the economic efficiency of each prescription during the solution process. The Spectrum prescriptions analyzed are briefly described below.

Minimum Level/Maintenance. Applies minimum custodial direction for the timber resource. There is no commercial timber harvest and no production of outputs related to timber harvest. This is the prescription assigned to lands not scheduled for timber harvest

Clearcut. Removal of all merchantable commercial trees within a stand in one operation. The regenerated stand receives no thinning activities before the next clearcut.

Clearcut with precommercial thinning. Removal of all merchantable commercial trees within a stand in one operation. The regenerated stand receives a subsequent precommercial thin at 20 years of age.

Clearcut with commercial thinning. Commercial thin at age 70, 80, or 90. Clearcut at choice of rotation ages. Applies to Productivity Class 1 lands, Regulation Classes 1 and 2.

Clearcut with precommercial and commercial thinning: Precommercial thin at age 20. Commercial thin at age 60, 70, or 80. Clearcut at choice of rotation ages. Applies to Productivity Class 1 lands, Regulation Classes 1 and 2.

Small-group selection and uneven-aged harvesting. The objective of this prescription is to create uneven-aged stands with regeneration of desirable species. Trees are harvested individually or in small groups normally from 0.5 to 5 acres in size. Timber production is not the primary management emphasis in these areas (emphasis is recreation, scenery, fisheries, and/or wildlife). Applies to Regulation Class 3.

This prescription is modeled as a series of removals that occur every 50 years and remove 25% of the volume at every entry. For old-growth stands, accounting rows (reflecting standing volume) in these yield tables show the combination of remaining old growth plus assumed regrowth of the small patch. Green-up interval is implied by the regulated scheduled entries (50 years); rotation age will be 200 years. Existing young-growth stands in Regulation Class 3 are modeled in a similar manner as the old growth; 25% of the volume is removed upon first entry (starting age 80) and 25% is removed at second entry, etc.

Old Growth Two-Aged Management (Partial Cut). This prescription was developed for areas where goshawk and marten standards apply. On first entry into old-growth stands, 75% of the land area is harvested (75% of the standing volume). The stand is then considered "regenerated" and second-growth activities are allowed on the cut portions of the stand starting at age 80. Standing volume is a function of remaining old growth plus assumed regeneration. Regeneration volume is approximately 10% less than full young-growth volume, due to the increased shading from reserve trees. This prescription is available to Regulation Class 1 and 2, Productivity Classes 1 and 2 Old-Growth High volume strata only. This prescription is applied to Alternative 5 VCUs with goshawk/marten standards when more than 33% of the POG within a VCU has been regenerated.

Activities and Outputs

Activities are the costs associated with Spectrum-assigned timber harvests. Outputs are the timber volumes and prices associated with the same harvests. Each Activity and Output used in the model is described below.

Activities (Costs). All costs and values used in the Spectrum analysis are based on collected values (2004). In order to reduce the number of numeric tables in this appendix, only average and summarized values are used in this section. The actual cost figures used in the analyses are available in the planning records.

Coefficient Development and Estimation of Effects. The GIS enables identification and stratification of land into logical groupings. The response of these groups to management activities was determined from a wide variety of existing data. All coefficients and assumptions made in the modeling process have been developed from the following information sources.

Sale Preparation and Administration
Information Sources: Tongass National Forest, historic actual expenditures and accomplishment data, declaration of Forrest Cole, July 2004.

Occurs With: Thousand board feet of net sawlogs removed from the stand.

Assumptions*:* This is the cost to the Forest Service of administering and laying out timber sale areas. A single coefficient was used to estimate timber sale preparation and administration costs: $32/MBF.

Log Transfer Facility (LTF)
Information Source: The forest GIS coverage of existing and proposed LTFs. Costs and construction levels are based on historic costs experienced in the past 5 years of construction contracts and adjusted with Region 10 construction cost guide information.

Occurs With or Varies By: Acres harvested.

Assumptions: Using the LTF map and database, each LTF, existing or proposed, was assigned to the appropriate VCU. Appropriate mathematical adjustments were made for VCUs that access more than one LTF, or LTFs that service more than one VCU. LTF costs used in Spectrum are an average of total cost of the LTF to be constructed divided by the number of suitable acres in that VCU. The cost is incurred at time of harvest. LTF Construction costs are classified by 4 different categories to reflect the total cost of constructing the LTF.

Category 1: Existing LTF constructed/used within last 10 years = $50,000
Category 2: Existing LTF constructed/used more than 10 years ago = $125,000

Category 3: New Construction (large) (>30 MMBF total volume) = $175,000
Category 4: New Construction (small) (<30 MMBF total volume) = $125,000

LTF Camp/Commute
Information Source: Based on most recent published collected costs, Region 10 Forest Management (2004).

Occurs With or Varies By: Acres harvested. Varies by VCU.

Assumptions: The cost is incurred at the time of harvest. Each LTF used by a VCU was identified as either needing to maintain a camp, pay for a significant commute, or be free of this cost. Average camp cost per MBF is $15. Average commute cost is $7 per MBF. Weighted averages assigned to all acres of a VCU were used when not all acres of a VCU require LTFs to incur camp or commute costs.

Road, Raft, and Barge Haul
Information Source: Road haul costs are an average for the forest based on most recent published collected costs (2004). Raft and barge haul distances are based on a GIS analysis of LTFs and existing and/or potential mill locations. Barge and raft haul costs are calculated by a formula based on regional published costs.

Occurs With or Varies By: Value Comparison Unit (VCU). Costs are based on the volume (thousand board feet) removed from the stand.

Assumptions: Hauling cost includes all anticipated modes of transport likely used to transport logs from the landing to the mill. This may include road, barge, and/or log raft. Road haul is the cost of transporting logs by truck to either the closest LTF or mill. Road haul costs represent the forest-wide average haul cost per MBF volume removed based on average haul time. The average Road Haul cost is $24 per MBF. Barge haul is the cost of barging logs from the site or the LTF to the appropriate mill. Raft haul is the cost of building rafts out of the logs and hauling them to the appropriate mill. Raft haul cost may only be used in higher-demand alternatives, assuming the construction of new Medium Density Fiberboard (MDF) plants. Appropriate mathematical adjustments were made for calculating the haul costs for alternatives that incurred haul costs for utility wood vs. those Alternatives that left the utility wood at the site.

The distance to the nearest sawmill was determined for each VCU as VCUs are geographically distinct. For alternatives that recognized the eventual existence of Medium Density Fiberboard (MDF) plants, there were potentially two distances calculated for each VCU – one from the VCU's LTF to the sawmill and one from the LTF to the MDF plant. This distance was then used in a formula to calculate the total cost per thousand board feet (MBF) of the timber sale.

Formula: ((((RTD/M)*C)/B) + F)/(1-SD)

Where:
RTD = Round trip distance (unique for each VCU – twice the distance from the LTF to the mill)
SD = Scaling Defect (unique based upon age of the stand, volume strata, and geographic zone).
C = Cost per hour of operation ($182.50)
B = Average MBF on the barge or raft (238)
M= Miles per Hour (6.9)
F = Fixed costs ($33.72)

By inspection, one can see that when all other factors are held constant, logs traveling a greater distance to the mill incur a higher per-MBF transportation cost. This relationship is not exact, however, in that different VCUs were determined to have different Scaling Defects (SD) which may mitigate or exacerbate the transportation costs due to proximity to the mills.

Road Construction, Maintenance, and Repair

Information Source: The extent of Road construction and maintenance and repair needs are based on total projected road miles and the total suitable land base. Costs required for different regulation class lands are derived from the linear grading road construction calculations within the Construction Cost Guide. Road construction and maintenance and repair costs are obtained from the Construction Cost Guide calculations, compared to the costs for construction of roads, over the past 5 years, for public works and timbersale contracts. Road maintenance that occurs during logging operations is included in logging costs.

Occurs With or Varies By: Cost varies by Regulation Class. Miles of Road Construction and/or Maintenance and Repair vary by Roaded status and Regulation Class within each VCU.

Assumptions: All harvest requires some road construction and maintenance and repair. If the area is classified as roaded, then the majority of the activity is road maintenance and repair. Otherwise, road construction is the primary activity. The amount of road construction or maintenance and repair required depends on the geographic location of the harvest area. Each VCU has a distinct roading requirement coefficient. This coefficient is in the terms of miles of roads required to access 1 acre of timber land. The average construction and maintenance and repair for the Tongass is approximately seven miles of road per 1,000 acres (this does not include temporary roads). Maintenance and repair is the only activity necessary once timber harvest is comprised solely of regenerated timber stands because the roads were assumed to be built to the stands for the first harvest.

The timing of construction and maintenance and repair activities and costs varied by management prescription:

- Even-aged prescriptions without commercial thinning incur road construction and maintenance and repair costs as necessary upon first harvest. Upon subsequent harvests, these prescriptions incur the sum of the initial construction and maintenance and repair costs as maintenance and repair costs.
- Even-aged prescriptions with commercial thinning incur road construction and maintenance and repair costs as necessary at the time of the thin. When the stand is regenerated, roads maintained and repaired at thin will be maintained and repaired and roads constructed at thin will be maintained and repaired.
- The partial-cut prescription works as the even-aged prescription, except in that even though only a portion of the area is treated by this prescription, the full cost for the total area is incurred.
- The Regulation Class 3 prescription works similar to the even-aged prescription; roads are constructed and maintained and repaired upon first entry and they are all maintained and repaired upon subsequent entries.

Road construction and reconstruction costs are obtained from the Construction Cost Guide calculations, compared to the costs for construction of roads, over the past 5 years, for public works and timber sale contracts. Road construction costs are dependent on slope; steeper slopes have a higher road construction cost. Construction costs are exactly calculated for each Regulation Class and Roaded status type within each VCU in order to accommodate the different slopes in these classes between VCUs. The Forest-wide road construction cost is $185,000 per mile and maintenance and repair costs are $50,000 per mile. Road construction/maintenance and repair miles needed for harvests are exactly calculated for VCUs with 100 or more acres of suitable land. For VCUs with less than 100 acres, an average for the administration area was used to mitigate small mapping errors and miscalculations that may occur with small areas.

Regeneration Certification

Information Source: Tongass National Forest, average cost

Occurs With or Varies By: Acres harvested with an even-aged prescription

Assumptions: Occurs for every acre harvested and the cost is incurred at time of harvest. This activity usually takes place from 3 to 5 years after harvest, but because modeling is done on a decadal basis the cost is incurred at time of harvest. It also is assumed that all stands will be certified as regenerated by year five. According to the Tongass silviculturist, when planting occurs, it costs $200/acre. However, only about 3% of treated acres need to be planted. Therefore, the average planting cost of all treated acres is $6 per acre. Planting on Regulation Class 3 lands or in partial cuts is adjusted by the percentage removed (i.e., if a partial cut is 75% of the acre, 75% of the planting cost is incurred). In addition to planting costs, there is a regen/survey cost of $18 per acre that will be included with this cost. The total planting cost used in Spectrum was $24.

Precommercial Thinning
Information Source: Tongass National Forest, implementation cost data based on Region 10 budget allocation

Occurs With or Varies By: Acres receiving a timber prescription permitting this activity.

Assumptions: The Tongass has an active program of precommercial thinning. This improves the health of the stand and permits greater understory development for wildlife. This thinning operation is termed "precommercial" because no revenues are derived from the sale of the harvested trees. The average cost for precommercial thinning on the Tongass is $550 per acre. This silvicultural activity is generally conducted when the stand is between 10 and 20 years old and modeled to occur at age 20.

Yarding/Logging Costs
Information Source: Calculated using procedures in FSH 2409.22 -- Timber Appraisal Handbook.

Occurs With or Varies By: Varies by volume class, logging operability, geographic zone, productivity group, stand age, and prescription. This cost is incurred according to net sawlogs removed per acre and net utility volume removed per acre.

Assumptions: These costs include road maintenance relative to logging, profit and risk relative to yarding, landing construction, and yarding. Logging costs increase as operability becomes more difficult. The logging operability classification of the area heavily influences the logging costs due primarily to the different harvest systems required. The size of the logs influences logging costs. Typically, larger logs result in less logging cost per 1,000 board feet. Volume class, productivity group, stand age, and the use of precommercial thinning is used to estimate the average log size and volume per acre for each unit.

Logging systems include ground-based/shovel, short-span cable and long-span cable. Helicopter costs will also be determined by three categories of distance (0.5 mile, 1.25 mile, and 2+ mile). Helicopter costs are constant costs independent of volume strata and geographic zone, so they can be applied wherever helicopter logging must be used. Young-growth harvest costs were determined initially from FVS outputs at age 80. They were then adjusted for geographic zone, age, and prescription (i.e., clearcut or thin) using South Islands (POW, where the data was collected) as a reference point. Cost curves from 1996 were used as the basis of this adjustment.

Felling and bucking coefficients
Information Source: Based on most recent published collected costs, Region 10 Forest Management (2004).

Occurs With or Varies By: Tracked on a per volume basis (MBF). Varies by Geographic zone and volume class.

Assumptions: Felling and bucking costs were split out separately from logging costs. Costs varied by Geographic zone and volume strata. The forest-wide average felling and bucking cost was $47 per thousand board foot volume.

Outputs(Benefits). The economic benefits associated with timber harvest are based on appraised value. Value is based on tree size, species composition, amount of defect, and other factors. Timber benefits are measured as pond log value. Pond log values used in the Spectrum model are the estimates of price a timber buyer would pay for a log at the mill site, less the markup charged by the logger (profit and risk). To get the stumpage value of this log, all estimated costs that are incurred to get the log to the mill must be subtracted from the pond log value. The resulting stumpage price is assumed to be the price the timber buyer pays for the log (bid price). Bid price represents money to the U.S. treasury.

Sawtimber (board feet and cubic feet)
Information Source: Timber values were determined using timber appraisal methodologies for Southeast Alaska (FSH 2409.22). Values were derived from historic cruise database based on actual collected values (2004). Merchantable volume of existing old-growth timber stands was based on FIA plot analysis by volume strata within each identified Geographic Zone. Yields for regenerated second growth timber stands were derived from permanent study plots and the FVS yield table generation program.

Occurs With or Varies By: At harvest, the volume of merchantable timber produced generates a per mbf revenue that varies by Geographic Zone and volume class. Geographic zone affects this revenue due to differences in species composition and wood quality.

Assumptions: For existing stands, piece size and species composition is determined from a tree-by-tree analysis of the FIA plot summary data. For regenerated stands, piece size and species composition is based on a tree-by-tree analysis of the FVS model outputs. It is assumed that existing old-growth volumes are constant (i.e., through time, growth equals mortality). Young-growth (regenerated) stands grow at a rate determined by the FVS model. The average old-growth pondlog value is $273 per mbf, which is adjusted for profit and risk (economic benefit, or profit, to the logger). Young-growth sawtimber pond log values are also adjusted for profit and risk.

Utility Volume (board feet and cubic feet)
Information Source: No value for utility wood is recognized for Alternatives 1, 2, and 3. Values for Alternatives 4, 5, 6 and 7 are based on Medium Density Fiberboard pond log calculations. Source: "Technical & Economic Feasibility of Constructing a Medium Density Fiberboard Plant in Southeast Alaska". Leonard Guss Associates, 31 May, 2005 and discussions with Dr. Allen Brackley, USDA Forest Service, Sitka Wood Utilization Center. Average percent utility volume was derived using timber measurements methodologies developed by the Region 10 Measurements Specialist. Merchantable volume of existing stands is derived from an analysis of FIA plots located within the suitable land base of the forest. Volume of regenerated stands is obtained from the FVS.

Occurs With or Varies By: At harvest, the volume of merchantable timber produced generates revenue that varies based on Geographic Zone and volume class. Geographic Zone affects this revenue due to differences in species composition and quality.

Assumptions: For existing stands, piece size and species composition is determined from a tree by tree analysis of the FIA plot summary data. For regenerated stands, piece size and species composition is based on a tree-by-tree analysis of the FVS model outputs. It is assumed that existing old growth volumes are constant (i.e., through time, growth equals mortality). The utility volume from regenerated stands is assumed to be negligible and is therefore not counted, whereas the utility component of existing old growth stands averages 16 percent. This difference results from the mixed diameter distribution of old growth stands and the impact of defect to potential sawlogs. The average utility log pondlog value is $72 per mbf, which accounts for profit and risk.

Spectrum Constraints

Constraints in a linear programming model are the rules that must be followed when determining an optimal problem solution. Without constraints, the solution of a Spectrum model may represent a management strategy that is impractical, inconsistent with the forest plan, or in conflict with Forest Service policy. Thus, constraints are included in Spectrum models to ensure that their results are useful and meaningful.

There are two categories of constraints within a Spectrum linear matrix: implicit and explicit. Implicit constraints are common to all Spectrum models. For example, all acres in the model must be allocated to some prescription (even if it is the “no management” prescription), or the number of acres assigned to each prescription must not be negative. These types of constraints are exercises in logic and need not be discussed further.

Explicit constraints are those constraints added to Spectrum models by planners. These constraints come in many forms and are applied to mimic regulations and laws such as NFMA, standards and guidelines set forth in the forest plan, and on-the-ground operating conditions. An example is the non-declining yield constraint. Proven ability to maintain a constant flow (non-declining yield) of harvested timber volume in perpetuity is Forest Service policy. A constraint is added to the Spectrum data set that forces all timber harvest volumes to be at least as great as the previous decade's harvest volume (see below for further discussion). Another example may be a constraint that forces a certain area to be managed specifically for wildlife habitat. There are many explicit constraints in the Tongass models. They vary by land attributes, geographic area, and by management alternative. The explicit constraints used in the Spectrum models fall into two categories: timber policy constraints and operational constraints. A detailed discussion of the intent of these constraints follows. They are summarized in Table B-2 for comparison of their application across the alternatives.

Timber policy constraints. These constraints are included in the Spectrum models to represent legal or policy requirements of national forest timber management. The primary requirements regarding timber management incorporated into Tongass Spectrum models are:

Non-declining Yield. The Tongass models have a constraint that ensures harvest volume (in board feet) will not decline in any decade over the 160-year planning horizon per national policy. Harvest volumes may increase, but all subsequent harvests must be at least as much as the previous decade’s harvest.

Sustained Yield. The harvest in any decade of the planning horizon must not exceed the Long-Term Sustained Yield that can be maintained on the forest. Long-term sustained yield is measured in cubic feet. It is calculated as the average yearly volume yielded from a chosen management action, summed across all management actions for all stands chosen by the model. For instance, if a management action yields 50 cubic feet every 100 years, the Long-Term Sustained Yield for that management action is 0.5 cubic feet per year.

Culmination of Mean Annual Increment. The age at which a managed stand is harvested is called the rotation age. Agency policy is that rotation age can be no earlier than the age at which 95% of culmination of mean annual increment (CMAI) occurs. CMAI is the age at which the stand achieves its highest average volume. The Spectrum models have constraints that allow timber harvest only when a stand has reached 95 percent of this CMAI age. On the Tongass, this translates to a range of rotation ages of about 60 to 170 years. CMAI varies by stand productivity, management prescription, and administrative area and is calculated using merchantable cubic foot volume.

Table B-2
Timber Policy and Operational Constraints Used for Spectrum Modeling

Constraint	Description	Variation Among Alternatives 1	2	3	4	5	6	7
Non-declining Yield	Ensures that a Decade's total harvest volume is at least as much as the previous decade	These constraints are identical between the Alternatives						
Sustained Yield	Prevents the model from harvesting all available timber in the last planning period - limits it to Long-Term Sustained Yield or less	Calculated for each Alternative - Applied the same way*						
Culmination Mean Annual Increment	Prevents the model from harvesting a stand before 95% CMAI is reached	These constraints are identical between the Alternatives						
Strata Harvest Control	Limits the harvest of Old Growth High Volume to their proportion of the total	Calculated for each Alternative - Applied the same way*						
Logging Operability	Limits harvest in Normal Operability (NIC I) to its proportion of the total	Calculated for each Alternative - Applied the same way*						
Watershed Entry	Limit the model to 20% of any watershed less than 30 years old	Calculated for each Alternative - Applied the same way*						
Precommercial Thinning	Limits the total amount of precommercial thinning to a feasible level - 6300 acres per year	This constraint is identical between the Alternatives						
Minimum Timber Constraint	Sets the minimum amount of volume to harvest in certain decades; this is a desired condition of the Alternative	Calculated for each Alternative - Applied the same way*						
Regulation Class 3 Harvest	Limits harvest in Regulation Class 3 to historic proportion of the total	This constraint is identical between the Alternatives						
Goshawk/Marten, Legacy, Retention Standards and Guidelines	Cause the model to accommodate the appropriate standards and guidelines of the Alternative							
	Goshawk/Marten	No	No	No	No	Yes	No	No
	Legacy	Yes	Yes	Yes	No	No	Yes	No
	Old Growth Retention	No	No	No	Yes	No	No	No
Regulation Class Management Intensity	Cause the model to implement the correct management scheme for each Regulation Class	These constraints are identical between the Alternatives						
Modeled Implementation Reduction Factor (MIRF)	Accounts for unmappable unsuitable lands	These constraints are identical between the Alternatives						
Dispersion and Adjacency	Controls on management intensity in the different Regulation Classes	Calculated for each Alternative - Applied the same way[1]						

[1] The constraint level is unique for each alternative but it takes the same form (e.g., High Volume Strata < X, where "X" is unique for each alternative)

Operational Constraints. These constraints are added to Spectrum models to ensure that the results fall within certain Forest-derived guidelines and objectives. Many of these constraints are included to ensure the Forest Plan standards and guidelines are followed. Others are included to make sure the model is "well-behaved." The term well-behaved means that Spectrum results are reviewed for any operationally impossible solutions and constraints are added to deal with these. An example may be the harvest of all of the high-volume strata in the first two decades of the planning horizon. The "strata harvest control constraints" are then added to address this problem (see below). The operational constraints used in the Tongass Spectrum models vary slightly by alternative but are used primarily to control the spatial and volume components of timber management. These constraints are summarized below.

Strata Harvest Control Constraints. In order to ensure that the model does not cut all of the most valuable timber early in the planning horizon, each model is constrained so that the proportion of harvest in the highest volume strata does not exceed the proportion of that stratum in each administration area. This prevents the model from harvesting all of the most desirable timber in an unsustainable way. This constraint is adjusted to account for the type of land (volume class mix) available in each alternative. For Alternative 5, this constraint limits the harvest of the high-volume strata acres to less than 43 percent of the total harvest of all old-growth acres.

Logging Operability Constraints. The forest has three general classes of logging operability derived from six specific classes of operability. The general classes are normal, difficult, and isolated, and the six specific classes are ground based/shovel, short span cable, long span cable, short distance helicopter, medium distance helicopter and long distance helicopter. Shovel, short span cable and short distance helicopter were considered “normal” operability, long span cable and medium distance helicopter were “difficult” and the long distance helicopter was “isolated.” To ensure that the model does not cut all of the cheapest, most accessible acres early in the planning horizon, constraints were added to disperse harvest to the difficult and isolated operability areas in proportion to their occurrence within each Administrative Area. These constraints vary by alternative due to different LUD applications but, in general, limit harvest from normal operability areas to no more than about 90 percent of total harvest acreage per decade.

Watershed Entry Constraints. In order to minimize cumulative watershed impacts from harvest operations, constraints are included to restrict the number of acres that are in an open state in any time period. In general, these constraints limit total harvest acres in any 30-year period to less than 20 percent of the total watershed land area. Because the Tongass models use VCU as the primary land attribute, these constraints are entered for each VCU. Coefficients had to be calculated in each VCU in order to accommodate the fact that only suitable acres are included in the Spectrum model and are only a portion of the total area of most VCUs. In instances where suitable acres are less than 20% of the total acres in the VCU, the constraint will never be violated—even if all suitable acres are harvested. Therefore, these constraints are constructed based on total acres [ownership] in the VCU relative to suitable acres with the following formula:

$C = .2 * T / s$

Where C = constraint percentage, .2 is the 20% limit, T is total acres in the VCU, and “s” is the number of suitable acres.

As an example, consider a VCU with 100 total acres, but only 50 suitable acres. C = .2 * 100/50, or 40%. The constraint added to the model would be 40% of the 50 acres, which is the same as 20% of the 100 acres. Only constraints where C is less than 50% will be applied in order to mitigate model size, based on the assumption that Dispersion and other constraints will cause these constraints to be redundant where C is greater than 50%.

Precommercial Thinning Constraint. All alternatives are limited to a maximum precommercial thinning of 6,300 acres per year. This is the amount that Region 10 considers feasible given budget and personnel limitations. A recent Region 10 report shows that the Forest has treated between 3,500 to 5,500 acres per year (2003-2006). It is recognized that this is not a maximum feasible amount, but suggests that 6,300 is a reasonable estimate of the maximum amount possible.

Minimum Timber Constraint. All alternatives are constrained to meet at least the timber demand associated with the alternative being modeled. This helps to ensure that a full range of ASQs are explored during the decision-making process. These constraints are formulated on the basis that alternatives have been developed to evaluate different possible timber demand scenarios. Therefore, the level of timber demand in an alternative is viewed as a desired condition of that alternative.

Regulation Class 3 Constraints. Of the acres clearcut during the planning horizon, no more than 7% of them can be from lands in Regulation Class 3. This constraint is based on the historic level of harvest on marginally economically viable lands adjacent to normal timber sales. This constraint prevents the model from scheduling impractical amounts of Regulation Class 3 lands in later decades.

Goshawk/Marten Constraints. These constraints apply to Alternative 5 at the VCU level. The amount of POG that can be harvested before these guidelines are enforced is used to constrain the number of acres that can be clearcut in each applicable VCU. Once that threshold is reached, lands may only receive a less intensive treatment (Old-Growth two-aged management – see "Management Prescriptions" above)

Legacy Constraints. Alternatives 1, 2, 3, 5, and 6 incorporate the legacy constraint instead of the goshawk/marten constraints. This constraint requires 30% of the stand to be left unharvested in 49 VCUs on the Forest that have experienced high rates of past harvest. It is modeled in Spectrum using volume. This simulates leaving the appropriate number of legacy trees at the time of harvest. The constraints apply in perpetuity; if the regenerated stand is harvested later in the planning horizon, it is assumed that the same trees (or appropriate substitutes) will be left living at the site.

Old Growth Retention Constraints. These constraints are applied to Alternative 4. Alternative 4 includes old-growth reserves in four biogeographic provinces and an old-growth retention strategy in the others. Reserve areas are excluded from the model, and the retention strategy is modeled with a series of constraints.

The alternative framework says that within each VCU where timber harvest is scheduled, the following constraints should apply:

1) Harvest no more than 50% of the POG during any 50-year period
2) Retain a minimum of 33% of the VCU in an old-growth forest condition

Constraint 1 is formulated based on the amount of 2006 suitable POG relative to the amount of POG present in 1954 (represents the "original" amount of POG present). If the amount of suitable POG in 2006 is less than 50% of the total amount of 1954 POG, there is no danger of violating Constraint 1, and therefore the VCU is not constrained. In the remaining VCUs, the constraint was formulated so that no more than 50% of the 2006 suitable POG could be harvested in any 50-year period.

Constraint 2 was formulated based on how much of the remaining suitable POG could be harvested before 67% of the 1954 POG was harvested. If it was possible to harvest enough suitable POG to cross the 67% threshold, the constraint was set so that harvest would stop once 67% of the POG was removed. Otherwise, the constraint was not necessary as one could harvest 100% of the remaining suitable POG and still leave 33% or more of the 1954 POG in the VCU.

Model Implementation Reduction Factor Constraints (MIRF). These constraints are designed to accommodate for unmapped unsuitable lands that were missed during the suitability determination. It is assumed that when harvest activities occur, a certain percentage of the assumed suitable land will be off-limits for management due to several economic or ecological considerations. These constraints are applied to each old-growth volume strata of each of the six operability harvest systems as well as to young-growth stands. The constraint is implemented by forcing the model to never harvest a certain percentage of the acres in the model. The effect is to control the maximum amount of acres from the suitable land base that are actually harvested. See below for a discussion of how MIRF factors were determined.

Dispersion and Adjacency Constraints. To meet visual quality and Regulation Class objectives, dispersion and adjacency constraints were incorporated into the models. "Dispersion" refers to spreading harvests across the landscape rather than focusing all activities in a concentrated area. The dispersion limits are taken from proxies developed by Tongass landscape architects for each LUD. These visual guidelines estimate how much of a viewshed can be "disturbed" at any one time and still meet the adopted scenic integrity objectives of the area. They also specify length of time before harvest of adjacent units is permissible and the maximum size of these harvest units. Table B-7 (below) shows the constraints that were used for each Regulation Class. The "Visual Disturbance" factors were used in the constraints section of the model and the "Adjacency" definitions were defined in the outputs section of the model. Together, these two definitions (as well as treatment options available to each regulation class) distinguish the regulation classes in the model. Detailed information about these constraints is found in the "Regulation Class" section of this appendix (below).

Spectrum Solution Process

The following sections describe some of the steps involved in solving the Spectrum models. The concept of "objective function" is discussed as the final model component. Following that is a brief discussion of how the Tongass evaluated economic efficiency of the alternatives. Last is a discussion of how the Spectrum model was used to gain insight into the management situation of each alternative and make more informed decisions.

Objective Functions

The objective function of a linear programming model defines the overall management objective of the forest quantitatively. It is generally expressed as a "minimize" or "maximize" function. The LP solution software finds the largest (or smallest) value possible of the objective function within the boundaries of the model constraints. Linear programming principles guarantee that the solution is optimal; that is, the best answer possible. Several different objective functions were used to explore the nature of the Tongass management problem. While only the "maximize present net value" objective function was used for the final results, the other ones may have been used at intermediate steps in the analysis process. Some of the objective functions used in the modeling process include:

Maximize Present Net Value. Present Net Value (PNV) is defined as the benefits less the costs of a management prescription, discounted at 4% annually to the present day, summed over all management prescriptions of all Analysis Areas. Because the model is formulated in 10-year time periods, discounting is done from the middle of each period. This is the objective function that was used for all final model runs presented in this Final EIS.

Maximize Timber Volume. Timber volume is tracked for each management action of each Analysis Area and the total amount is maximized. Several forms of this objective function were used; maximize timber volume in a given period or span of periods, maximize the sawlog component of the total timber volume in a given period or over a span of periods, or maximize the volume from an operability class in a period or span of periods. This objective function was used to ensure that desired levels of timber could be achieved. These runs were also used to proportionally allocate the Alternative demand level across the three Administrative Areas based on each area's potential. However, the maximize timber runs were not used as the final models evaluated in this EIS.

Minimize Harvest from the Unroaded Areas. This objective function was used to determine a management strategy that would meet the desired timber demand level by building as few roads as possible. It was used to help determine appropriate levels of suitable lands in some alternatives.

Minimize Old-Growth Harvest. This objective function was used to determine the minimum amount of old-growth harvest that would sustain the desired timber demand level of an alternative. This information was not used in the final analysis of any alternative, but rather was an intermediate step.

Iterative Process

The Spectrum model was used to test the assumptions and problem formulation strategies used in this analysis. Model outputs were generated and assessed to strengthen the validity of the model. For instance, if it was noticed the model was capitalizing on a certain commodity early in the planning horizon that was out of proportion with a likely feasible implementation (for instance, the model tends to high grade when given the opportunity), the model could be constrained appropriately. Additionally, the Spectrum model was used to formulate feasible constraints in the model. An objective function of "minimize harvest from unroaded areas" can be used to determine the minimum number of unroaded acres that need to be kept in the model to meet the desired demand level. If desired, excess acres could then be constrained to no management or removed from the suitable land base. Timber maximization in later decades can be evaluated to explore trade-offs between harvesting the timber early vs. saving inventory for later decades. If a model solution was infeasible (there is no management strategy that does not violate at least one constraint), the limiting constraints were identified and adjusted appropriately.

One of the strengths of Spectrum or any Linear Programming model is the ability to analyze marginal costs associated with the different constraints. If a solution space is very narrow (there are very few decisions that result in a feasible management strategy), the marginal costs of the constraints can be analyzed to determine which are the "bottlenecks," or constraints that have the largest impacts on meeting the objective. The problem can then be reformulated by relaxing these constraints if desired.

Economic Efficiency

The Spectrum model was used to help measure the economic efficiency of the timber management activities of each alternative. Timber management activities can be thought of as a portion of the net public benefits associated with each alternative. Net public benefits are the "overall long-term value, to the nation, of all outputs and positive effects (benefits) less all associated Forest inputs and negative effects (costs) whether they can be quantitatively valued or not" (36 CFR 219.3). Net public benefit represents the sum of the net value of priced outputs plus the net value of non-priced outputs. The EIS Chapter 3 explains and describes the elements of public benefits that may be a function of Forest planning and management activities. In the Tongass Spectrum analyses, the only economic efficiency directly considered was related to timber management.

Present Net Value Formulation. Economic benefits from the Spectrum model were calculated as Present Net Value, or PNV, of the scheduled timber management activities. This calculation was done by the Spectrum model using pond log values, costs to the logger, and costs to the agency for administering the sale. The formula used to calculate the PNV of each potential management prescription is:

$PNV = [PLV – LC – AC]/(1 + d)^t$

PLV = pond log value (adjusted to exclude logger profit and risk)
LC = Logging costs (operability, haul, LTF, camp/commute, felling and bucking, road building)
AC = Agency costs (regeneration certification, sale preparation and administration)
t = time (year) of harvest into the future
d = discount rate (4% annually)

The dollar values of outputs used to calculate PNV in the Spectrum model are pond log values measured at mill sites less the profit and risk to the seller. The costs weighed against these values included all of the expenses incurred from removing the timber from the site to the mill (logging costs, haul costs, LTF costs, road building costs, etc. – see above). This is a more detailed approach than a typical Spectrum application, but is done so to account for the variability in stumpage values that occur over such a large land area that is the Tongass National Forest. Stumpage value is the value of the timber at the site and is considered receipts to the federal government for a timber sale. In other words, it is what a purchaser will pay for the timber after considering all of the expenses (LC in the equation above) that are incurred in removing it to the mill. Stumpage, while not explicitly calculated before it is entered into the Spectrum model, it is an inherent part of the above equation [PLV – LC] that is calculated by Spectrum for all potential management prescriptions.

See the above section on "Activities and Outputs" for more detailed information on each of the costs and timber values used in the Spectrum model.

Supplemental Information on Other Model Assumptions

Stage II Suitability Analysis

Each acre classified as suitable for timber harvest was analyzed to determine the costs and benefits for a range or management intensities (36 CFR 219.14(b)). For the purpose of this analysis, the planning area was stratified into categories of land with similar costs and returns according to the Analysis Area Identifiers described above. The stratification also took into account those factors that influence costs and returns such as physical and biological conditions of the site (affecting logging system) and transportation requirements (by VCU).

Stage II analysis is used to identify management intensities of timber production for each category of land that results in the largest amount of discounted net revenues. Stage II analysis provides insight into the overall economic condition of the suitable land base and what types of land are most cost efficient for management. The costs and benefits used for this analysis are described above and include pond log value, the cost of logging, removing, and transporting the timber to the mill as well as the agency-incurred costs of management. This analysis does not account for the utility volume costs or revenues, as the current market conditions do not favor its removal.

Stage II analysis was conducted for all applicable management intensities: Intensive even-aged management with thinning regimes to very small clearcuts and group selection prescriptions (regulation class 3 areas). Table B-3 shows per-acre weighted average net revenue by category. These figures are representative of the highest value of the earliest treatment available to each land type.

The current economic situation in Southeast Alaska creates some confusion in the interpretation of Table B-3. At an initial glance, it may appear there are no economically viable areas for timber harvest. It is important to realize that within each category of land there can be large differences in economics. For instance, the Regulation Class 1 Ketchikan High Volume Class Normal Operability category (-$478/acre) contains a range of economics from acres of short-span helicopter harvest with a large negative net revenue (-$6,917/acre) to acres of shovel harvest in a roaded area with a large per acre net revenue ($3,257/acre). Therefore, a summary of the positive values in each category is also provided in the final two columns of the table. These figures represent the weighted average net value per acre of only those acres that have positive value. Again, some caution in interpretation must be used; the $1,461/acre of Regulation Class 1 Chatham High Volume Class Normal represents 3,600 acres, whereas the Regulation Class 1 Ketchikan High Volume Class Normal Operability ($488/acre) represents nearly 53,000 acres. A complete economic analysis for each Analysis Area is too lengthy for this appendix and is included in the planning record.

Another potentially confusing aspect of these tables occurs due to the decreasing value of more highly stocked stands. An example of this can be seen in the Regulation Class 1 Chatham Normal Operability, where a "Low" stand is valued at -$1,736 and a "High" stand is at -$2,529. Here is a case where on average, the additional cost of removing the volume from the woods is more than the revenues received for that volume. The Chatham is susceptible to this phenomenon likely due to its average distance from the nearest processing mill. The additional cost incurred from shipping more volume from a "High" stand is cumulatively more than the cost of shipping less volume from a "Low" stand. This same relationship generally holds true when comparing Regulation Classes 1 or 2 with Regulation Class 3. In Regulation Class 3, there is generally less volume removed per acre, and therefore the overall costs per acre are lower. Otherwise, the table generally shows lower economic desirability in more expensive harvest systems and lower volumes per acre. Regulation Classes 1 and 2 numbers are predictably similar due to their difference only in allowable clearcut size, green-up intervals, and adjacency constraints, none of which factor into this economic feasibility study.

Table B-3
Discounted Average Net Revenues by Land Category

		Regulation Class 1			Reg. Class 1 - Positive Values Only	
Admin Area	**Volume Class**	**Normal (net$/acre)**	**Difficult (net$/acre)**	**Isolated (net$/acre)**	**Normal (net$/acre)**	**Difficult (net$/acre)**
Chatham	Low	-1,736	-3,242	-4,567	90	
	Medium	-1,842	-5,437	-8,927	585	
	High	-2,529	-7,557	-12,948	1461	
	Young Gr	-184	-5,095	-7,094	873	
Ketchikan	Low	-1,532	-4,474	-6,809	247	
	Medium	-589	-4,381	-9,702	856	318
	High	-478	-5,191	-13,994	1,288	819
	Young Gr	-28	-1,550	-4,270	349	
Stikine	Low	-1,577	-4,492	-7,134	140	
	Medium	-554	-4,466	-9,386	755	343
	High	-396	-3,503	-13,985	1,177	230
	Young Gr	-193	-939	-3,763	144	

		Regulation Class 2			Reg. Class 2 – Positive Values Only	
Admin Area	**Volume Class**	**Normal (net$/acre)**	**Difficult (net$/acre)**	**Isolated (net$/acre)**	**Normal (net$/acre)**	**Difficult (net$/acre)**
Chatham	Low	-1,657	-3,102	-4,727		
	Medium	-1,865	-5,867	-9,342	505	
	High	-1,913	-7,153	-13,207	1,302	505
	Young Gr	-175	-4,642	-6,934	708	
Ketchikan	Low	-1,388	-4,005	-7,309	171	
	Medium	-607	-4,678	-9,437	967	671
	High	-675	-3,675	-13,923	1,508	438
	Young Gr	-43	-3,133	-8,637	213	
Stikine	Low	-1,679	-4,078	-6,910	228	
	Medium	-1,004	-4,539	-9,542	913	24
	High	-402	-3,739	-13,879	1,095	325
	Young Gr	-165	-2,518	-8,286	277	

		Regulation Class 3			Reg. Class 3 – Positive Value Only	
Admin Area	**Volume Class**	**Normal (net$/acre)**	**Difficult (net$/acre)**	**Isolated (net$/acre)**	**Normal (net$/acre)**	**Difficult (net$/acre)**
Chatham	Low	-949	-1,480	-1,801		
	Medium	-1,080	-2,032	-3,040	115	
	High	-1,012	-2,596	-4,071	163	
	Young Gr	-78	-924	-2,414	293	
Ketchikan	Low	-1,093	-1,607	-2,785	141	
	Medium	-858	-1,950	-3,915	306	
	High	-1,015	-2,751	-4,771	229	
	Young Gr	-49	-548	-3,223	121	
Stikine	Low	-1,119	-1,423	-2,389	36	
	Medium	-947	-2,010	-3,099	223	
	High	-899	-2,204	-4,414	241	
	Young Gr	-16	-279	-1,731	112	

The Regulation Class Process

To recognize the varying intensities of timber harvests that may occur on the landscape, the regulation class concept was developed. Regulation Class is a methodology developed to distill the unique combinations of Land Use Designation (LUD), Distance Zone (DZ), Scenic Integrity Objective (SIO), and Visual Absorption Capacity (VAC) into four management categories, or Regulation Classes. These classes group lands that allow similar allowable harvest unit size, visual disturbance, and re-entry times (adjacency). Regulation Classes are numbered 0 to 3, with 0 being ineligible for management. Most of the following discussion is focused on Regulation Classes 1-3.

Land Use Designation (LUD) For each alternative, a unique assignment and map of Land Use Designations was developed. Every Land Use Designation, or LUD, delineates a unique set of standards and guidelines that apply to that area. For each Alternative, up to 19 LUDs were recognized, but only three were allowed to produce timber counted towards Allowable Sale Quantity (ASQ): Scenic Viewshed, Modified Landscape, and Timber Production. These three LUDs were evaluated in the Regulation Class process. See the supplemental Alternative LUD maps and Chapter 3 of the Forest Plan for more specific information on LUDs.

Distance Zone (DZ) The amount of allowable timber harvesting also is affected by distance zone (DZ). Distance zone is the proximity of an area to a view-point. Distance zone varies from Foreground (within a 0.25 mile), Middle Ground, Background, to Not-Seen, which is completely out-of-view from selected viewing points. Again, available treatment intensity is usually greater on lands with more hidden Distance Zones.

Scenic Integrity Objectives (SIO) Scenic Integrity Objectives are a function of LUD and Distance Zone and describe the desired quality of the scenery to be maintained in each classification. The categories include “High,” “Moderate,” “Low,” and “Very Low” objectives. Further description of SIOs is found in the “Scenery” section of Chapter 4 in the Forest Plan. SIOs for each of the LUD/Distance Zone combinations are shown in Table B-4.

Visual Absorption Capability (VAC) The VAC is a measure of an area's ability to "absorb" (make visually less noticeable) ground disturbing activities (i.e., timber harvesting). VAC is simplified to three categories: Low, Interim, and High. VAC is used to define the intensity of management treatments that can be used to maintain each SIO. Generally, areas with greater VAC can sustain a more intensive treatment while still maintaining the desired SIO. Table B-5 shows the management unit size allowed for each SIO/VAC combination.

Tongass landscape architects developed some general timber harvesting guidelines, or proxies, for various VACs, SIOs, and LUDs. Although the exact harvest intensity an area receives is determined during the timber sale layout stages, estimates of allowable disturbance were needed in order to facilitate modeling. Each LUD has a series of adopted SIO and VAC objectives. Associated with these objectives are the estimated allowable disturbance factors. The proxies for each LUD and SIO/VAC setting were grouped by similar harvest method and unit size, cumulative visual disturbance, and height to adjacent stand criteria. Grouping the proxies of similar standards resulted in the creation of four distinct categories. These groups became the four regulation classes used in Spectrum modeling. These groups range from no harvest allowed to large clearcutting with minimal visual concerns. The GIS is then used to provide Spectrum with the regulation class allocations by alternative for each Analysis Area. Table B-6 summarizes the approximate disturbance factors by LUD, Distance Zone, SIO, and VAC.

Table B-4
SIO for Distance Zone/LUD from Scenery Standards and Guidelines

LUD	Foreground	Middle Ground	Background	Not Seen
Scenic Viewshed	Retention	Partial Retention	Partial Retention	Max Modification
Modified Landscape	Partial Retention	Modification	Modification	Max Modification
Timber Production	Modification	Max Modification	Max Modification	Max Modification

Table B-5
Maximum Unit Size based on Visual Absorption Capability

SIO	Low VAC	Interm. VAC	High VAC
Retention	< 2	5-15	15-30
Partial Retention	5-10	15-40	40-60
Modification	15-40	40-60	80-100
Max Modification	50-75	80-100	80-100

R = Retention, PR = Partial Retention, M = Modification, MM= Maximum Modification

The percentages in Table B-6 are rough estimates intended to depict the possible level of disturbance one may encounter when viewing these areas. For modeling purposes, these visual disturbance zones were aggregated into groups with similar standards and economic response (e.g., logging costs). Because the percent of visual disturbance includes all visible terrain, tests had to be conducted to "recalculate" disturbance thresholds since only suitable lands are being modeled. These tests involved a series of iterative mapping exercises where varying levels disturbance factors were applied to the separate groups. The feasibility of the harvest level was then compared to the standards and guidelines and reviewed by Tongass National Forest landscape architects. This work was conducted under the following assumptions:

1. The items in the database (e.g., distance zone, visual absorption capability) were correct,
2. The standards and guidelines are modeled to their limits, and
3. The "viewshed" was a large area (e.g., as viewed from a boat).

This work indicated a need to further review the scenery components of the database but in general the process worked well in terms of modeling the intent of the standards and guidelines. This work resulted in three distinct regulation classes that permit timber harvest activities. The final allocation of regulation classes to the various disturbance zones is shown in Table B-7.

Table B-6
Percent Allowable Visual Disturbance

Land Use Designation	Distance Zone	SIO	Low VAC	Interm VAC	High VAC
Scenic Viewshed	Foreground	R	8	10	10
	Mid. Ground	PR	8	15	20
	Background	PR	20	20	20
	Not Seen	MM	20	20	20
Modified Landscape	Foreground	PR	8	15	20
	Mid. Ground	M	15	20	25
	Background	M	25	25	25
	Not Seen	MM	25	25	25
Timber Production	Foreground	M	15	20	25
	Mid. Ground	MM	50	50	50
	Background	MM	50	50	50
	Not Seen	MM	50	50	50

Table B-7
Regulation Class Allocation

Land Use Designation	Distance Zone	SIO	Low VAC	Intermediate VAC	High VAC
Scenic Viewshed	Foreground	R	3	3	2
	Mid. Ground	PR	3	3	2
	Background	PR	3	2	1
	Not Seen	MM	1	1	1
Modified Landscape	Foreground	PR	3	3	1
	Mid. Ground	M	2	2	1
	Background	M	2	1	1
	Not Seen	MM	1	1	1
Timber Production	Foreground	M	2	2	1
	Mid. Ground	MM	2	1	1
	Background	MM	1	1	1
	Not Seen	MM	1	1	1

R = Retention, PR = Partial Retention, M = Modification, MM= Maximum Modification

There are two main components of scenery constraints applied to the Regulation Classes in each VCU: the total visual disturbance and adjacency considerations. Total visual disturbance is the percent of land within a viewshed (VCU) that is classified as disturbed (Table B-8). Adjacency refers to the amount of time required before a harvest unit can be placed immediately next to an existing harvest unit (often referred to as the "green-up" period). These constraints are shown in Table B-8.

There are several important things to remember regarding the above table:

1. Disturbance percent is applied to suitable lands only, not the entire viewshed.
2. These values are entered into the models as constraints for each VCU.
3. The disturbance and adjacency factors for Regulation Class 3 are based on the use of small patch cutting (less than 2 acres). Optimally, disturbance and adjacency would not be an issue with carefully planned uneven-aged management (i.e., partial stand removal).

Variation by Alternative. Because LUD is one factor in determining Regulation Class, the breakdown of each of the seven alternatives into regulation class was recalculated for each alternative. A GIS map of Regulation Class was developed and used to intersect with the other layers used in Analysis Area development. Regulation Class was then used as an attribute to help define Analysis Areas.

Table B-8
Generalized Visual Constraints
Regulation Class Visual Disturbance Adjacency

Regulation Class	Visual Disturbance	Adjacency
1	40%	20 Years
2	30%	35 Years
3	20%	50 Years

Model Implementation Reduction Factors (MIRF)

To reiterate what was stated in the "Constraints" section (above), the use of MIRF is designed to accommodate for unmapped unsuitable lands that cannot be directly eliminated from the suitable land base but should be. It is known that when harvest activities occur, a certain percentage of the assumed suitable land will be ineligible for management (unsuitable) due to a number of physical, biological, or economic considerations. However, reasonable assumptions can be made to estimate the average amounts of these elements on the ground. Their effect on actual suitable land can be incorporated into the Spectrum model as constraints. Constraints are applied to each old-growth volume strata of each of the six operability harvest systems as well as to young-growth stands. The constraints are implemented by forcing the model to never harvest a certain percentage of the acres in the model. The effect is to control the maximum amount of acres from the "pre-MIRF" suitable land base that are actually harvested. A discussion of these elements and their estimated amounts follows.

MIRF Elements. Each of the nine MIRF subfactors used in the 1997 FEIS (Riparian Habitat was actually divided into two subfactors so there were 10 identified in 1997) was re-evaluated for the 2008 Final EIS. These subfactors are listed below and described in the following paragraphs.

- Land Selections – reduction due to the conveyance of selected lands to the State of Alaska and Native interests
- TTRA Stream Buffers – reduction due to unmapped Class I and II stream buffers
- Non-Commercial Forest – reduction due to volume class mapping errors
- Slope/Soil Hazard – reduction due to unmapped steep slopes
- Cost Efficiency – excludes stands with the lowest economic potential from the suitable base
- Riparian Habitat (Class III streams) – reduction due to unmapped Class III stream buffers
- Karst/Caves – reduction due to upgrading of the karst classification to high vulnerability on some areas
- Deer Habitat – reduction due to implementation of deer habitat standards and guidelines (some 1997 alternatives included these)
- Remaining Standards and Guidelines – reduction due to unmapped raptor and murrelet nests, wolf dens, mountain goat habitat, and habitat linkages

Land Selections. This subfactor estimates the reduction in the suitable land base as a result of conveyance of land to the State of Alaska and Native interests. In 1997, it was assumed that past land selections were representative of future land selections. It was also recognized that the subfactor may be overestimating the suitable lands lost because Native Corporations may select townsites near shore and within the 1,000-foot beach fringe.

In 1997, this subfactor was estimated by determining (with GIS) that there was 638,737 acres of encumbered lands and that 186,980 acres remained to be conveyed. This indicated that 29% of the encumbered lands would be transferred out of Forest Service ownership. Then, the amount of encumbered suitable lands was estimated and 29% was applied to those lands, producing the estimated suitable lands likely to be conveyed. This acreage was divided by the total suitable lands to estimate MIRF for this subfactor, which was rounded to be 2%.

In 2006, the following estimates are made using GIS and other knowledge of lands remaining to be conveyed (see the planning record for calculations):

- Total encumbered lands = 260,487 acres (not including encumbered lands in Misty Fiords)
- Current suitable (Alt 5) encumbered lands = 33,589 acres
- Remaining lands to be conveyed (40,000 State and 65,000 Native interests) = 105,000 acres
- Percent of encumbered to be conveyed (105,000/260,487) = 40%
- 40% of current suitable encumbered lands = 13,436 acres
- Total current suitable = 1,044,587 acres
- MIRF subfactor (13,436/1,044,587) = 1%

Therefore, 1% was used for this MIRF subfactor. This percent was applied to all alternatives.

Tongass Timber Reform Act (TTRA) Stream Buffers. This subfactor estimates the reduction in the suitable land base due to unmapped Class I and II stream buffers. In 1997, it was assumed that the loss of suitable timber was proportional to its occurrence and that streams were randomly distributed across the landscape.

In 1997, this subfactor was estimated using the Forest Service response to the Irland Group report, Chatham data, Central Prince of Wales Island data, and Stikine field reviews. The following TTRA buffer MIRF estimates were made based on each of these studies:

- Irland Study (1992) – 2.50%
- Chatham (1995) – 3.91%
- Central Prince of Wales Island (1995) – 3.62%
- Stikine Field Visit – 2.32%

Based on these estimates, the 1997 MIRF for this subfactor was 2.5%.

For 2006 it was assumed that this percentage is reduced to 2%. This is because of the significant amount of field survey work and the amount of updating of the streams GIS layer that has occurred in the 10 to 15 years since these studies were done.

Non-Commercial Forest. This subfactor estimates the reduction in the suitable land base due to volume class mapping errors. In 1997, it was assumed that reduction in suitable land due to mis-mapping was the same for all three Administration Areas.

In 1997, a statistician at the Pacific Northwest Research Station used the Forest Inventory plot data (1970s) and the revised TIMTYPE volume strata to identify plots designated as high/medium/low volume that actually had less than 8,000 board feet of volume per acre. The 8,000 board feet per acre figure was used as the definition of productive old growth, or POG. This analysis indicated that 2% of the medium volume strata plots and 18% of the low volume strata plots were stocked at less than 8,000 board feet per acre. The reduction for the medium plots was not used because it was judged too small and would overlap with other reduction factors, so 18% MIRF was used for this subfactor only for the low volume strata.

In 2006, 10% MIRF was used for low volume strata for this subfactor. Recent consultation with the Pacific Northwest Research Station statistician concluded that the 18% figure the low volume strata is still reasonable, even with the new inventory data. However, it was decided that there should be recognition of “fall-up” or the determination that areas of Unproductive Forest are misclassified and should actually be POG. It was estimated, based on detailed experience with the inventory data, that 5 to 10% of the Unproductive Forest is POG (> 8,000 board feet/acre). So the following steps were followed:

- The Tongass has 4.22 million acres of Unproductive Forest, 4.95 million acres of POG, and 0.98 million acres of low volume strata POG.
- If 5% of the Unproductive Forest is low volume strata POG, then there are 0.21 million additional acres of low volume strata POG.
- 0.21 million acres represents a 21% increase in the amount of low volume strata.
- If the Forested Muskeg type of Unproductive Forest is not included in Unproductive Forest, then there are 3.15 million acres and 5% of 3.15 million acres is 0.16 million acres. Assuming only half of these acres are actually identified and incorporated into units, this results in 0.08 million acres represents an 8% increase in the amount of low volume strata.

Therefore, being conservative and using only half of the 5% of the “other” Unproductive Forest as “fall-up,” in 2006 an 8% “fall-up” and an 18% fall-down were assumed. Therefore, the MIRF for this subfactor is the net difference, which produces a 10% reduction in low volume strata.

Slope/Soil Hazard. This subfactor estimates the reduction in the suitable land base due to unmapped steep slopes. It represents the additional acreage of steep slopes identified during project implementation that is not already mapped, divided by the mapped suitable acres.

In 1997, this subfactor was based on a draft Baranof MIRF analysis (1996), the Forest Service response to the Irland Group report (1995), Chatham data, Central Prince of Wales Island data, and the Ketchikan cumulative effects contract study (on suitable and fall-down by project area). Based on these sources, the 1997 MIRF for this subfactor was defined as 32% for Chatham and 3.1% for the Stikine and Ketchikan Areas.

For 2006, the slope data that was developed to produce the suitability layer for the new Tongass LSTA was reviewed. This new layer (which removes slopes >72% and includes more detailed information, including LIDAR) already removes many of the steep slopes that were not accounted for in 1997. A GIS query examined the acres in steep slopes that are not in MMI4. This amounted to 6% of the suitable in the Chatham Area and 3% of the suitable in the Ketchikan and Stikine. In addition, there are two other factors that affect the MIRF for this subfactor: First, there is a certain amount of “fall-up” for areas mapped as MMI4 and areas mapped as >72% slope. These positive factors were not considered in the 1997 MIRF. Second, there is a large amount of area removed due to being mapped as Site Index = 1 and it appears that more areas are added back in (due to “fall-up”) than are taken out due to site index. Therefore, for 2006, the Chatham MIRF was reduced for this subfactor to 26% and the Ketchikan and Stikine MIRFs to 1%.

Cost Efficiency. This subfactor excludes the stands with the lowest economic potential from the suitable land base. In 1997, 36 CFR 219.14[c][3] was applied and it was assumed that future economic potential could be estimated using past harvest experience.

In 1997, the subfactor was estimated using the best professional judgment of Bill Wilson and Don Golnick. They assumed that no harvest would be conducted in low volume strata if it was in the Difficult or Isolated Operability Class. In addition, they assumed the same for medium volume strata in the Isolated Operability Class. Therefore, lands with these characteristics had a 100% MIRF subfactor.

In 2006, it was decided that economics should be factored in differently because the Spectrum modeling extends over a 150-year period. It was decided to make the MIRF for this subfactor equal to 25% for Difficult/Low Volume and Isolated/Medium Volume and 50% for Isolated/Low Volume. These subfactors are additive with the other subfactors; therefore, the combined MIRF for these low economic categories ranges from 44 to 79% in Ketchikan, 38 to 73% in the Stikine, and 64 to 99% in the Chatham Area (see attached Excel file).

It should be noted that by design the Spectrum model will tend to harvest the most economically challenging areas only as a means to achieve a desired condition. Even without these subfactors the model is unlikely to schedule these lands for harvest.

Riparian Habitat (Class III Streams). This subfactor estimates the reduction in the suitable land base due to unmapped Class III stream buffers. In 1997, it was assumed that 50% of the Class III streams would need to be buffered and that 50% of the Class III streams were unmapped.

In 1997, the subfactor was estimated to be 14% based on estimating 50% of unmapped Class III stream acreage and then relating it to the suitable. It appears that the amount of suitable used in the calculation was incorrect, making the percentage higher than it should have been.

In 2006, it was decided to be more conservative (although a lower MIRF was estimated). The MIRF for this subfactor was calculated as follows:

- GIS analysis showed 7,557 miles of Class III streams in the development LUDs of the No-Action alternative.
- Since 29% of these development LUDs is suitable forest land, it was estimated that there are 2,191 miles of Class III streams on suitable forest land.
- Assuming all are buffered and the buffers are 100 feet on each side, these stream miles would produce 53,114 acres of buffers.
- Assuming an equal amount will be established in the future: 53,114 divided by 1,044,588 gives a MIRF of 7.6%.
- To be conservative, we rounded this MIRF to 8%.

Karst/Caves. This subfactor estimates the reduction in the suitable land base due to a change in karst classification from low – moderate to high vulnerability. In 1997, it was assumed (based on the professional judgement of J. Baichtal (1996) and others) that 30% of low-moderate lands in Ketchikan should be high vulnerability; similarly, the percentages for the Stikine and Chatham are 10% and 20%.

In 1997, the subfactor was estimated based on professional judgement and GIS queries. For Alternative 11, the MIRF values for this subfactor were: 0.5% for the Chatham Area, 0.3% for the Stikine Area, and 5.9% for the Ketchikan Area.

In 2006, GIS queries were made again, using the new karst rock layer (tkarst06). The MIRF for this subfactor were calculated as follows:

- It was determined there are 100,743 acres of karst rock on suitable lands on the Forest.
- GIS analysis showed these were apportioned among the Administrative Areas as follows: 18.5% (18,637 acres) to the Chatham; 5.2% (5,239 acres) to the Stikine; and 76.3% (76,867 acres) to Ketchikan.
- Applying the 30%, 10%, and 20% factors defined in 1997 for the Administrative Areas produces the following: 3,727 acres of low-moderate should be high vulnerability for the Chatham, 524 acres for the Stikine, and 23,060 acres for the Ketchikan Areas.
- Dividing these by the amount of suitable for these areas (277,016, 354,362, and 413,210, respectively) produces the final MIRFs for this subfactor:
  - Chatham = 1.3%; rounded to 1%
  - Stikine = 0.1%; rounded to 0%
  - Ketchikan = 5.6%; rounded to 6%

Deer Habitat. This subfactor estimates the reduction in the suitable land base due to implementation of the deer standards and guidelines. In 1997, these applied to the high and medium volume strata for Alternatives 3, 4, 5, and 6 of the 1997 Final EIS.

In 2006, this subfactor is not used, because none of the 2006 alternatives include these deer habitat standards and guidelines.

Remaining Standards and Guidelines. This subfactor estimates the reduction in the suitable land base due to unmapped eagle/osprey nests, goshawk nests, murrelet nests, wolf dens, goat habitat, and 600-foot habitat linkages. In 1997, this subfactor was estimated at 1% based on the best professional judgement of Bill Wilson and Don Golnick.

In 2006, it was decided to maintain the MIRF of 1% for this subfactor.

Overall Results. The sum of these subfactors produces the overall MIRF for each category (Administrative Area, volume strata, operability class, alternative). To date, we have identified one MIRF for all alternatives. Specific calculated MIRF values are in the planning record. The range of MIRFs (varying with operability class) for the different volume strata and Administrative Areas are as follows:

	Low Volume	Medium Volume	High Volume
Chatham	49% – 99%	39% – 64%	39%
Stikine	23% – 73%	13% – 38%	13%
Ketchikan	29% – 79%	19% – 44%	19%

Estimation of Past and Future Harvest and Road Construction for Effects Analysis

The quantification of the direct, indirect, and cumulative effects of the alternatives on fish, wildlife, plants, and other resources was based heavily on the estimation of past and future harvest of old growth and young growth and the amount of road construction. These tasks were conducted for both National Forest System (NFS) and non-NFS lands. This section describes the process followed and the major assumptions.

Estimation of Past and Future Harvest

The estimation of the direct, indirect, and cumulative effects of the alternatives on POG habitats and the fish, wildlife, and plants that use these habitats required three major steps. First, it was necessary to assemble the inventory of existing vegetation on both NFS and non-NFS lands. The second step was the estimation of the original POG on NFS and non-NFS lands and the classification of this original POG into POG types for the purpose of evaluating the level of disproportionate past harvest. The third step was the estimation of future harvest and the amount of POG in various POG categories that would be remaining after future harvest on NFS lands under each alternative, and for all lands combined, including factors for harvest of future harvest on non-NFS lands.

Vegetation Inventory

For NFS lands, the existing vegetation information from the Tongass Geographic Information System (GIS) library was used. Specifically, the recently developed Size Density Model (SDM) (see Affected Environment in the *Biodiversity* section) was used for the classification of existing vegetation on the Tongass. Using this model, POG is defined by seven old-growth types: SD67, SD5N, SD5S, SD5H, SD4N, SD4S, and SD4H. Young growth is defined by six types, depending on the approximate age and origin of the stand; natural young growth (e.g., young growth originating from blowdown) is divided into three types (S1, S2, and S3) and young growth that originated from timber harvest is classified into three types (HS1, HS2, and HS3).

For non-NFS lands, a number of sources of information were used to produce the most updated and accurate mapping available for non-NFS lands in Southeast Alaska. These sources included:

- Sealaska Regional Corporation provided recently updated GIS layers for vegetation and harvest on their lands throughout Southeast Alaska; these layers were used for mapping all Sealaska lands.
- The State of Alaska provided GIS layers for harvesting on state lands in Southeast Alaska. These layers were used for most state lands.
- Audubon Alaska and The Nature Conservancy recently completed a conservation assessment for Southeast Alaska (Albert and Schoen 2007) that included the development of a reasonably accurate vegetation map of the entire region based on Tongass GIS vegetation data (SDM mapping), augmented with timber inventory data from Haines State Forest and with classified Landsat Multi-spectral Scanner (MSS) imagery from the Interim Landcover Mapping Program of the U.S. Geological Survey, and 1997 aerial photography. This mapping was used for most of the remainder of Southeast Alaska.
- Forest Service orthophotography and aerial photography was interpreted in some areas to fill in gaps in the above layers.

Based on all of the above information, a Catalogue of Past Harvest for all of Southeast Alaska was developed that itemizes the acres harvested for each land ownership category, landowner, and biogeographic province, and breaks this harvest down by approximate decade, where the decade of harvest is known or can be reasonably estimated. In addition to the spatial information described above, statistics on the implementation of the Alaska Forest Resources and Practices Act and information on State timber sales in Southeast Alaska were collected from the Alaska Department of Natural Resources, Division of Forestry. This information is presented in Appendix E.

Original POG by Category

Next, the original POG was estimated on NFS and non-NFS lands in each biogeographic province and ecological subsection by category. This was done for the purpose of evaluating the level of disproportionate past harvest.

Original POG is defined in this EIS as the POG that existed, outside of the developed areas associated with towns, prior to all mapped timber harvest. Therefore, all young growth originating from timber harvest (mapped as HS1, HS2, and HS3 on NFS lands) was assumed to be original POG. Natural young growth (mapped as S1, S2, and S3 on NFS lands) was assumed to be in a steady state of succession and replacement; therefore, it was not assumed to be original POG. On the Tongass, about 300 acres of young growth were mapped as having been harvested in the 1700s and 1800s and about 16,000 acres are from the first half of the 1900s. The vast majority (about 438,000 acres on the Tongass) of the harvest occurred since 1950.

In addition to total POG (represented by the seven SDM types), two other categories of POG were used to represent the larger tree types: high-volume POG, which includes the three types with the largest trees (SD5S, SD5N, SD67), and large-tree POG, which is defined as SD67 by itself. To estimate original high volume- and large-tree POG, an estimate was first made of the percentage of past harvest in these categories using timber type mapping from the mid-1980s. The archived tim86 GIS layer from the Tongass GIS library was used and lands that had been harvested since this mapping was done were examined. For NFS lands, these areas were divided into older harvests done prior to the TTRA and harvests after the Act was implemented.

The following compositions of harvest were determined for NFS and non-NFS lands:

- For NFS lands, prior harvest was estimated to have been 29 percent large-tree POG and 64 percent high-volume POG.
- For non-NFS lands, prior harvest was estimated to have been 37 percent large-tree POG and 62 percent high-volume POG.

Future Harvest

Future harvest on NFS lands was estimated based on the acreage of POG scheduled for harvest by the Spectrum model under each alternative assuming the maximum harvest allowed by the ASQ is harvested each decade. The estimate assumes all scheduled suitable POG is harvested (calculated by subtracting alternative-specific reduction factors for MIRF and scheduling from the mapped suitable acreage under each alternative [see the *Timber* section]). Factors are applied separately to each biogeographic province and ecological subsection to develop province- and subsection-specific acreages.

The estimation of future harvest on non-NFS lands was made by examining the amount of POG remaining on these lands and making reasonable assumptions regarding the percentage of that POG that would be harvested in the future. Estimates were conservatively high, in general.

Estimation of Past and Future Road Construction

The estimation of the direct, indirect, and cumulative effects of the alternatives associated with road construction required two major steps. First, it was necessary to assemble the inventory of existing roads on both NFS and non-NFS lands. The second step was the estimation of future road development for NFS lands under each alternative, and for all lands combined, including factors for future road development on non-NFS lands.

Road Inventory

For NFS lands, the existing road information from the Tongass GIS library was used. The infra roads layer was used for the inventory of system roads and the definition of maintenance levels to determine whether they were open or closed. The allroads layer was used to estimate additional unauthorized roads. For non-NFS lands, existing roads were inventoried using the following sources:

- Tongass GIS library layers contain many roads on non-NFS lands.
- Sealaska Regional Native Corporation provided mapping of roads on Sealaska lands.
- The State of Alaska provided GIS layers for roads on many non-NFS lands in Southeast Alaska.
- Other available GIS layers (e.g., ESRI's StreetMap) was used for urban and rural areas around towns and settlements.
- The sources above were supplemented by orthophoto and aerial photograph interpretation to "fill in holes."

Future Road Construction

Future road construction on NFS lands was estimated based on the recently completed logging system and transportation analysis (LSTA) for the Tongass. In areas that the LSTA did not cover, future roads were extrapolated based on the road miles per harvest acreage in the portions of each Value Comparison Unit (VCU) or Wildlife Analysis Area (WAA) that were covered by the LSTA. Projections were made for each VCU and WAA and under each alternative, so that road densities could be calculated for each of these land divisions.

On non-NFS lands, future increases in road density were projected after examining existing road densities and making reasonable assumptions regarding the additional road density that would be developed in the future. Estimates were conservatively high, in general. All non-NFS roads were assumed to be open roads.

Deer Model Assumptions and Application

The TLMP or DeGayner Deer Model was used in the EIS to (1) evaluate reductions in winter habitat capability under each alternative, as indicated by changes in the DeGayner Deer Model habitat suitability index (HSI) scores, (2) estimate the percentage of high value deer winter range that could be harvested under each alternative, and 3) estimate the number of WAAs across the Tongass that exceed the 18 deer per square mile index in the wolf standards and guidelines. Changes in winter habitat capability and harvest of high-value winter range were based on projected 1954 (point at which large-scale timber harvest began) conditions, to be consistent with past analyses done at the Forest planning level. Analyses were run at the WAA level, as this is the land division used by the ADF&G for deer inventories and planning. A cross-walk was developed to reclassify the new Forest-wide vegetation model (the SDM) into the deer model vegetation categories (high, medium, low volume old-growth). High-volume stands included SDM vegetation categories SD5N, SD5S, and SD67; medium volume stands include SD4N, SD4S, and SD5H; and low volume stands include SD4H. HSI scores from this model range from 0 to 1.3 but were standardized to range from 0 to 1.0 by dividing all values by 1.3, because outputs from such models represent a range from 0 to 100 percent habitat suitability, with higher values indicating higher habitat capability. Greater details are documented in the project planning record.

To estimate 1954 habitat suitability, it was necessary to "grow back" the vegetation in previously harvested units. Previously harvested units were assumed to have been stands of POG. The variable for volume class (VolClass) in the Existing Veg layer, which exists for most stands that have recently been harvested, was used as an indicator of their 1954 VolStratum categories. Stands with an Existing Veg VolClass of 4 or 5 were assumed to have been medium volume POG in 1954, following the assumption that few low VolStrata stands were harvested; stands with a VolClass of Null, 3, 6, or 7 were assumed to have been high VolStratum POG. VolStratum 6 and 7 were obviously in high VolStratum and it was assumed that the remainder of the stands that were harvested many years ago were in the high VolStratum also. All stands with a date of origin prior to 1954 were not modified.

Future habitat suitability was based on maximum timber harvest after full implementation of the Forest Plan under each alternative. It was assumed that 25 percent of the harvestable acreage would be in the stand initiation stage (I) and 75 percent of harvestable acreage would be in the stem exclusion stage (E) of stand development after full implementation. In addition, the MIRF, or the percent of the mapped suitable acres not actually harvested due to factors identified during implementation (e.g., karst, unstable slopes and other issues that preclude harvest during timber sale layout), and a scheduling factor was taken into account as they are for the timber volume estimation, the Spectrum ASQ modeling, and other future harvest and road construction estimation.

Accordingly, future WAA-level HSI scores were based on a weighted average of three scenarios, or model runs, which assumes that all harvestable lands are harvested. This approach produces an unbiased estimate of future HSI scores under the assumption that 25% of all suitable forest land is in the I stage, 75% is in the E stage, the remaining harvested young growth (unsuitable) is in the E stage, and all old growth and natural young growth remains the same. No-Harvest Scenario weights account for the area represented by MIRF and scheduling and which is not harvested.

To estimate the percentage of 1954 winter range habitat capability that currently remains, and would remain under each alternative after full implementation of the Forest Plan, the1954 HSI score was divided by the current and future HSI score for each WAA, respectively. This illustrates the cumulative effect of timber harvest on estimated deer habitat capability, from the beginning of large-scale timber harvest on NFS lands in 1954 to the present and to the year 2105.

To take into account effects on deer across the Tongass inhabiting areas that vary naturally in their habitat quality, high quality habitat was defined as the quartile of the current land base with the highest HSI scores within each WAA. This was defined by using the following process:

- Sorting HSI scores within each WAA from highest to lowest by polygon;
- Filtering out all polygons with HSI scores = 0 (this area was not included when identifying the area percentages);
- Identifying the polygons that are in the highest 25% based on the WAA acreage, by accumulating the acreages starting with the polygons with the highest HSI scores and working down until 25% of the area was included; and
- Determining the percentage of these acres (which represent the highest quality deer winter range within each WAA) that are harvested under each alternative.

Deer per square mile were calculated to develop an index of the effects of the alternatives on the wolf standard and guideline that deals with deer habitat capability. For this analysis, habitat capability in terms of deer density was calculated by assuming a density of 100 deer per square mile for an HSI of 1.0. Only WAAs where wolves potentially occur (GMUs 1, 2, 3, and 5) were included and WAAs with naturally very low deer densities (WAAs 4302-4607) were excluded from the analysis.

APPENDIX C
POTENTIAL LAND ADJUSTMENTS

Appendix C

Potential Land Adjustments

CONTENTS

LIST OF TABLES

Appendix C
Potential Land Adjustments

Introduction

This appendix addresses certain types of land ownership adjustments involving Tongass National Forest lands that could potentially occur during the period of the Forest Plan Amendment. Adjustment of land ownership within the Tongass boundaries can occur through Congressionally-mandated conveyances, exchanges, and acquisitions or through Forest Service administrative activities. The latter two types of adjustments typically involve small acreages and specific, localized property circumstances, and have little impact on management of the Tongass. Land conveyance processes and land exchanges can involve larger acreages and can be relatively wide-ranging in geographic scope. Because these types of adjustments could have more substantial implications for Forest management, this appendix provides more detailed information about specific potential actions that have been proposed by parties other than the Forest Service in recent years. The discussion of the possible ramifications of potential conveyances or exchanges is an overview and is intended for informational purposes only. It does not represent a National Environmental Policy Act (NEPA)-type analysis of the potential environmental impacts of such actions. If the Forest Service were to propose such a land adjustment action or accept for review a proposal from another entity, the Forest Service would evaluate the proposal under NEPA and standard Forest Service processes for land adjustments.

Legislated Alaska Conveyances

Land ownership status within the Tongass is complicated by several ongoing Alaska land conveyances created under various federal legislation (USDA Forest Service 2003b). The Alaska Native Allotment Act of 1906 provided for Native individuals who had occupied lands prior to their designation as National Forest to apply for conveyance of up to 160 acres, under conditions prescribed by the Act and federal regulations. As of August 2006, approximately 4,500 acres in 44 Native allotments had been conveyed, with an additional 3,500 acres pending adjudication by the Bureau of Land Management (BLM).

The 1958 Alaska Statehood Act authorized the State of Alaska to select 400,000 acres of vacant and unappropriated land from within the Tongass and Chugach National Forests in Alaska, to further the development and expansion of Alaskan communities. To date, under this provision of the Statehood Act, the state has received title to approximately 258,600 acres located in the Tongass National Forest. Approximately 37,400 acres remain to be conveyed to the state from the Chugach and Tongass National Forests.

The Alaska Native Claims Settlement Act (ANCSA) established processes for transfer of federal land to Alaska Native village corporations and regional corporations, and to Native individuals. ANCSA provided for the conveyance of 23,040 acres of surface estate lands (a full township, 36 square miles) to each of the 10 Native village corporations and 2 urban corporations located in Southeast Alaska. ANCSA provided that the subsurface estate under the village and urban corporation land would be conveyed to the Native regional corporation. ANCSA also included other provisions addressing land conveyances to Native regional corporations. Under Section 12c of ANCSA, 11 regional corporations were to share in the selection of 16 million acres. Section 14(h)(8) set aside a pool of 2 million acres to be transferred to the Native regional corporations in the State after certain other conveyances are completed. After the specified conveyances have been implemented, the remaining land in the pool will be divided among the regional corporations based on population, with approximately 22 percent of the balance going to Sealaska Corporation, the regional corporation for Southeast Alaska. Finally, ANCSA provided for selection and transfer of up to 160 acres to Native individuals who had occupied that land as a primary place of residence on August 31, 1971.

To date, approximately 571,000 acres within the Tongass have been conveyed under ANCSA. Each of the 10 Native village corporations and 2 urban corporations in Southeast Alaska has selected its authorized acreage; virtually all of that land has been conveyed, amounting to a total of approximately 279,000 acres. Approximately 292,000 acres have been conveyed to date to Sealaska Corporation, in addition to the subsurface estate under the lands owned by the village and urban corporations. Sealaska has selected about 171,000 additional acres. It is expected that approximately 64,000 acres of these lands will be conveyed to Sealaska.

Potential Future Conveyances

The major Alaska land conveyances described above (those occurring under the Alaska Statehood Act and ANCSA) have been authorized by Acts of Congress and implemented through additional legislation and regulations. In recent years there have been a number of other formal and informal proposals that, if authorized, might result in the transfer of Tongass National Forest System (NFS) lands out of federal ownership. Information currently available to the Forest Service about these conveyance proposals is provided below. For each proposal, the text includes background information, a description of the conveyance proposal, and a discussion of the potential implications for land ownership and management of the Tongass. Because the proposed legislation for the respective conveyances does not generally specify where land selections would be made, it is not possible at this time to identify the types of Tongass lands and resources that would likely be affected by the proposals. Consequently, the discussion of forest management implications for the potential conveyances is necessarily quite general.

Southeast Alaska Native Land Entitlement Finalization Act

A proposal was identified in the Draft EIS entitled Sealaska Proposed Comprehensive Tongass-wide Land Exchange. Since the Draft EIS was published, the potential land exchange has evolved into a legislative proposal entitled Southeast Alaska Native Land Entitlement Finalization Act, which was subsequently introduced into Congress as H.R. 3560. This bill, as introduced, more closely resembles a conveyance rather than a land exchange as earlier described. The text describing the original proposal has been maintained under the Potential Land Exchange section of this appendix so readers can compare the current proposal to the original proposal identified in the Draft EIS.

H.R. 3560 is to provide for the completion of certain land selections under ANCSA, and for other reasons. H.R. 3560 defines its purpose as the vehicle to redress the inequitable treatment of the regional corporation for Southeast Alaska by allowing Sealaska to select its remaining entitlement under section 14 of the ANCSA (43 U.S.C.1613). These selections are to come from designated Federal land in Southeast Alaska, outside the ten Southeast Alaska village withdrawal areas. In general, H.R. 3560 authorizes Sealaska to select and receive conveyance of its remaining land entitlement from three categories including economic development lands; sites with sacred, cultural, traditional, or historic significance; and Native enterprise sites.

Proposal and Current Status

H.R. 3560 was referred to the House Committee on Natural Resources, U.S. House of Representatives, in Washington D.C. on September 18, 2007. A hearing was held by the same Committee on November 14, 2007. Testimony was presented by officials from the Departments of the Interior and Agriculture for the Executive branch, along with representatives of the Sealaska Corporation and Southeast Alaska Conservation Council. At this time no additional hearings or committee assignments have been identified and it is not clear whether or not this proposal will move further through the legislative process.

The goal of the H.R. 3560 is to finalize Sealaska's entitlement equitably; secure ownership of places of sacred, cultural, traditional, and historic importance; maintain its existing resource development and management operations; and continue economic opportunities for the Native people in Southeast Alaska. While not clearly defined in the Act, those lands identified as entitlement are assumed to be similar to those described in the Potential Land Exchange section of this appendix. For brevity, this section will not repeat the information described in that section. Maps (Sealaska ANSCA Land Entitlement

Rationalization Pool, dated May 17, 2007) have been made available that define the locations of the potential land acquisitions, which further refine what was presented in the Draft EIS. Upon completion of the land conveyance from the Tongass to Sealaska, all encumbrances (327,000 acres according to the Bill) currently held by the regional corporation would be removed.

Two new items presented by H.R. 3560, were not addressed in the Draft EIS. These include sites with sacred, cultural, traditional, or historic significance (sacred sites) and Native enterprise sites. The sacred sites encompass no more than 2,400 acres of known locations (identified on maps entitled "Places of Sacred, Cultural, Traditional, and Historic Significance, dated May 17, 2007" and "Traditional and Customary Trade and Migration Routes, dated May 17, 2007"). An additional 1,200 acres is set aside and may be used by Sealaska to acquire new discoveries. The known sites are depicted across the extent of the Tongass National Forest and prohibit commercial timber harvest; shall not be subject to additional covenants; and provide for varying uses of the sites by Sealaska.

Native enterprise sites encompass no more than 5,000 acres and are identified on a map entitled "Native Enterprise Sites dated May 17, 2007." These sites are identified across the extent of the Tongass National Forest and prohibit commercial timber harvest; shall not be subject to restrictive covenants; provide for access from the site to NFS lands 15 miles away from the exterior boundary of the site; and provide for varying uses by Sealaska.

Forest Management Implications

The Forest Service conducted preliminary analysis of the economic development lands in the Draft EIS. Based on how these lands are described in H.R. 3560, it is likely that the effects of the Act would be similar to what is presented for the Sealaska Proposed Comprehensive Tongass-wide Land Exchange in the Potential Land Exchange section of this appendix. Rather than repeat that analysis here, readers are directed to that text for reference.

Sites with sacred, cultural, traditional, or historic significance as well as Native enterprise sites could potentially affect management of many resources and issues on public lands, including subsistence, recreation, wildlife and fish, timber (including second growth), karst, travel management, and heritage resources. These potential effects are difficult to determine from the proposed legislation due to the vagueness of its language. More information, than what can be derived from the bill and testimony, would be necessary in order to adequately address this issue.

From the review the Forest Service conducted in the Draft EIS only on economic development lands, it was determined that implementation of the Sealaska proposal would require a Forest Plan Revision based on the magnitude of the changes in land use designations. With the addition of the sacred and Native enterprise sites, this determination is still warranted as a result of net losses in the Conservation Strategy, the lack of ability in making up key lands associated with the old-growth reserves, effects on the Allowable Sale Quantity, and impacts associated with other existing uses. Additionally, the lands to be exchanged to the federal government generally do not have existing road systems, and costs for developing roads on these lands would likely constrain the ability to supply timber economically. The combined impacts on the availability of timber from the Tongass could have a significant adverse effect on the supply of timber to mills on Prince of Wales Island and surrounding areas.

Table C-1 (at the end of this appendix) has been updated to reflect the acreages included in the legislative proposal and assumes like acreages for the economic development lands as described in the Draft EIS. It indicates the acreage of the NFS lands that could be transferred to Sealaska via the entitlement and conveyance components of the proposal, and the acreages of the current Sealaska lands that could be conveyed to the U.S. This table displays the acreages of the entire pool of parcels. The actual acreage conveyed would likely be less than listed.

Additionally, the U.S. Fish and Wildlife Service recently published a determination not warranting the listing of the Queen Charlotte Goshawk (Accipitier gentilis laingi) in Alaska (Federal Register on November 8, 2007). This determination was made, in part, based on the habitat protection measures on federal lands. Should the proposed legislation be implemented a high probability exists that this determination would be revisited, given the current harvest level that has taken place on Prince of Wales Island, where the legislation would give emphasis to lands being acquired by Sealaska.

University of Alaska Lands

The following discussion is based on information obtained from the University of Alaska and Senate Bill 293.

By separate acts passed in 1915 and 1929, Congress granted approximately 360,000 acres of surveyed land to the University of Alaska to be used to generate revenue to support the University's educational mission (University of Alaska 2005). Only about 100,000 acres had been surveyed and conveyed to the University by the time of statehood in 1959, and the Statehood Act extinguished the University's right to receive the balance of its federal land grants. At that time the State of Alaska also took on management responsibility for the University lands, and allowed several municipalities to select University grant lands for their municipal entitlements without compensating the University. Through multiple settlements of lawsuits filed by the University, the University subsequently gained title to additional lands and timber harvest rights. The University of Alaska now owns and manages approximately 183,000 acres of land, of which approximately 170,000 acres are managed for investment purposes. Because the University received only a portion of the acreage total granted it by Congress, and that figure was smaller than the university land grant for virtually all other states, the University has sought additional grant lands through proposed state and federal legislation.

Proposal and Current Status

Under the terms of Senate Bill 293, introduced in Congress on February 3, 2005, the University of Alaska will be allowed to select up to an additional 250,000 acres of federal land that would be managed to provide income for the university system. If enacted, the university would not be allowed to select lands within a federal conservation system area (e.g., a national park or a wilderness area) or Tongass NFS lands other than those within development Land Use Designations (LUDs), and their selections would be limited to areas of second-growth timber where timber harvest occurred after January 1, 1952. Senate Bill 293 was not passed by Congress. As of September 2007, the bill has not been re-introduced.

Forest Management Implications

The proposal to allow conveyance of federal lands to the state to provide income to support the University of Alaska exists in concept only at this time. The Forest Service is aware of no maps indicating areas of interest for selection for such purpose, or statements from policy makers identifying areas that might be of interest. Therefore, it is not possible to determine specifically how enactment of such a conveyance process might affect management of the Tongass.

Based on the purpose of the University of Alaska Lands Bill, however, it is possible to identify the broad outlines of possible implications for the Forest. Because the purpose of the program is to generate income, lands with relatively high timber production capability and accessibility are a logical focus of land selection under such an act. Areas known or suspected to have high mineral resource potential will also be of interest. While some areas of the Chugach National Forest and some lands under the jurisdiction of the BLM will also be of interest, it is reasonable to assume that a substantial portion of any lands selected under such a conveyance program will be located on the Tongass.

Under the current Forest Plan, there are approximately 3.6 million acres within development LUDs and nominally available for selection, based on the language of Senate Bill 293. The Biodiversity section of this EIS indicates approximately 453,000 acres of the Tongass are second growth resulting from timber harvest (about 234,000 additional acres are in natural young growth). About 240,000 of these acres are in the 0-70 year age category and are on lands suitable for timber harvest. Therefore, this latter figure represents the lands that could be taken as the approximate area eligible for selection. Therefore, it is conceivable that land selection for the University of Alaska could absorb essentially all second-growth land in development LUDs on the Tongass. While this is possible, the Forest Service does not consider that to be a realistic possibility, given the availability of large areas of federal lands with income-generating potential elsewhere in the state.

If the University of Alaska Lands Bill is enacted, it is evident that any lands within the Tongass selected by the University would be productive timber lands currently supporting second-growth timber of varying ages. Because little, if any, of that timber is ready for harvest relatively soon, there would likely be minimal direct effect on near-term sales and harvest volumes for the Tongass. Nevertheless, removal of productive forest land from the development LUD land base would necessarily cause a commensurate reduction in the ASQ for the Forest, and therefore indirectly result in reduced harvest volumes from the Tongass in the relatively near term. Conversely, it can reasonably be assumed that any Tongass lands selected by the University under such a program will be open for timber harvest by the University and will provide a supply of wood as soon as that is economically viable. Therefore, over the long term it appears likely that the total harvest volume would not be much different with enactment of the University lands legislation, although the mix of sources would change somewhat. Timber from University lands would presumably be available for export, however, in which case the supply of wood to processors in Southeast Alaska could be reduced somewhat.

Unrecognized Southeast Alaska Native Communities

Under the Alaska Native Claims Settlement Act (ANCSA), corporations representing Native residents of 10 Southeast Alaska communities were each allowed to select 23,040 acres of surface estate for conveyance from the U.S. to those village corporations. ANCSA also provided the same conveyance rights to two Native urban corporations in Southeast Alaska. Native residents of Haines, Ketchikan, Petersburg, Tenakee Springs, and Wrangell were not addressed in those ANCSA provisions presumably because they did not meet the eligibility requirements. For a number of years there have been legislative proposals to extend land conveyance rights to the Native residents of these five communities to place them on an equal footing with other Southeast Alaska communities.

Proposal and Current Status

The Unrecognized Southeast Alaska Native Communities Recognition and Compensation Act (Senate Bill 1746), introduced most recently on June 29, 2007, proposes to allow Alaska Native residents of Haines, Ketchikan, Petersburg, Tenakee Springs, and Wrangell to organize as five Urban Corporations and to each receive 23,040 acres of surface estate lands and other compensation. Sealaska Corporation would receive the subsurface estate to these lands. The language in the bill does not identify the specific areas that would be available for selection and conveyance.

Forest Management Implications

If enacted, Senate Bill 1746 would presumably result in the transfer of up to 115,200 acres of current NFS lands out of federal ownership. Such an action would represent a reduction of approximately 0.7 percent in the total Forest land base. Given the limited existing information about how the proposal might be implemented, it is difficult to speculate as to which types and acreages of NFS lands would be affected. It is also unknown if selections would be allowed within congressionally designated areas such as Wilderness and LUD II areas. If it is assumed that selections would occur from available lands in areas close to the respective communities, selections under such a program could affect LUDs as follows:

Haines – Semi-Remote Recreation and Remote Recreation, with some Modified Landscape on either side of Lynn Canal

Ketchikan – Semi-Remote Recreation, Scenic Viewshed and Timber Production

Petersburg – Modified Landscape, Scenic Viewshed, Timber Production and Old-Growth Habitat

Tenakee Springs – Modified Landscape and Timber Production

Wrangell – Modified Landscape, Scenic Viewshed, Timber Production and Old-Growth Habitat

Based on the distribution of Tongass lands near the subject communities, it appears that Native selections under such a program could be concentrated within moderate development and intensive development LUDs. Alternatively, newly-formed village corporations might choose to select productive timberlands, to maximize the revenue potential from their lands. In either case, it appears likely that a large majority of the total selected acreage would occur in development LUDs. Consequently, a conveyance program such as outlined in Senate Bill 1746 would likely result in forest management implications similar to those discussed above for the proposed University of Alaska conveyances. Based on the respective potential acreage figures (up to approximately 250,000 acres vs. about 115,000 acres), passage of Senate Bill 1746 or similar legislation could affect approximately half as much land on the Tongass as the University land proposal. Adoption of such a proposal would likely result in a minor reduction in the land base of suitable timber and a small corresponding decrease in the ASQ.

Alaska Native Veterans

The 1906 Native Allotment Act established a conveyance process under which individual Alaska Natives could select and receive title to up to a 160-acre parcel of vacant, unappropriated, and unreserved nonmineral federal land. Allotments may be made in national forests if founded on occupancy and use of the land prior to the establishment of the forest. In 1971, ANCSA repealed the Native Allotment Act and extinguished this right for Alaska Natives to claim allotments. The 1998 Alaska Native Veterans Allotment Act (Public Law 105-276) amended ANCSA to provide Alaska Native veterans another opportunity to apply for a Native allotment of up to 160 acres of land. This act was intended to compensate for the fact that Natives serving in Vietnam may not have been able to apply for their allotments prior to closure of the allotment program. This situation applies to approximately 2,800 Alaska Natives who served in the military during the Vietnam conflict. The 1998 legislation contained several provisions regarding federal land status, prior use of the claimed land and eligible military service dates that may be viewed by some as barriers to Native veterans obtaining their allotments.

Proposal and Current Status

The Alaska Native Veterans Land Allotment Equity Act, introduced most recently on August 2, 2007, as House Bill 3350, proposes to redress certain obstacles created by the 1998 Alaska Native Veterans Allotment Act. The Bill allows Alaska Natives who served in the military between August 5, 1964 and May 7, 1975 (the starting and ending dates of the entire Vietnam conflict) to each claim 160 acres of vacant federal land. Unlike the 1998 legislation, Alaska Natives filing under this program would not have to demonstrate substantially continuous use or occupancy of the subject land for at least five years that is potentially exclusive of others. Based on the estimated number of eligible Alaska Natives and the allotment size, this legislation could, if passed, result in the conveyance of up to approximately 448,000 acres of federal land in Alaska.

As of November 2006, the current Congress had not taken action on Senate Bill 2000 and passage is not likely to occur before this Congress adjourns. Future action would require reintroduction of the bill in the next Congress, which will convene in 2007.

Forest Management Implications

- The Forest Service is not aware of any information indicating how much Tongass land might be selected for Native allotments if this legislation is passed. It is unknown how many of the approximately 2,800 Alaska Native Vietnam veterans addressed by Senate Bill 2000 would actually select and claim land for allotments. In addition, many of those veterans no doubt live elsewhere in the state and would be inclined to select allotments in regions other than Southeast Alaska. Alaska population statistics indicate that Native Alaskans living in Southeast Alaska comprise about 12 percent of the total statewide Native population (Alaska Department of Labor and Workforce Development 2006). If Alaska Native Vietnam veterans are distributed geographically in the same proportion and selected allotment lands within their home region, the maximum area of Tongass lands potentially subject to selection under such an allotment program would appear to be in the range of 50,000 to 55,000 acres.

- It is not known what type of lands Alaska Native Vietnam veterans would be inclined to select under such an allotment program. Because the individual parcels would be small, many claimants might be inclined to select parcels that would be desirable for homesites or locations for hunting and fishing camps. Alternatively, some might select lands with income potential from timber resources. An allotment program such as proposed in House Bill 3350 could have implications similar to those described above for the proposed Unrecognized Southeast Alaska Native Communities Recognition and Compensation Act, including a reduction in the suitable timber land base and ASQ on the Tongass. To the extent such effects would occur, they would be considerably less extensive based on the respective acreages involves, and would be minor from a Forest-wide perspective. Because an Alaska Native Vietnam veteran allotment program could result in a relatively large number of small, scattered private inholdings around the Tongass, perhaps a more important forest management effect would be to complicate land ownership administration by the Forest Service in areas where allotments were selected.

Alaska State Forest

The Alaska Department of Natural Resources, Division of Forestry manages extensive areas of current State-owned lands that are forested. Those lands include two designated state forests, the Haines State Forest and the Tanana Valley State Forest, which together comprise over 2 million acres and about 2 percent of all State-owned land (Alaska Department of Natural Resources 2006). The two state forests are managed to provide a sustained yield of many resources, primarily timber, while allowing other beneficial uses of the public land and resources. The state forests also provide fish and wildlife habitat, clean water, opportunities for recreation and tourism, and minerals. The Haines State Forest contains approximately 286,000 acres of land north of Haines in Southeast Alaska, generally in the Chilkat River watershed and surrounding the Chilkat Bald Eagle Preserve.

Various State of Alaska officials or interests have at times advocated for the establishment of an additional Alaska State Forest, to be managed to provide income for state government programs. A new state forest conceivably could be created through state legislation creating a new management unit on existing state-owned lands, or through federal legislation establishing a new conveyance process to transfer additional federal lands to state ownership for management as a state forest. If such a proposal were ever implemented through federal legislation, it would presumably include conveyance of existing Tongass and/or Chugach National Forest lands with timber production capability to the State of Alaska.

Proposal and Current Status

- The Forest Service is aware of no formal, public proposal to create an Alaska State Forest. To date, no federal legislation to implement such a proposal has been introduced in Congress, and State documents do not indicate the size and location envisioned for a state forest. The Forest Service is aware of public discussion of one concept for such a management unit, which involved a 2-million-acre area on or near Prince of Wales Island. Creation of a state forest in such a location would require transfer of extensive areas of current Tongass NFS lands to the state. Because there has been no formal proposal or action on a proposal, establishment of an Alaska State Forest in Southeast Alaska should be considered a speculative possibility.

Forest Management Implications

With respect to the types of potential changes, the implications for future management of the Tongass from establishment of a new, large-scale state forest would be similar to those described for the proposed University of Alaska Lands bill, although the affected area would likely be much larger. Consistent with Alaska State Senate Bill 149 that was signed into law on August 8, 2003; a new Alaska state forest would presumably be managed for timber resources while allowing for other beneficial uses of public land and resources. Therefore, future management and human uses of Tongass lands conveyed to the state under such a proposal might be managed more intensively for timber production than under current management and uses. The state would likely be inclined to select productive timber lands for inclusion in a new state forest, and would emphasize timber production as a primary uses of those lands. Based on current Alaska state forest management policies, the new state forest lands would also presumably continue to support other resource values such as water, fish and wildlife habitat and recreation, but to a lesser extent than for timber. To the extent that future state forest management paralleled current Tongass management under Forest Service administration, the available multiple resource values from those lands could change significantly under such a proposal. The prospects for such a change cannot be predicted at this time.

Potential Land Exchanges

Administrative land exchanges, in which NFS lands can be conveyed to another entity in exchange for lands of equal value, are another form of land ownership adjustment. Complex land exchanges are sometimes authorized by Congress through special legislation. The Forest Service has completed several land exchanges involving relatively small acreages of Tongass NFS lands. These adjustments are summarized in Chapter 3 of the EIS and include exchanges involving the Kake Tribal Corporation, the Alaska Pulp Corporation and the Kennecott Greens Creek Mining Company, Inc.

There have also been discussions regarding potential future land exchanges between the Forest Service and a number of Native Corporations and other entities that could influence land ownership on the Tongass. As before, for each potential exchange the text includes background information, a description of the conveyance proposal, and a discussion of the potential implications for land ownership and management of the Tongass. In one case, a land adjustment package proposed by the Sealaska Corporation, the Forest Service has received a specific proposal identifying the NFS lands proposed for inclusion in the land adjustment. For that case, the level of available information allows a more specific discussion of the types of lands that would be affected and how their conveyance or exchange might influence forest management.

Shee Atika Cube Cove Proposed Land Exchange

Shee Atika, Incorporated, is an Alaska Native Village Corporation established under ANSCA, representing the historical Native interests of Sitka, Alaska. Through ANSCA, Shee Atika received approximately 23,040 acres in the vicinity of Cube Cove on Admiralty Island. Admiralty Island, for the most part, represents the Admiralty National Monument and surrounds Shee Atika in-holdings. Over the period of enactment of ANSCA to the mid 1990's, Shee Atika harvested the vast majority of the old-growth forests on these lands and at present has no active management taking place. An extensive road system is in place beginning at a log transfer facility in Cube Cove and extending throughout the limits of their lands primarily in the lower reaches of the valleys. The conditions of the roads are unknown.

Proposal and Current Status

Shee Atika formally approached the Forest Service on September 20, 2007, after the Draft EIS was published, proposing a mutual interest agreement to explore the possible exchange of certain NFS lands for Shee Atika surface estate located at Cube Cove. In exchange, Shee Atika is interested in acquiring lands (both surface and subsurface estate) within the Tongass National Forest located on West and North Yakobi Island and on western Chichagof Island. A map depicting the lands they wish to acquire in whole or in part was presented as a general description.

Sealaska, the Alaska Native regional corporation, owns the subsurface estate under the Shee Atika inholdings at Cube Cove. Shee Atika has informed Sealaska of its intent to enter into discussions with the Forest Service. At this time, Shee Atika and the Forest Service have met once to discuss the land exchange concept in general terms only and neither party has made any binding commitments on proceeding further.

Shee Atika's goal for the proposal is to maintain a viable resource and land base for its shareholders. Lands Shee Atika has identified an interest in acquiring are in the Semi-Remote Recreation LUD with a small portion of congressionally designated LUD II within the boundaries.

Table C-1 (at the end of this appendix) has been updated to reflect the acreages included in the proposed land exchange. It indicates the acreage of the NFS lands that could be transferred to Shee Atika via the land exchange components of the proposal, and the acreages of the current Shee Atika lands that could be conveyed to the U.S. This table displays the acreages of the entire pool of parcels. The actual acreage exchanged would likely vary depending on the final lands pool identified, values determined through appraisal, and site-pecific issues raised by the public.

Forest Management Implications

The Forest Service has conducted a cursory evaluation of how the Shee Atika proposal, if implemented as presented, would affect the Tongass Land Management Plan. The evaluation was based on the assumed existing character and resource condition of the respective lands that would be conveyed from Shee Atika to the U.S. and vice versa. It focused on the potential effects on the ability to implement the Old-Growth Conservation Strategy and on necessary changes to the Allowable Sale Quantity for the Tongass. The evaluation also considered subsequent effects on sawmills, karst and cave resources, heritage resources, subsistence hunting and fishing, and public access.

From the limited review, the preliminary determination by the Forest Service is that implementation of the proposal would not require a revision but may require an amendment to the Forest Plan, based on the magnitude of the changes in land base designations. The evaluation assumed that, if all lands in the proposal were transferred, there would be no significant loss of old-growth reserves, no effect on sawmills, no effect on known karst and cave resources, potential effect on heritage resources, no significant effect on subsistence hunting and fishing, and limited effect on public access. This analysis is premised on the limited knowledge given the nature of the proposal and the limited understanding by the Forest Service of what Shee Atika interests are in the lands acquired.

Mental Health Trust Land Exchange

The Trust Land Office (State of Alaska, Department of Natural Resources) manages about one million acres for the Alaska Mental Health Trust land on behalf of the Alaska Mental Health Trust Authority. Resource categories managed by the Trust Land Office include coal, gas, materials, minerals, oil, real estate and timber. The Trust Land Office generates revenues from the Trust land through a variety of methods including sales, long-term leases and short-term land use licenses. Revenues generated from Trust land management are used by the Trust Authority to improve the lives and circumstances of Trust beneficiaries throughout the State of Alaska.

Proposal and Current Status

The Trust Land Office (State of Alaska, Department of Natural Resources) representing the Mental Health Trust Authority, presented a conceptual proposal to the Forest Service on November 20, 2007, after the Draft EIS was published. This proposal offers to exchange approximately 20,000 acres of lands managed by the Trust Land Office in Southeast Alaska for an equal value of Tongass National Forest lands on Prince of Wales Island. The parcels the Trust has offered for exchange are adjacent to or in the immediate vicinities of Skagway, Juneau, Petersburg, Wrangell, Sitka, and Ketchikan. The lands being offered for exchange for the most part are adjacent to NFS lands and, in many cases, form the backdrops, in whole or in part, to the communities identified. Maps depicting these parcels have been provided to the Forest Service for further review and consideration. The lands the Trust has interest in acquiring from the Forest Service are located on Prince of Wales Island and have generally been identified as lands containing the majority of their timber base in young-growth stands. These lands are identified in concept on a map showing areas around Coffman Cove, Staney Creek, Thorne Bay North, Kasaan, Hollis, Twelve Mile Arm, and Polk Inlet.

The Trust has identified two interests as the primary uses of the lands considered for acquisition. These interests include sustained harvest of young-growth timber stands and small parcel developments. The Trust has identified an interest in discussing the possibilities of making all or a portion of the timber volume harvested available to Southeast Alaska processors; allowing access to continue subsistence harvesting by rural residents; and either maintaining or avoiding the Conservation Strategy which the Tongass Forest Plan uses as a foundation for wildlife habitat management.

This proposal, while new, was presented to the Tongass Futures Roundtable for information on December 3, 2007. The Forest Service at this point is considering the concepts of the proposal and has made no agreements on whether or not it will pursue this exchange further.

Forest Management Implications

Given that only preliminary discussions of the proposal have taken place and specific details of the exchange are not available, only general considerations can be made regarding effects. The Forest Service has conducted a cursory evaluation of how the Trust proposal, if implemented as presented, would affect the Tongass Land Management Plan. The evaluation was based on the assumed existing character and resource condition of the respective lands that would be conveyed from the Trust to the U.S. and vice versa. It focused on the potential impacts on the ability to implement the Old-Growth Conservation Strategy and on necessary changes to the Allowable Sale Quantity for the Tongass. The evaluation also considered subsequent effects on sawmills, karst and cave resources, heritage resources, subsistence hunting and fishing, and public access.

From the limited review, the Forest Service preliminary determination is that implementation of the proposal would not require a revision but may require an amendment to the Forest Plan, based on the magnitude of the changes in land base designations. The evaluation indicated that, if all lands in the proposal were transferred, there may not be a significant loss of old-growth reserves; there may not be an effect on sawmills; a potential exists to affect karst and cave resources; a potential effect could occur to heritage resources; there may be an effect on subsistence hunting and fishing; and there is potential for a limited effect on public access. This evaluation is premised on the limited knowledge given the nature of the proposal and the limited understanding by the Forest Service of what the Trust's interests are in the lands acquired.

Table C-1 (at the end of this appendix) has been updated to reflect the acreages included in the proposed land exchange. It indicates the acreage of the NFS lands that could be transferred to the Trust via the land exchange components of the proposal, and the acreages of the current Trust lands offered for consideration that could be conveyed to the U.S. This table displays the acreages of the entire pool of parcels. The actual acreage exchanged would likely vary depending on final lands identified, values determined through appraisal, and site-specific issues raised by the public.

Sealaska Proposed Comprehensive Tongass-wide Land Exchange

The potential exchange that has received the most attention and discussion is known as the Sealaska Proposed Comprehensive Tongass-wide Land Exchange (USDA Forest Service 2005b). This land adjustment package was proposed by the Sealaska Corporation, the Native regional corporation for Southeast Alaska. The package includes two components; one involves an exchange of existing lands owned by Sealaska for existing NFS lands, and the other involves adjustments to Sealaska's land conveyance rights under ANCSA.

ANCSA established processes for transfer of federal land to Alaska Native village corporations and regional corporations, and to Native individuals. ANCSA included two separate provisions addressing land conveyances to Native regional corporations. Under Section 12(c) of ANCSA, 11 regional corporations were to share in the selection of 16 million acres. Section 14(h)(8) set aside a pool of 2 million acres to be transferred to the Native regional corporations in the State after certain other conveyances are completed. After the specified conveyances have been implemented, the remaining land in the pool will be divided among the regional corporations based on population, with approximately 22 percent of the balance going to Sealaska.

Under the applicable ANCSA provisions Sealaska selected approximately 463,000 acres for potential conveyance to the corporation. To date, the U.S. has conveyed approximately 293,000 acres to Sealaska. Sealaska has selected about 171,000 additional acres, which are distributed among nine withdrawal areas defined by ANCSA for Native selections. Based on current information from the Bureau of Land Management, approximately 64,000 of those acres will eventually be conveyed to Sealaska to complete the corporation's land entitlement under ANCSA. (Native corporations were allowed and encouraged to select lands in excess of their entitlements, and the final amount of the Sealaska entitlement has not yet been determined.) Sealaska has approximately 20,000 acres of unconveyed ANCSA entitlement under Section 14(h)(8), in addition to approximately 44,000 acres of 14(h)(8) lands resulting from the 2004 Alaska Land Transfer Acceleration Act, P.L. 108-452.

Proposal and Current Status

In August 2002 Sealaska Corporation submitted a proposal to the Forest Service to exchange approximately 100,000 acres of NFS lands for Sealaska Corporation lands and selection rights under ANCSA. As noted above, Sealaska has approximately 20,000 acres of remaining entitlement under Section 14(h)(8), plus approximately 44,000 acres from P.L. 108-452. The Tongass-wide exchange proposed by Sealaska involves lands throughout Southeast Alaska.

The goals of the proposed exchange are to consolidate NFS lands and Sealaska lands and to finalize Sealaska's remaining land selection rights under ANCSA. Approximately 171,000 acres of the Tongass are encumbered by Sealaska land selections. Resolution of Sealaska's remaining ANCSA land entitlement would remove these selection rights in existing ANCSA withdrawal areas as part of the exchange.

The proposed land exchange package would enable Sealaska to acquire other lands outside of the ANCSA withdrawal areas, in addition to the selected Native heritage 14(h)(1) parcels. This is not authorized under ANCSA except through a land exchange. Land exchanges are discretionary, voluntary real estate transactions between Federal and non-Federal parties. At present there is no binding land exchange agreement signed by the Forest Service and Sealaska that would enable Sealaska to receive lands outside of the withdrawal areas. In the most recent version of its proposal, Sealaska defined what it termed an "entitlement pool" of approximately 123,000 acres, all of which are located outside of the ANCSA withdrawal areas. Sealaska consciously defined the entitlement pool to include substantially more acres than its maximum entitlement amount, to allow flexibility in resolving the proposal. Under the proposal, lands from this entitlement pool of current NFS lands would be conveyed to Sealaska as a substitute for its current entitlement rights. The affected acreage occurs in approximately eight blocks located on Prince of Wales Island (northern, central and southern portions) and on Kosciusko, Tuxekan and Heceta Islands. In addition, Sealaska would transfer to the U.S. lands from a pool of approximately 68,000 acres of existing corporation lands distributed among five withdrawal areas in exchange for lands from a pool of 74,000 acres of current NFS lands. Those lands occur in five blocks located on Kuiu, Kosciusko, Heceta and central Prince of Wales Islands and on the Cleveland Peninsula, and are generally adjacent to areas Sealaska would receive from the entitlement pool. Sealaska would also relinquish claim to the 171,000 acres of lands it has selected within the ANCSA withdrawal areas. Without an appraisal, it is difficult to determine how many acres would be transferred or exchanged under this proposal. Federal law requires that lands or interests to be exchanged must generally be of equal value, based on market value as determined through an appraisal. Both Section 22(f) of ANCSA and Section 1302(h) of ANILCA provide that exchanges shall be based on equal value and contain provisions for cash payments to equalize land values. If the parties agree to an exchange and the Secretary of Agriculture determines it is in the public interest, exchanges may be made for other than equal value.

The Forest Service completed a draft feasibility report on a similar version of this proposal in 2003. After lengthy discussions and several modifications to the proposal, in 2005 the Forest Supervisor informed Sealaska that he was not willing to move forward with the exchange because of a lack of substantial agreement on the parcels to be exchanged, concerns over a variety of resource issues, and the need for a revision to the Forest Plan to accommodate the exchange due to the magnitude of the resulting changes in LUD designations. The response also indicated that the proposal lacked support from local communities and could result in a further decline in the current timber industry dependent on the Tongass for its supply.

There has been no further formal action on the proposed exchange since 2005. The proposed Alaska Land Transfer Acceleration Act of 2003 (Senate Bill 1466) included provisions to implement Sealaska's proposed land exchange, but Congress did not pass this bill. Congress subsequently approved the Alaska Land Transfer Acceleration Act (PL 108-452) in 2004, without the Sealaska exchange provisions. New legislation to authorize the proposed exchange has not been introduced to Congress, although such legislation remains a possibility. Sealaska has been working internally on refinements to the proposed exchange and has shared a variety of preliminary maps with the Forest Service, but to date has not submitted a revised formal exchange proposal for Forest Service review.

Forest Management Implications

The Forest Service conducted a preliminary evaluation of how the Sealaska proposal, if implemented, would affect the Tongass Land Management Plan. The analysis was based on the existing character and resource condition of the respective lands that would be conveyed from Sealaska to the U.S. and vice versa. It focused on the potential impacts on the ability to implement the Old-Growth Conservation Strategy and on necessary changes to the allowable sale quantity for the Tongass. The analysis also considered subsequent effects on local sawmills, karst and cave resources, heritage resources, subsistence hunting and fishing, and public access.

Table C-1 (at the end of this appendix) summarizes the acreages included in the most recent version of the proposed land adjustment and their general location. It indicates the acreage of the entire pool of NFS lands that could be transferred to Sealaska via the entitlement and conveyance (exchange) components of the proposal, and the acreages of the pool of current Sealaska lands that could be conveyed to the U.S. The actual acreage conveyed or exchanged would likely be much less than the listed acres.

From the review the Forest Service determined that implementation of the Sealaska proposal would require a Forest Plan Revision, based on the magnitude of the changes in land use designations. Our analysis showed that, if all lands in the pools were to be transferred, there would be a significant loss of old-growth reserves on the Tongass. There would also be a significant reduction in the Tongass allowable sale quantity (ASQ). In order to make up for the loss of old growth reserve acres, some areas currently in development LUDs would likely be precluded from timber production. This would further reduce the ASQ. In addition, the lands to be exchanged to the U.S. generally do not have existing road systems, and costs for developing roads on these lands would likely constrain the ability to supply timber economically. The combined impacts on the availability of timber from the Tongass could have a significant adverse effect on the supply of timber to mills on Prince of Wales Island and surrounding areas.

In addition, the Sealaska proposal presented to the Forest Service does not provide any assurances that important resources on the lands to be exchanged to Sealaska would be protected to the same degree as under national forest management. Specifically, the proposal does not ensure that the conditions and requirements of the National Historic Preservation Act would be met to protect heritage resources, nor are there assurances that karst and cave resources would be protected. The lands proposed for conveyance to Sealaska also include at least one Research Natural Area and a Special Interest Area. Finally, there are no provisions in the Sealaska proposal that would allow for continued access to lands for subsistence and community recreation purposes. Consequently, resource values to the public from the affected lands could be lost, and subsistence and recreation uses currently occurring on those lands could be shifted to other areas on the Tongass.

Several of the Sealaska parcels that would potentially be exchanged to the United States have high recreation and scenic values and are along established highways or cruiseship and ferry travel routes. Several parcels are important to local communities for dispersed recreation and subsistence activities. Two parcels are noteworthy for heritage resources including one site that is eligible for listing on the National Register of Historic Places. Other of the parcels are known to have well developed karst and/or karst that has been determined to be of high vulnerability. Several of the Sealaska parcels have been harvested. Generally, the unharvested parcels are adjacent to Tongass National Forest lands that have been allocated to non-development LUDS. If acquired by the United States, these parcels might also be allocated to non-development LUDs and may not contribute to the Tongass allowable sale quantity.

Cape Fox Land Entitlement Adjustment

The Cape Fox Corporation is the Native corporation established under ANCSA for the Village of Saxman, which is located near Ketchikan. While Cape Fox was granted entitlement to 23,040 acres within a defined withdrawal area, as were all Native village corporations in Southeast Alaska, its ability to select lands was constrained by the proximity to Ketchikan (Bureau of Land Management 2003). While other village corporations were prevented from making selections within 2 miles of the boundary of home-rule cities, Cape Fox was not allowed to select lands within 6 miles of Ketchikan. In addition, all villages were required to take title to all available land within the core township surrounding the village and were only allowed to select lands within the respective withdrawal areas defined by ANCSA. As a result of these multiple ANCSA restrictions, the only land within the core township available for conveyance to Cape Fox was a 160-acre parcel that Cape Fox did not want, but that the United States was required to transfer to Cape Fox.

For some time there has been interest in legislative action to adjust the selections and conveyances available to Cape Fox. Under ANCSA, village corporations receive only the surface estate for the lands conveyed to them, while the subsurface estate to those lands was transferred to the respective Native regional corporation, which is Sealaska Corporation in the case of Cape Fox. Therefore, to avoid creation of a split estate condition between NFS surface lands and Sealaska subsurface rights, adjustment of Cape Fox selections and conveyances also requires adjustment of Sealaska selections and conveyances.

Sealaska Corporation, Shee Atika, Inc. (the urban Native corporation for Sitka), and the Forest Service have conferred regarding a possible land exchange and purchase since November of 1999, when Shee Atika expressed interest in selling its surface estate to approximately 23,100 acres at Cube Cove, within the Admiralty Island National Monument and Kootznoowoo Wilderness. In April 2000 Sealaska proposed exchanging their subsurface estate to these Cube Cove lands, or other Sealaska subsurface lands or land interests, in exchange for the surface and subsurface of NFS lands of equal value at the Kensington and Jualin Mines near Berners Bay, north of Juneau.

By the fall of 2001 it became clear that the non-federal lands at Cube Cove were no longer offered as part of the exchange proposal, apparently because their preliminary appraisal figures for fair market land values did not meet Shee Atika's expectations. In March 2002 Sealaska revised its proposal to offer approximately 5,200 acres of Sealaska subsurface lands and land interests in exchange for NFS surface and subsurface lands at the Kensington and Jualin Mines. This proposal was captured in a Congressional bill, S. 2222, along with other proposals by Cape Fox Corporation. S. 2222 was passed by the Senate in the 107th Congress, but not by the House.

Proposal and Current Status

Several versions of a Cape Fox Land Entitlement Adjustment bill were introduced to both houses of the 107th Congress in 2002, but were not passed. On April 30, 2003, Congressman Young introduced H.R. 1899, the Cape Fox Land Entitlement Adjustment Act of 2003, in the 108th Congress. On June 26, 2003, Senator Murkowski introduced a similar bill in the Senate, as S. 1354.

H.R. 1899 and S. 1354 provided for an additional 99 acres of ANCSA selection area at Clover Passage (on Revillagigedo Island), for selection by Cape Fox and Sealaska Corporations. The corporations would select these 99 acres from within their existing ANCSA entitlements. These bills also require the Forest Service to offer a land exchange and, if accepted by Cape Fox, to complete a land exchange with the Cape Fox and Sealaska Corporations. Through this land exchange:

1. Cape Fox Corporation would receive the surface and subsurface estates to 2,663.9 acres of NFS lands at the Jualin Mine.
2. Sealaska Corporation would receive the surface and subsurface of NFS lands to equalize values of Sealaska subsurface lands and land interests they convey to the United States. Sealaska Corporation would select NFS lands of equal value from within a 9,329-acre pool of NFS lands at the Kensington Mine.
3. The Forest Service would receive lands and land interests of equal value from within: (a) a pool of approximately 2,900 acres and a public trail easement, offered by Cape Fox (surface) and Sealaska (subsurface) on Revillagigedo Island; (b) 2,506 acres of Sealaska split estate subsurface, located at Upper Harris River and Kitkun Bay (Group 2 Lands); and (c) approximately 2,698 acres of Sealaska subsurface land interests at Kitkun Bay and Dora Lake West, which remain as Sealaska entitlement (Group 3 Lands). Lands in (b) and (c) above are located on Prince of Wales Island and are left over from the Haida Land Exchange Acts and the

Sealaska/Forest Service Split Estate Exchange Agreement of 1991. Cape Fox will choose the lands to be conveyed to the United States from the approximately 2,900-acre pool in (a) above.

Senator Murkowski held a legislative field hearing in Anchorage August 6, 2003, to provide an opportunity for public input and comments on the proposal. She also held a public town meeting in Juneau on September 20, 2003, and an additional legislative hearing March 10, 2004, in Washington, D.C. The Administration supported the legislation, with some minor changes to clarify valuation standards, extend required time frames, and provide for environmental survey and remediation standards. The 108th Congress did not pass the legislation, however.

On April 7, 2006 Senator Murkowski introduced S. 2615, "to provide equitable treatment for the people of the Village Corporation established for the Native Village of Saxman, Alaska, and for other purposes," in the 109th Congress. This bill waived the requirement under ANCSA Section 16(b) that the U.S. convey and Cape Fox receive the 160-acre parcel discussed above, and provided for conveyance of the surface estate for the 99 acres at Clover Passage to Cape Fox (with the subsurface estate going to Sealaska). This bill did not address the other land conveyances proposed in H.R. 1899/S. 1354 (see items 1-3 above), although it did state that conveyance of the 99 acres identified in Section 3(a) of the bill would be considered to fulfill the entitlement of Cape Fox under ANCSA Section 16(b). This bill was not passed by the 109th Congress. The bill was mostly recently introduced on January 8, 2007 as Senate Bill 203 in the 110th Congress.

Forest Management Implications

The Cape Fox land entitlement adjustment proposal introduced in 2003 is a relatively complex package of selections, conveyances and exchange actions that could affect a number of NFS parcels and have a variety of effects on Tongass management. Under that proposal, Cape Fox and Sealaska would convey to the Forest Service the surface and subsurface rights to approximately 2,900 acres on Revialgigedo Island, and Sealaska would convey to the Forest Service the subsurface rights to approximately 5,200 acres on Prince of Wales Island. Surface management of those lands on Revillagigedo Island would likely remain unchanged, while the Forest Service would need to administer a split-estate condition for the lands on Prince of Wales Island. In return, Cape Fox would receive surface and subsurface rights to nearly 2,700 acres of NFS lands and Sealaska would select up to 9,300 acres of NFS lands with a value equal to the 5,200 acres of subsurface rights. The Native corporations would presumably receive lands with high mineral values located near existing mineral resources (the Jualin and Kensington mines), which could change the jurisdiction over future mining activities. While these conveyances could ultimately be of note from a financial perspective, they would affect relatively small areas and probably would not change the likelihood of expanded future mineral development in the subject locations.

Senate Bill 2615, introduced in 2006, and the current version, Senate Bill 203 would have a minor effect upon Tongass management. The 99-acre parcel to be conveyed to Cape Fox Corporation is adjacent to lands owned by Cape Fox, other private owners, and the State of Alaska. Currently this parcel is managed as scenic viewshed, a moderate development LUD. This bill would also complete Cape Fox Corporation's ANCSA entitlement resulting in the removal of selection encumbrances on approximately 800 acres of NFS lands.

Summary Discussion

Table C-1 summarizes the key parameters of the proposed land conveyance and exchange programs discussed in this appendix. For each proposal, the table indicates the maximum acreage of Tongass lands that could be transferred to other ownership, acreage that could be added to the Tongass land base, the general location of the action (if identified in the proposal), whether the proposal is intended to complete an existing entitlement, and the type of land involved (if known or inferred).

Table C-1
Summary of Potential Land Adjustments

Conveyance or Exchange Proposal	Max. acres from NFS	Max. Acres to NFS	Likely Tongass Location	Entitlement Completion?	Type of Land
University of Alaska Lands, Senate Bill 293	250,000	0	Unknown	No	*Second-growth cut since 1952*
Unrecognized SE AK Native Communities, Senate Bill 1306	115,200	0	Near Haines, Ketchikan, Petersburg, Tenakee Springs, Wrangell	No	*Development LUDs?*
Alaska Native Veterans Land Allotment Equity Act, Senate Bill 2000	55,000 est.	0	Unknown	No	*Homesites, recreation lands?*
Alaska State Forest proposal	2,000,000	0	Prince of Wales island	No	*Timber Production*
Southeast Alaska Native Land Entitlement Finalization Act* or Sealaska Proposed Comprehensive Tongass-wide Land Exchange	203,000	68,000	Widely distributed	Yes, outside of ANCSA withdrawal areas. Also exchange other lands	*Varied*
Shee Atika	±23,000	±23,000	West and North Yakobi & Northwest Chichagof	No	*Semi-Remote Recreation*
Mental Health Trust	±20,000	±20,000	Prince of Wales Island	No	*Timber Production (young growth)*
Cape Fox Entitlement Adjustment, Senate Bill 2615	99	0	North of Ketchikan	Yes, outside of ANCSA withdrawal area	*Moderate Development LUD*
Total	2,666,000	111,000			

*Assumes economic development lands similar to what depicted in DEIS. An additional 3,600 acres are added for sacred, cultural, traditional, or historic significance, as well as 5,000 acres for Native enterprise sites.

When considered as individual actions, several of the land adjustment proposals discussed above appear to be relatively minor in scope and potential effect, and/or the implications of the proposal for Tongass management are difficult to determine due to lack of specificity in the proposal. Conversely, some of the proposals could result in substantial changes to the NFS land base and prompt corresponding adjustments in Tongass management.

The Forest Service believes that it is unlikely that all of the identified conveyance and exchange proposals would be enacted and/or implemented. Because some of the proposals involve larger acreages and it is conceivable that multiple proposals could be adopted; however, it is appropriate to consider the range of implications for management of the Forest. Pertinent observations based on considering the conveyance and exchange proposals collectively include the following:

- These proposals generally target, or would be likely to focus interest on, Tongass lands that are currently managed for resource development activities. Conveyance of these lands out of federal ownership would decrease the acreage available for development activities on the Tongass.
- If all of the proposals were enacted and implemented, it could conceivably result in transfer/exchange/conveyance of over 2 million acres from the Tongass, representing approximately 15 percent of the current NFS land base.

- Conveyance of large blocks of land under several of these proposals would consolidate certain other ownerships while likely further fragmenting the federal land ownership pattern within the Tongass.
- While new owners of former Tongass National Forest lands would presumably pursue resource development objectives on much or most of the affected acreage, it is unlikely that all new owners would continue the currently applicable protection measures for cultural and ecological resources, or continue to supply timber to local mills at current rates.
- It is unlikely that all new owners would allow public access to the affected lands for subsistence, recreation, and similar public uses, resulting in a reduction in the set of opportunities currently available for these purposes.

As it has in the past, the Forest Service will evaluate any new or modified proposals for administrative land exchanges for their consistency with applicable NFS planning and management direction. The Forest Service will follow Congressional direction in implementing future land adjustments that might be enacted by Congress, and will modify Tongass National Forest planning and management as needed in response to such changes.

APPENDIX D
OLD-GROWTH HABITAT CONSERVATION STRATEGY, WILDLIFE STANDARDS AND GUIDELINES, AND WILDLIFE VIABILITY

Appendix D

Old-Growth Habitat Conservation Strategy, Wildlife Standards and Guidelines, and Wildlife Viability

CONTENTS

LIST OF TABLES

1. INTRODUCTION

This appendix provides a description of the background, rationale, and assumptions, for the changes to the Tongass old-growth habitat conservation strategy, proposed by the alternatives evaluated in the 2008 Forest Plan amendment Final Environmental Impact Statement (FEIS). In addition, it describes the assumptions and rationale for application of the wildlife viability ratings to the alternatives. This appendix brings forward and updates information contained in Appendix N to the 1997 FEIS.

Chapter 2 addresses the old-growth habitat conservation strategy. It includes a summary of the historical background, a description of the 1997 strategy including modifications to the strategy between 1997 and 2007, and an overview of the new science that is relevant to the strategy. Sections 2.1 and 2.2 begin by presenting the historical background of the strategy and describe the strategy, as it was proposed in 1997. These two sections are largely summarized from Appendix N to the 1997 FEIS. Section 2.3 summarizes the modifications to the strategy that have occurred through Forest Plan amendments and land adjustments from 1997 through 2007 and Section 2.4 summarizes new relevant science that has been developed since 1997.

Modifications to the strategy proposed by the 2008 FEIS alternatives are described in Section 2.5. In this FEIS, Alternative 5 (No Action) incorporates the 1997 strategy, as modified between 1997 and 2007, while the six action alternatives propose modifications. Alternatives 1, 2, 3, and 6 propose the same refined network of Old-Growth Habitat Land Use Designations (LUDs) and incorporate the same changes to the wildlife standards and guidelines, but differ in the amount and distribution of some of the other non-development LUDs that also comprise the reserve system. Section 2.5 describes the background, rationale, and modifications to the strategy proposed by these four alternatives. These modifications include changes to the old-growth reserve (OGR) network, changes in other non-development LUDs, and changes to species-specific standards and guidelines. Alternatives 4 and 7 propose more extensive changes to the conservation strategy and standards and guidelines. Section 2.5 also summarizes the rationale and changes to the strategy incorporated in these alternatives. The changes for all of the alternatives are compared to Alternative 5 (the 1997, as amended, Forest Plan).

In 1995/1996 and 1997 a series of expert risk assessment panels were conducted to evaluate the various alternatives used in the 1997 FEIS and predecessor documents. The purpose of the panels was to evaluate various alternatives for the likelihood of maintaining sufficient, well distributed habitat to maintain viable populations of old-growth associated wildlife species over a 100-year horizon. These panel assessments, along with new information and an alternate method, were used as a tool to evaluate wildlife viability for the 2008 FEIS alternatives. Chapter 3 describes the panel assessments, summarizes results of the panel assessments that are relevant to the 2008 alternatives, discusses new relevant science, and then summarizes the application of the panel assessments to the 2008 alternatives, including rationale and assumptions. Section 3.1 presents historical background for the Tongass wildlife risk assessment panels and ratings, Section 3.2 describes the panel assessment process, and Section 3.3 summarizes the 1995/1996 and 1997 panel assessment results. These first three sections of Chapter 3 are largely summarized from the risk assessment panel reports and Appendix N to the 1997 FEIS. Section 3.4 summarizes new science related to wildlife viability assessment that has been developed since 1997. The application of the 1995/1996 and 1997 panel assessments to the 2008 FEIS alternatives is described in Section 3.5. Finally, Section 3.6 presents an alternative approach to assessing viability.

Chapter 4 presents a summary of the major conclusions that are relevant to the 2008 Forest Plan amendment and the alternatives evaluated in the EIS. Finally, Chapter 5 lists the references cited.

2. OLD-GROWTH HABITAT CONSERVATION STRATEGY

2.1. Historical Background of the Conservation Strategy

2.1.1. Overview

An integrated science-based old-growth forest habitat conservation strategy was developed and adopted during the 1997 Forest Plan Revision process. The old-growth strategy has two basic components. The first is a forest-wide reserve network that protects the integrity of the old-growth forest by retaining blocks of intact, largely undisturbed habitat. The OGRs include a system of large, medium, and small Habitat Conservation Areas (HCAs) allocated to the Old-Growth Habitat LUD, and full protection of all islands less than 1,000 acres in size. The reserve network also includes all other non-development LUDs. These include Wilderness, National Monument, Legislated LUD II, Wild River, Remote and Semi-Remote Recreation, Research Natural Area, Municipal Watershed, and all other LUDs that essentially maintain the integrity of the old-growth ecosystem. The second component of the old-growth habitat conservation strategy is management of the matrix, e.g., the lands with LUD allocations where commercial timber harvest may occur. Within the matrix, components of the old-growth ecosystem are maintained by standards and guidelines to protect important areas and provide old-growth forest habitat connectivity. The analysis presented in this section describes the rationale for the strategy and its specific components.

Development of the old-growth strategy relied on several key scientific documents that provided the basic foundation for addressing wildlife viability. These included the Interagency Viable Population Committee (VPOP) Conservation Strategy (Suring et al. 1993), the Pacific Northwest Research Station Peer Review of the VPOP Strategy (Kiester and Echkardt 1994), and the VPOP Response to the Pacific Northwest Research Station Peer Review (Suring et al. 1994). In addition, the Alexander Archipelago Wolf (Person et al. 1996) and Northern Goshawk (Iverson et al. 1996) conservation assessments provided the basis for design of some components of the strategy as well as a basis for examining whether the old-growth strategy would sustain viable and well-distributed populations of these two species. This section provides a discussion of the major features, findings, and recommendations of each of the three conservation planning (VPOP-related) documents, a consideration of features and recommendations in each document, and the integration of features in the deliberative process to arrive at an overall strategy to address viability of old-growth associated species. As such, it represents a summary of much of the information presented in Appendix N to the 1997 Forest Plan.

2.1.2. Habitat Reserve Approach

There is a substantial science base for an old-growth habitat reserve approach for addressing wildlife viability. Habitat reserves have often been the focal point of conservation strategies since the pioneering work of MacArthur and Wilson (1967) on the theory of island biogeography: that the equilibrium number of species on an island generally depends on island size, and island distance from (usually mainland) source populations. Reserves are viewed as islands of undisturbed or natural habitat within a landscape of management-altered or dissimilar habitat. Reserves attempt to protect the integrity of an isolated landscape. From this theory, five general concepts of reserve design have evolved in conservation planning (Thomas et al. 1990):

- ♦ Well-distributed species are less prone to extinction than species confined to small portions of their range;
- ♦ Larger reserves supporting many pairs of individuals are superior to smaller reserves supporting only a few pairs;
- ♦ Reserves that are close together are better than ones far apart;
- ♦ Reserves should have the least amount of induced fragmentation possible; and

- Reserves should be connected, either through specific corridors (such as beach fringe or riparian areas) or through maintaining habitat characteristics similar to the reserves on the lands between them.

A reserve-based strategy relies on blocks of intact, largely undisturbed habitats (such as old-growth forest) of the appropriate size, spacing, and composition to meet a desired design that will maintain viable, well-distributed populations of one or more species. The HCA network used for the conservation of spotted owl habitat in the Pacific Northwest is a classic example (Thomas et al. 1990).

Potential drawbacks of a reserve approach are the failure to consider natural disturbance processes-the dynamic nature of ecosystems, and not being able to preserve landscape integrity (Irwin and Wigley 1992). These can be overcome by combining a reserve system with some type of matrix management approach (Thomas et al. 1990, Franklin 1993). As a complement to reserves, matrix management can serve at least three important roles: 1) providing habitat at smaller spatial scales, 2) increasing the effectiveness of the reserves, and 3) improving landscape connectivity.

2.1.3. VPOP Strategy

The Interagency Viable Population Committee (VPOP) performed pioneering work in designing a landscape conservation strategy to address wildlife viability. Their strategy and extensive supporting analysis are contained in *A Proposed Strategy for Maintaining Well-Distributed, Viable Populations of Wildlife Associated With Old-Growth Forests in Southeast Alaska* (Suring et al. 1993). VPOP was commissioned by the Tongass Land Management Plan (Forest Plan) Revision Team to provide recommendations for sustaining habitat to help ensure the maintenance of well-distributed viable populations of all old-growth associated wildlife species across the Tongass. VPOP systematically screened all wildlife species and identified those old-growth associated species they considered to be most sensitive to habitat loss and fragmentation of the old-growth ecosystem. Their ‘coarse filter’ landscape strategy designed to consider the entire complement of old-growth associated species, included a system of large (40,000-acre) and medium (10,000-acre) HCAs with spacing and habitat composition requirements well distributed across the Tongass. Small (1,600-acre) HCAs in each major watershed (>10,000 acres) and individual species-specific management guidelines also were recommended.

Landscape connectivity was an integral feature of the original VPOP landscape conservation strategy (Suring et al. 1993). VPOP reviewed the available literature and concluded that there was limited empirical support for corridors but that this should not preclude their inclusion in landscape conservation planning. They reasoned that landscape habitat connectivity was an important component of conservation planning to facilitate animal dispersal and movement, whether specifically designed as corridors or through overall management of a habitat matrix. They recommended a 500-foot beach fringe buffer Forest-wide and 200-foot buffers on anadromous fish streams. Breaks in these buffer corridors should be less than 65 feet to facilitate flying squirrel dispersal.

VPOP mapped the large and medium reserves and provided guidance for locating the small reserves, stating that their mapping effort represented only one possible application of the OGR system across the forest. VPOP concluded that their strategy represented “the minimum amount and distribution of habitat necessary to assure a high likelihood of maintaining viable, well-distributed populations of old-growth associated wildlife species across the Tongass National Forest” (p. 37).

2.1.4. Pacific Northwest Research Station Review

The Forest Service Pacific Northwest Research Station was requested by the Alaska Region to conduct an independent scientific peer review of the VPOP strategy. Kiester and Eckhardt (1994) obtained technical reviews from 18 scientists from North America with substantial knowledge and experience in species ecology or conservation biology. Kiester and Eckhardt (1994) synthesized these technical reviews and published all reports in the document *Review of Wildlife Management and Conservation Biology on the Tongass National Forest: A Synthesis with Recommendations* (Pacific Northwest Research Station Review).

The general concepts in VPOP's multiscale habitat conservation strategy received positive support from the scientists involved in the Pacific Northwest Research Station Review: Beckman (p. 37): "The proposal of HCAs of three sizes somewhat uniformly scattered across the landscape seems like a reasonable strategy..."; Forsman (p. 48): "...proposed network of conservation areas is a reasonable start in combination with protection of known (goshawk) nest areas within the matrix."; Hansen (p. 50): "The core approach of this report (strategy) is scientifically sound and generally consistent with modern conservation biology."; Jarvis (p. 71): "The strategy is an innovative and bold attempt to apply species, community, and ecosystem concepts to applied management."; Lande (p. 78): "...a good initial attempt to develop a strategy for maintaining biodiversity."; Lidicker (p. 87): "The strategy outlined is a giant step in the right direction, but improvements are needed..."; Marcot (p. 101): "...the process and basis for the proposed conservation strategy is scientifically sound given our current knowledge base..."; and Walters (p.194): "...the overall management strategy that considers landscape level features is excellent. The approach is well-grounded in the best current information in conservation biology...". Kiester and Eckhardt (p. 5) concluded in their summary review that "the Strategy (VPOP) receives high marks. It represents a solid attempt to integrate species viability concerns with the HCA approach."

The Pacific Northwest Research Station Review identified several weaknesses in the VPOP strategy. For example, corridors were considered inadequate, there was insufficient attention directed to the matrix lands, and HCAs were considered to be too small by many scientists. Kiester and Eckhardt (1994 p. 5) concluded that "the particular pattern of HCAs that it [the VPOP strategy] suggests will not ensure viability of all species"--although no individual species were specifically identified. Careful examination of all reports by the 18 scientists that participated in the Pacific Northwest Research Station Review revealed repeated concerns relative to brown bears and wolves (Lande p. 82; Lidicker p. 91; McLellan p. 132, Paquet p. 143; Pletscher p. 147; Powell p. 156, and in the summary by Kiester and Eckhardt, p. 16, 17) and that 40,000-acre large HCAs recommended by VPOP were too small to sustain populations of these wide-ranging species. Lande recommended that at least one very large HCA be maintained in each ecological province or island (p. 81); Lidicker recommended a "few large areas, one per island or island group" (p. 91); McCullough (p. 116) recommended fewer but larger HCAs to support continuous populations; and Pletscher (p. 147) suggested an "inverse HCA" concept of very large preserved landscapes with small areas allocated for timber harvest.

Importantly, Kiester and Eckhardt (1994, p.3) noted that the Pacific Northwest Research Station Review only considered the network of mapped VPOP large and medium HCAs and Congressionally protected areas such as Wilderness, Monuments and Legislated LUD II areas. The VPOP reserve network was not examined in the context of the entire forest plan or a fully articulated planning alternative containing the strategy. The scientists were unable to consider other LUDs that effectively function as reserves and conserve the old-growth ecosystem—a very important component incorporated into the development of the old-growth habitat conservation strategy in the revised Forest Plan and this analysis.

Corridors and landscape connectivity received considerable attention among the scientists involved in the Pacific Northwest Research Station Review, and somewhat differing opinions emerged regarding how to address landscape connectivity. Lidicker recommended 1,000-foot corridors (p. 91), while Lande (p. 82) recommended corridors of up to 4,000 feet wide. Other scientists questioned the value of explicitly designed corridors. McCullough (p. 116) noted that "corridors are of considerable debate" and recommended larger reserves to minimize reliance on dispersal corridors; Paquet (p. 137) stated "there are few controlled data with which to assess the conservation role of corridors, thus it is difficult to support or refute their value" but added "…maintenance or restoration of connectivity in the landscape is a prudent strategy"; Pletscher (p 147) stated "There are few empirical studies documenting the value of narrow corridors" and recommended more attention be focused on overall management of the matrix; and Powell (p. 154) agreed with VPOP regarding uncertainty of corridors and recommended more attention be given to the intervening landscape matrix to facilitate wildlife movement and dispersal. Kiester and Eckhardt (p. 17) stated that overall landscape connectivity was an essential component of an old-growth conservation strategy and wider corridors were necessary (especially for marten), particularly relative to ecological pinch points, but cautioned that corridors are "virtually untested in practice."

In their summary chapter, Kiester and Eckhardt (1994) provided many recommendations that specifically relate to forest planning and features of landscape design:

- Existing largest blocks of contiguous high-volume old-growth forest should not be further fragmented by timber harvesting or road building.
- Incorporate larger reserves.
- Incorporate wider corridors.
- Do not differentially cut low altitude, high-volume old growth
- Consider an inverse HCA concept.

They provided many other sound management recommendations not directly related to landscape planning design, such as adaptive management, biological inventory, gap analysis, and population viability analyses.

2.1.5. VPOP Response

Suring et al. (1994) specifically responded to individual recommendations made in the Kiester and Eckhardt (1994) review of the VPOP Conservation Strategy in the document: *Response to the Peer Review of: A Proposed Strategy for Maintaining Well-distributed, Viable Populations of Wildlife Associated with Old-Growth Forests in Southeast Alaska* (VPOP Response). In this brief (11 pages with appendices) response, Suring et al. (1994) indicated that the document represented an "initial response" outlining additional elements that would be considered in their preparation of a final Conservation Strategy as provided for in the peer review process, stating "additional support will be needed by the Committee (VPOP) from the Forest Service to adequately incorporate the recommendations of the peer reviewers into our manuscript and to publish that manuscript" (Suring et al. 1994, p. 3).

Within the VPOP Response, seven specific recommendations were made that were responsive to Pacific Northwest Research Station Review comments. All recommendations were considered during the Viability Synthesis Workshop (Iverson and Rene, 1997) to identify building block concepts for forest plan alternative development. All VPOP Response recommendations were analyzed spatially and quantitatively (Iverson 1996a). In doing so, the Forest Plan interdisciplinary team (IDT) concluded that the features described in the recommendations would not collectively represent a fundamentally different alternative than existed within the range for forest plan alternatives considered in the Revision planning process and that general concepts recommended (e.g., larger reserves and wider corridors) were already addressed.

Specifically, from the Pacific Northwest Research Station Review recommendation to "keep landscape options open, and do not further fragment existing large blocks of high-volume old growth," the VPOP Response generated the following recommendation: "it is important that the largest remaining patches not be fragmented. This may (emphasis added) be accomplished by restricting logging and road building to areas other than the three largest old-growth forest patches within each ecological province" (p.8). The Pacific Northwest Research Station Review referred to blocks of old growth while the VPOP response referenced "patches"; the Pacific Northwest Research Station Review recommendation specifically mentioned "high-volume" old growth—VPOP did not; the VPOP Response only recommended that the three largest old-growth forest patches be protected—the Pacific Northwest Research Station Review suggested all blocks. Despite slight but important differences between these two recommendations, the Forest Service concluded that minimizing additional fragmentation of large areas of old-growth forest with a focus on the high-volume class strata was the basic intent of the recommendations.

Noting the limitations in their original conservation strategy identified by the Pacific Northwest Research Station Review, the VPOP Response considered the diversity of opinion among the scientists concerning corridors and provided a series of explicit corridor recommendations. They recommended that a beach fringe corridor of 3,300 feet be established Forest-wide within which only selective uneven-aged management could be applied. They also recommended that 1,000-foot and 1,600-foot no harvest corridors be designated to connect medium and large HCAs, respectively. These corridors should be located below 800 feet in elevation.

2.2. The 1997 Old-Growth Conservation Strategy

The 1997 Forest Plan IDT carefully reviewed the landscape design recommendations contained in the documents discussed above. In consideration of all multiple-use issues and concerns, they designed a habitat strategy that was responsive to the recommendations contained in these documents. This strategy represents the integration of many elements, some of which are specific to addressing wildlife viability, others of which respond to other issues, such as Congressional legislation (Wilderness, National Monument, and Legislated LUD II), riparian habitat management from the Anadromous Fish Habitat Assessment, or the allocation of lands to Remote and Semi-Remote Recreation in recognition of recreation and tourism uses.

After considering the Pacific Northwest Research Station Review by prominent scientists and considering all other available information, the IDT incorporated the VPOP HCA strategy as the cornerstone of the old-growth forest habitat strategy in the 1997 revised Forest Plan. This represents a fundamental 'coarse filter' approach to addressing wildlife viability and the conservation of biodiversity. In addition, a variety of other coarse filter standards and guidelines provided connectivity between the reserves. At the "fine filter" level, species-specific standards recommended by VPOP (e.g., brown bear, goshawk, wolf, great blue heron, etc.) were fully considered in light of additional information such as conservation assessments, panel assessment results, etc. and appropriate standards and guidelines were incorporated into the Threatened, Endangered, and Sensitive Species and Wildlife sections of the Forest Plan for species that needed additional protection measures to assure their viability and well-distributed status.

The following sections describe the strategy. First, the Forest-wide reserve network is discussed. Next, the management of lands outside the reserve network (the "matrix") is described with subsections on each category of standards and guidelines that affect this management.

2.2.1. Forest-wide Habitat Reserve Network

2.2.1.1. Introduction

The coarse-filter approach was designed to maintain a functional and interconnected old-growth ecosystem, which in turn will maintain the component parts (composition and structure) and processes (function) of that ecosystem (p. 3-11, U.S.D.A. 1997c). In general, the home range and dispersal capabilities of old-growth associated species of concern were considered in determining the size, spacing, and number of reserves.

The system of Forest-wide habitat reserves adopted by the Forest Plan consists of large, medium, and small reserves. Of the estimated 5 million acres of productive old growth (POG) in 1997, the reserve system sets aside 3.6 million acres, and nearly 1 million additional acres are protected through the various standards and guidelines prescribed for management of the lands outside the reserves (U.S.D.A. 2003). The percentage of POG reserved within each of the 21 biogeographic provinces on the Tongass ranges from 38 to100 percent (Iverson and DeGayner 1997). The percent of the reserve system that is high-volume old growth (greater than 25,000 board feet per acre) is slightly higher than the Forest-wide average (44 percent and 43 percent, respectively) (U.S.D.A. 1997a).

2.2.1.2. Description and Design Features of the Reserve Network

A summary description of the reserve types, as they were defined in the 1997 Forest Plan, is provided below. In addition, details regarding the design features of the reserve network are presented following the description.

Description and General Design of Each Reserve Type

Large Reserves:

- There are 38 large reserves on the Tongass. These are contiguous landscapes, typically at least 40,000 acres in size and including at least 20,000 acres of POG forest. At least 10,000 acres of POG was intended to be in the high-volume stratum. Large reserves consist of a variety of non-development LUDs including the Old-Growth Habitat LUD.

- Large reserves are intended to be no more than 20 miles apart and are distributed across the entire Forest. Large reserves within the range of brown bears were intended to have at least one Class I anadromous fish stream.

Medium Reserves:

- The Tongass includes 112 medium reserves. These are contiguous landscapes of approximately 10,000 acres including at least 5,000 acres of POG forest. At least 2,500 acres of the POG was intended to be in the high-volume stratum. Medium reserves consist of a variety of non-development LUDs including the Old-Growth Habitat LUD.
- Medium reserves are intended to be no more than 8 miles from the nearest large or medium reserve and are distributed across the entire Forest.

Small Reserves:

- The Tongass includes a network of 237 small reserves, which are defined by Old-Growth Habitat LUDs. They generally contain at least 16 percent of the area of a value comparison unit (VCU) in a contiguous landscape, with at least 50 percent of the area in POG forest.
- They typically contain a minimum of 400 acres of POG.

Small Islands:

- The Tongass Forest Plan protects all islands less than 1,000 acres from additional harvest of old-growth forest. These areas are mapped as non-development LUDs, typically Semi-Remote Recreation.

Additional Design Features and Assumptions of Reserve Network

This section describes additional design criteria and assumptions used to design the OGRs system. A basic assumption was that future reviews of most individual medium and large OGRs or reviews of the entire conservation strategy would need to consider the total acres of old-growth habitat and other non-development LUDs that maintain the integrity of the old-growth forest ecosystem and contribute to a Forest-wide system of reserves within National Forest System lands. Islands less than 1000 acres that are designated as non-development LUDs may be excluded from acreage calculations.

General Design Criteria

A. OGRs were located so that spacing is maintained in the four cardinal directions.
B. Reserves are more circular rather than linear in shape to maximize the amount of interior (secure from the effects of forest edge) forest habitat.
C. The amount of early seral habitat within mapped reserves was minimized to the extent feasible. In VCUs where managed stands constitute a high portion of the total acres, including seral habitat that previously supported high volume stands to the OGR was favored if it achieved a more circular shape, maintained connectivity or included rare habitats (e.g., karst).
D. The amount of roads and log transfer facilities within mapped reserves were minimized to the extent feasible.
E. Riparian, beach and estuary habitats were considered as contributing elements to OGRs.
F. Site-specific factors in placing reserves were considered to help meet multiple biodiversity or wildlife habitat objectives. Factors included, but were not limited to:
   1. The largest remaining blocks of contiguous old growth within a watershed. Old-growth forest that constitutes scattered fragments of unsuitable timberland generally did not contribute to meeting small reserve design.
   2. Rare features such as underrepresented forest plant associations or stands with some of the Forest’s highest volume timber stands.
   3. Known or suspected goshawk nesting habitat.
   4. Known or suspected marbled murrelet nesting habitat.

5. Important deer winter range to maintain important deer habitat capability to meet public demand for use of the deer resource.

There was no requirement to ensure connectivity among all small OGRs or between small OGRs and non-development LUDs (which form parts of large and medium OGRs). POG forest occurring within other features of the strategy (e.g., beach fringe, riparian, other non-development LUDs) contributes to overall landscape connectivity in the evaluation. It was anticipated that there would be a need to provide additional corridors only in rare situations. Medium and large OGRs were designed to provide connectivity between other old-growth LUDs and other non-development LUDs. The following parameters were used to ensure OGRs maintained connectivity.

A. Only one connection in one direction was necessary.
B. The beach fringe serves as a connector.
C. The connection did not have to be the shortest distance.

Additional Criteria for the Design of Small OGRs

This subsection provides a summary of additional criteria that were used in the design and layout of small OGRs.

A. Small OGRs were not required under the following circumstances:
   1. In VCUs where the total acres and acres of POG within non-development LUDs met or exceeded the minimum acreage criteria.
   2. In VCUs with a computational allocation of less than 800 acres of POG forest. An OGR may have been designed contiguous with old-growth acres in a non-development LUD in an adjacent VCU.
   3. In VCUs that were partially designated as very large, large, or medium OGRs even if these did not meet the minimum acre criteria for a small OGRs. In some cases, small OGRs have been designated in these VCUs for specific purposes.

B. Small OGRs may have been designated under the following circumstance:
   1. VCUs that have been separated may have been combined for computational purposes. These VCUs are denoted by an integer other than zero as the fourth digit of the VCU number (e.g., 5971, 5972, 5973). An OGR was located in at least one of these VCUs. In some cases, small OGRs were designated in more than one of these VCUs for specific purposes.

2.2.1.3. Rationale for the Reserve Network

The mapped system of 150 large and medium HCAs originally designed by VPOP as "one possible application of the proposed strategy" was integrated into the Forest Plan through allocation to the Old-Growth Habitat LUD and other non-development LUDs. Spatial modifications to the original VPOP large and medium HCAs were made; this is provided for in the VPOP report as long as HCA design criteria for size, spacing, and composition are maintained (Suring et al. 1993, p. 30). In their HCA composition analysis, Suring et al (1993) also identified limitations in their mapped strategy. Subsequent modifications were made to large and medium HCAs to correct limitations. Modifications were made for several reasons:

- The original VPOP delineation did not meet minimum HCA criteria (e.g., St. James Bay Large HCA);
- The original delineation incorporated large amounts of fragmented clearcut landscape (e.g., Couverden and Kelp Bay large HCAs);
- The original VPOP delineation exceeded minimum criteria (Ratz Harbor, Aaron's Creek medium HCAs);
- The integrity of the original HCA was substantially compromised by recent timber harvest that was inconsistent with HCA objectives (Game Creek Large HCA); and
- The reserve location was adjusted to achieve multiple-use objectives such as timber harvest.

Even after these modifications, all large and medium HCAs do not precisely match the specific VPOP size, spacing and habitat composition design criteria. Based on a detailed analysis of how well the original mapped VPOP reserves and the design criteria were integrated into the 1997 Forest Plan (Iverson 1997), VPOP found that over 90 percent of the 149 HCAs they mapped forest-wide met the minimum spacing criteria, and those that did not were generally isolated islands or within Wilderness (Suring et al. 1993, Table 8, 9). Very few HCAs were completely moved (Iverson, 1997); thus the current location of mapped reserves is considered in general compliance with the original VPOP design. While site-specific compliance is not always perfect, either exceeding or occasionally deficient in VPOP design criteria, fine-tuning application of the strategy would take many iterations. As VPOP concluded, "a 'perfect' application of this conservation strategy does not exist" (Suring et al. 1993, p. 35). Furthermore, standards and guidelines in the Old-Growth LUD provide for the examination of the size, spacing, and composition criteria for each reserve at the project level and provide for necessary adjustments to ensure minimum design criteria are met.

Small (1,600-acre) HCAs in each 10,000-acre watershed were recommended by VPOP, to be mapped during project implementation. VPOP identified two objectives for small HCAs (Suring et al. 1993, p. 28): "to provide temporary functional habitat for animals dispersing between large and medium HCAs and to ensure that species of concern have a relatively high likelihood of occurring in each 10,000+ acre watershed." The IDT identified and explicitly mapped the small reserves in the Forest Plan as part of the Old-Growth LUD. These small reserves also contribute to the overall landscape matrix outside large and medium HCAs (see Section 2.2.2 Matrix Management). Approximately 237 small reserves were mapped. These included nearly 267,000 acres of POG forest within a total of 480,000 acres (Appendix 1 to Appendix N of the 1997 Forest Plan Revision FEIS). These reserves represent an important component of the Forest-wide old-growth habitat conservation strategy.

The need for larger habitat reserves (larger than provided by VPOP) and minimizing fragmentation, in general, and specifically for brown bears and wolves, was a consistent recommendation expressed by the Pacific Northwest Research Station Review scientists. The 1997 Forest Plan, in response to observations of the Pacific Northwest Research Station Review scientists and management considerations contained in the interagency wolf conservation assessment, contained at least one very large reserve within each of the 21 biogeographic provinces across the Tongass to address large-scale distribution of large OGRs (Appendix 5 to Appendix N of the 1997 Forest Plan Revision FEIS). This action was specifically responsive to Lande's recommendation (p. 81, in Kiester and Eckhardt 1994) of one large reserve per province and to other scientist's concerns that VPOP's HCAs were too small. A quantitative definition of large was not provided in any reference; however, multiples in excess of the VPOP large HCAs of 40,000 acres may be considered as 'large' (1-2 times as large) or 'very large' (3 or more times as large).

The VPOP Response also recommended the following: "it **may** (emphasis added) also be necessary to establish 0.5- to 1-mile buffers around all large and medium HCAs as a "special management zone" permitting removal of up to 25 percent of the standing volume in 5-acre units using uneven-aged timber management. This recommendation relates to the need for larger old-growth forest reserves. This feature has been incorporated into the Forest Plan in a different way than proposed in the VPOP Response. As discussed above, at least one very large reserve per province was allocated. Furthermore, the VPOP Response recommendation would have permitted substantial harvest (up to 25 percent) of the expanded area. The Forest Plan protects entire reserves without selective harvest and associated additional reduction of old-growth forest.

Both the Pacific Northwest Research Station Review and VPOP Response expressed concern for disproportionate harvest of higher volume old-growth stands. VPOP Response specifically recommended (p. 9) that "it is necessary to defer logging and road building in volume class 6 and 7 old-growth forest (as determined by field reconnaissance) below 800 feet elevation until a biological survey is completed." The Forest Plan Revision IDT recognized the concern for higher volume stands and took a broader approach toward protecting larger reserves and intact landscapes, which necessarily include higher volume stands. The IDT did not believe that a focus on protecting small isolated stands of the former volume class 6 and 7 that may be imbedded within a mosaic of clearcuts, susceptible to windthrow, was a prudent management approach to addressing conservation of old-growth associated species.

The final component of the reserve strategy addresses potentially endemic taxa (species or sub-species) that may exist on small islands. MacDonald and Cook (1994) reported 27 mammalian taxa endemic to Southeast Alaska. Many may have limited dispersal capabilities and are restricted to individual islands (e.g., Coronation Island vole); some may also be susceptible to loss and fragmentation of old-growth habitat. Populations existing on small islands (oceanic or habitat fragments) are more susceptible to local extinction (Wilcove et al. 1986, Burkey 1995). The archipelago of Southeast Alaska contains over 22,000 islands (Iverson 1996b) and uncertain but likely high levels of biotic endemism (MacDonald and Cook 1994). Lidicker (in Kiester and Eckhardt, 1994, p. 91) identified a concern for small island endemic taxa and recommended that no logging occur on islands of less than 1,000 acres to reduce risks to these taxa, and further recommended that at least one reserve be maintained on larger islands. The Other Mammal Assessment Panel expressed similar concerns relative to endemic taxa (Julin 1996).

In response to these concerns about endemic taxa with possibly unique gene pools that may be restricted to small islands, the Forest Plan protected all islands less than 1,000 acres from additional harvest of old-growth forest, in direct response to the Lidicker recommendation and concern expressed by the Other Mammal Assessment Panel.

2.2.2. Matrix Management

The second component of the old-growth forest habitat conservation strategy is management of the area outside reserves (the “matrix”) that is subject to timber harvest. This topic was of notable concern to the Pacific Northwest Research Station Review scientists who suggested that more attention be directed to this component of landscape conservation planning. They particularly noted the need to provide enhanced landscape connectivity and to manage human disturbance of the land similar to natural disturbance regimes (Kiester and Eckhardt 1994: Hansen p. 52; Lande p. 82; Lidicker p. 87; McCullough p. 109; McClellan p. 133).

Some management protections within the matrix are spatially explicit, such as the 1,000-foot beach and estuary fringe, and the riparian buffers for maintaining the integrity of the aquatic and riparian ecosystems. In addition, other forest-wide standards and guidelines preclude or significantly limit timber harvest in areas of high hazard soils, steep slopes, karst terrain, visually sensitive travel routes and use areas, and in timber stands technically not feasible to harvest. Finally, a number of species-specific standards and guidelines provide additional protection to old growth within the matrix.

2.2.2.1. Beach/Estuary Fringe and Riparian Habitats

Beach and estuary fringe, and riparian habitats, have special importance as components of old-growth forests, serving as wildlife travel corridors, providing unique wildlife habitats, and providing a forest interface with marine or riverine influences that may distinguish them as separate ecosystems within the larger old-growth forest ecosystem. Riparian areas are important for fisheries in providing, among other resources, the source of large woody debris that creates pools for rearing habitat, and in controlling stream temperatures and the amount of sediment reaching streams. Riparian areas provide habitat for terrestrial species associated with aquatic environments (amphibians, for instance, or mammals such as river otter and beaver), and for terrestrial species for which fish from streams are important food (brown and black bears). Considering the dendritic nature of riparian systems that begin high in watersheds, these riparian areas provide forested corridors connecting higher elevation regions in upper watersheds with lower elevation forests in valley bottoms. Riparian areas often contain plant species which can live only where water is available year-round. Riparian soils often support large spruce trees and some of the most highly-productive stands of old growth.

The beach fringe, the forested area adjacent to salt-water shorelines, is thought to be an important wildlife travel corridor, a transition zone between interior forest and salt water influences, and a unique habitat (or micro-climate) in itself. The beach fringe is a very important feature on the Tongass given the extensive amount of shoreline (more than 13,000 miles) that exists on the more than 22,000 islands. The beach fringe provides horizontal or low-elevation connectivity between watersheds, many of which otherwise have very steep sides and/or non-forested ridgetops. In conjunction with riparian areas, which provide connectivity within watersheds, the beach fringe is thought to be a component of the major travel corridor system used by many resident wildlife species.

Interagency habitat capability models developed previously for management indicator species of the Tongass produced the highest habitat suitability value in POG forests within the 500-foot beach fringe zone for the bald eagle, marten, and river otter (Suring 1993). The beach fringe was rated second only to the 1,000-foot estuary fringe for brown and black bears in overall habitat quality, and higher deer habitat values generally occur in high-volume old growth below 800-foot elevation, much of which occurs in the beach zone with a moderating maritime-influenced microclimate. A revised marten habitat capability model rated the beach fringe old-growth forests highest among all habitat components (Flynn 1995).

There are indications that the value of the beach zone habitat may extend beyond 500 feet. Gende et al. (1998) reported reduced bald eagle nesting densities and success in landscapes adjacent to clearcuts and recommended a beach buffer zone of at least 1,000 feet. The 1,000-foot beach fringe was also used frequently by radio-marked goshawks (Iverson et al. 1996). The importance of the beach fringe zone has long been recognized, and was a component of the Retention Factor Method used in the 1979 Tongass Plan, as amended (USDA Forest Service, 1986) (specifically recognizing the importance of the 1,000-foot beach fringe for brown/black bear, 600-foot for furbearers, and 0.25 mile inland from the beach for deer winter range).

In developing the old-growth forest habitat strategy, the information described above and the available literature relative to Southeast Alaska were carefully examined. The Forest Plan Revision IDT concluded that explicit corridors should be a component of a landscape conservation strategy, that a 1,000-foot beach and estuary fringe corridor was clearly justified by the available information but that no evidence supported a 3,300-foot buffer recommended by the VPOP Response. The IDT further reasoned that a 1,000-foot no-harvest beach and estuary fringe corridor was comparable or possibly superior to a 3,300-foot corridor that permitted up to 25 percent volume removal in 5-acre patch cuts as recommended by the VPOP Response. Accordingly, the Forest Plan establishes a Beach and Estuary Fringe Forest-wide Standard and Guideline that prevents timber harvest within 1,000 feet inland from mean high tide. The 1,000-foot beach fringe serves many functions: providing more effective landscape linkages between habitat reserves, protecting long-term bald eagle habitat capability, buffering the primary beach fringe zone (0 to 500 feet) from windthrow (Hodges 1982, Harris 1989), maintaining a functional interior forest condition within the entire primary beach fringe (Concannon 1995), and sustaining very important habitat for goshawks (Iverson et al. 1996).

In addition, the Forest Plan incorporated, as a minimum, the riparian habitat recommendations in the Anadromous Fish Habitat Assessment (AFHA 1995). Riparian habitat buffers also provide elevational corridors within forested watersheds. Mapping the small old-growth habitat reserves (see above) also provides additional landscape connectivity. Together, the beach and riparian habitat management features and the mapping of small reserves represented a substantial response to the landscape linkage element of conservation planning and significantly contributed to management of the overall matrix among habitat reserves.

2.2.2.2. Landscape Connectivity Standard and Guideline

The Forest Plan contains a standard and guideline that provides for the maintenance of a contiguous forested corridor, where it exists, connecting each large or medium habitat reserve to at least one other reserve. This standard and guideline is to be implemented during the environmental analysis for projects proposing to harvest timber, construct roads, or otherwise significantly alter vegetative cover. In addition, young-growth treatments to accelerate old growth characteristics to help increase connectivity for wildlife are encouraged.

2.2.2.3. Species-Specific Standards and Guidelines

A variety of species-specific standards and guidelines were adopted to strengthen the conservation strategy for individual species and species groups. Many of these have positive effects for a variety of old-growth-associated species. For some species, like the northern goshawk and the American marten, additional habitat conservation measures were prescribed in areas of the Forest where intensive timber harvest had occurred.

Stand level habitat management objectives, that contributed to maintaining features of old-growth forest within the matrix, were established in the 1997 Forest Plan Revision to reduce the adverse effects of clearcut timber harvest on marten and goshawk habitat use by retaining important forest structure during harvest. These habitat management measures were added to the Forest Plan in response to panel assessments (see Section III.B). In the North and Central Prince of Wales Biogeographic province, where risks of sustaining habitat for goshawks was greatest (Iverson et al. 1996), the 1997 Forest Plan Revision standards and guidelines provide for the retention of forest structure during harvest in VCUs where over 33 percent of the original POG has been harvested and harvest units are over 2 acres. This management standard and guidelines maintains an average of at least 30 percent canopy closure after harvest and requires that an average of at least 8 large (20 to 30 inches diameter at breast height [DBH]) trees/acre are retained at harvest. The objective of this provision was to retain some foraging habitat value after harvest; silvicultural prescriptions that provide for retention were considered to be superior to clearcut harvest (Iverson et al. 1996).

Similar stand level structural retention standards and guidelines in the Forest Plan were established to manage high value marten habitat. These standards and guidelines applied to the five higher risk biogeographic provinces identified by VPOP (Suring et al. 1993, p. 41) (East Chichagof, Kupreanof/Mitkof, Etolin Island and Vicinity (except Zarembo), Revilladagado Island and Vicinity, and North and Central Prince of Wales Island). In VCUs within these provinces where over 33 percent of the original POG had been harvested, including additional future harvest, high value marten habitat was to be managed to retain important forest structure for marten. Harvest units over 2 acres in size in high value marten habitat (e.g., high volume timber strata and below 1,500 feet in elevation) retained after harvest: an average of over 30 percent canopy closure, an average of at least 8 large trees/acre (20 to 30 inches DBH), an average of at least 3 large decadent (20 to 30 inches DBH dead or dying trees) trees/acre, and an average of at least 3 pieces/acres of large (20 to 30 inches DBH) down logs. For all other VCUs within these five provinces, the following structure was retained in harvest units in high-value marten habitat: approximately 10 to 20 percent of original stand structure will be retained with an average of 4 large trees/acre (20 to 30 inches DBH), an average of 3 large decadent trees/acre (20 to 30 inches DBH), and an average of at least 3 pieces/acres of large (20 to 30 inches DBH) down logs.

For both the goshawk and marten stand management standards and guidelines above, harvest units under 2 acres did not need to maintain any of the prescribed amounts of forest stand structure. However, to provide for retention of important forest structure, the effective silvicultural rotation was increased to 200 years.

In addition, other fine-filter species-specific standards and guidelines contribute to the old-growth strategy. These include standards and guidelines for raptor nest habitat protection, wolf den protection, brown bear foraging habitat along certain streams, and others. The major species-specific standards and guidelines include:

- Brown Bear Foraging Habitat: Establish forested buffers, where available, of approximately 500 feet from the stream at sites where additional protective measures are needed to provide cover among brown bears while feeding, or between brown bears and humans.
- Heron and Raptor Nest Protection: Protect active rookeries and raptor nesting habitat with a forested 600-foot windfirm buffer, where available.
- Marbled Murrelet Nest Protection: Protect identified marbled murrelet nests with a 600-foot radius of undisturbed forest habitat.
- Wolf Dens: Maintain a 1,200-foot forested buffer, where available, around known active wolf dens.
- Mountain Goat Travel Corridors and Winter Habitat: Identify and maintain travel corridors between important seasonal sites. Where feasible, maintain important mountain goat winter habitat capability.

2.2.2.4. Other Non-Wildlife Standards and Guidelines

In addition, although the conservation strategy was designed without consideration of the contribution of standards and guidelines that restrict timber harvest to protect resources other than wildlife, there are many other standards and guidelines that restrict or limit timber harvest. These other Forest-wide standards and guidelines preclude or significantly limit timber harvest in areas of high hazard soils, steep slopes, karst terrain, visually sensitive travel routes and use areas, and in timber stands technically not feasible to harvest.

2.2.3. Analysis of the 1997 Old-Growth Strategy

Appendix N to the 1997 FEIS presented an analysis of the 1997 Old-Growth Strategy. This analysis documented the amount of habitat protection produced by the Forest Plan and compared it with the recommendations of VPOP and other recommendations. The following section summarizes this analysis (see Section IV.A.6 of Appendix N to the 1997 FEIS for the details).

2.2.3.1. Amount and Distribution of Old-Growth Forest

The analysis presented in Appendix N to the 1997 FEIS noted that the first and most prominent feature of the old-growth habitat strategy in the 1997 Forest Plan was the substantial amount of POG forest that is protected forest-wide in both the reserves and in the matrix areas that are allocated to timber management (70.1 percent in reserves and 19.0 percent in the matrix). A total of 84 percent of the POG that was present in 1954 was estimated to be present in 100 years assuming the maximum timber harvest levels per decade allowed in the 1997 Forest Plan. This is equivalent to an estimated 90 percent of existing POG.

Adequate distribution of old growth habitats, and not necessarily the forest-wide total amounts, was a principal element of the VPOP conservation strategy (Suring et al. 1993). The proportion of old-growth protected in reserves varied by biogeographic province, but ranged from 38 percent (Kupreanof/Mitkof Province) to 100 percent (Admiralty and West Chichagof Provinces). Within protected old-growth forests, all volume classes of POG were protected as well. High-volume old growth generally contains the largest trees and averages 35,000 board feet per acre (Julin and Caouette 1997). An average of 44 percent of the POG in reserves was estimated to be high volume, whereas 43 percent of the old growth forest-wide was high volume. The proportion of high-volume old growth in reserves in 18 of 21 provinces equaled or exceeded the proportion present in the province as a whole.

The 1997 Forest Plan exceeded the minimum strategy recommended by VPOP relative to sustaining viable wildlife populations. While fully integrating the large and medium VPOP HCAs and the mapping of the small reserves, the 1997 Forest Plan protected substantial additional POG forest to further reduce risks to wildlife viability and enhance protection of biological diversity. For comparison, reserves allocated in the Forest Plan with at least 5,000 contiguous acres of POG (the minimum POG requirement for VPOP medium HCAs) exceeded the amount recommended by VPOP by 147 percent forest-wide (Appendix 2 of Appendix N to the 1997 FEIS). Old-growth allocated to reserves exceeded the amount recommended by VPOP in 20 of 21 biogeographic provinces, ranging from 9 to 460 percent over VPOP recommendations. This comparison was conservative: it did not include old-growth forest in contiguous reserves with less than 5,000 acres of POG, and did not include the substantial old-growth forest that would remain in the matrix.

The old growth strategy was noted to contain at least one large contiguous reserve relative to the province size in each of the 21 biogeographic provinces across the Tongass to address large scale distribution of large OGRs (Appendix 5 of Appendix N to the 1997 FEIS). Seventeen of the 21 provinces have at least 1 very large reserve (e.g. over 180,000 contiguous acres). For example, in the North Central Prince of Wales Province, a contiguous reserve of 200,584 acres (Honker/Sarkar/Karta) was provided in the Forest Plan—5 times larger than a VPOP large HCA (40,000 acres). Two provinces had a large reserve exceeding 75,000 acres; the two remaining provinces were intermediate sized-islands or aggregates of smaller islands and had contiguous reserves of from 30 to 40,000 acres and virtually all federal lands within the province were in a reserve land allocation (Dall Island and Southern Outer Islands).

High-quality old-growth forest was mapped in the largest reserves as well. The proportion of high-volume old growth (used as one indirect measure of old-growth habitat quality) in the largest reserves was equal to or greater than the proportion of high-volume old growth throughout the province in 16 of 21 provinces forest-wide (Appendix 5, of Appendix N to the 1997 FEIS). Many of these reserves previously existed (e.g., Admiralty and Misty Fiords National Monuments), while others were explicitly created to achieve this objective (South and Central Prince of Wales Island, Kupreanof/Miktof and East Chichagof Island).

The comprehensive old-growth habitat strategy in the Forest Plan was also responsive to the Pacific Northwest Research Station Review recommendation to not further fragment existing blocks of high-volume old growth by incorporating many existing roadless areas in reserves. An average of 89 percent (range 55 to 100 percent in each of 21 biogeographic provinces) of the Tongass was roadless (Appendix 4), an indirect measure of unfragmented (from clearcut harvest) landscapes. An average of 84 percent of the roadless acreage on the Tongass was allocated to “non-development” LUDs in the 1997 Forest Plan and would, thus, retain the roadless and unfragmented character of the landscape. A substantial portion of the Tongass would remain roadless and unfragmented in the Forest Plan

Additional concerns regarding habitat fragmentation were expressed by the VPOP Response that recommended that the three largest old-growth forest patches within each ecological province should be protected from logging and roadbuilding. An examination of how well the old-growth strategy in the Forest Plan responded to these general recommendations to maintain large blocks of old-growth forest was conducted. However, it was noted that there are various ways to define forest blocks or “patches”. Without some patch definition restrictions, virtually all old-growth forest on any island could be considered one contiguous and interconnected patch.

Two analyses were conducted to examine the recommendation regarding preservation of large blocks of old-growth forest. The first examined the concept of contiguous blocks of interior old-growth forest. Interior forest was defined as greater than 300 feet into the forest from the productive/nonproductive forest edge. The resulting five largest interior forest blocks in each biogeographic province were compared to the Forest Plan land allocations to determine the proportion of these blocks protected in a reserve. Forest-wide, 73 percent of the area of these five largest interior old-growth blocks was protected for a total of 476,000 acres (Appendix 6 to Appendix N of the 1997 FEIS). A small portion of these acres may no longer meet the definition of interior forest acres after the maximum timber harvest levels allowed in of the Forest Plan for 100 years are harvested. The proportion varied by province, from 38 percent protected in the East Baranof Biogeographic Province to 100 percent on West Chichagof, Admiralty, and North and South Misty Fiords Biogeographic Provinces.

A second analysis examined the largest contiguous blocks of only high volume old-growth forest and the proportion protected in reserves in the Forest Plan. Overall, within a biogeographic province, these high-volume blocks were much smaller than the interior forest blocks of all POG (Appendix 6 and Appendix 7 to Appendix N of the 1997 FEIS). Forest-wide, an average of 83 percent (province range: 36 to 100 percent) of the five largest contiguous high-volume blocks in each province was protected in reserves for a total of 225,000 acres (Appendix 6 to Appendix N of the 1997 FEIS). These first two methods of many possible delineations of “large blocks” provided somewhat different results. There was no analysis to support the “three largest old-growth forest patches” recommendation—certainly nothing compared to the in-depth analysis VPOP contributed in their initial conservation strategy (278 pp.) or the scientific reviews provided by the Pacific Northwest Research Station Review 18 scientists (282 pp.). Nonetheless, the Forest Plan provides substantial (73 to 83 percent) protection to old-growth blocks considered in this analysis.

Regarding the matrix, it was noted that the allocation of forest stands and landscapes to some form of timber harvest did not mean that all trees and stands would be harvested leaving only a continuous “sea of second growth.” There are numerous standards and guidelines limiting timber harvest in these matrix lands to protect specific resource and landscape components. An average of at least 57 percent (Appendix 8 to Appendix N of the 1997 FEIS) of the original (pre-1954) POG in these landscapes (the three timber harvest LUDs) would not be harvested and would remain standing throughout the planning horizon of 100 years, even with application of the maximum allowable timber harvest under the Forest Plan. A total of 69 percent of all existing POG in the matrix would remain after full plan implementation.

The relative quality of habitat within the three principal features of the matrix, the beach and estuary fringe, riparian habitat management areas, and other lands not available for timber harvest, are identified at both the province and VCU spatial scales. The beach and estuary fringe accounted for 15 percent of the POG protected in the matrix; riparian habitat accounted for about 24 percent, and the “other lands” accounted for the remaining 61 percent. As discussed earlier, the proportion of high-volume old growth was one measure of habitat quality: the beach fringe averaged 45 percent and the riparian areas averaged 43 percent high-volume old-growth forest.

2.2.3.2. Island Effects

The potential risk to island endemic species that may be closely associated with old-growth forests was evaluated by conducting an analysis of islands of varying sizes (Iverson 1996b). This evaluation revealed a very low risk to islands ranging in size from 1,000 to 10,000-acres in Southeast Alaska. It was noted that there are 58 islands of this size range, but only 8 had POG forest that was suitable for timber harvest in the Forest Plan representing only 2.2 percent of the POG on these islands (Table D-1). However, long-term risk may be elevated on some of these 8 islands considering past as well as potential additional harvest (e.g., Shelikof, Sokolof, Marble, and Orr Islands).

Risks were slightly higher for islands ranging from 10,000 to 100,000 acres, with 7 of 19 having suitable POG potentially available for harvest. Heceta Island was identified as the largest island in this category (41,000 acres of federal land) with POG suitable for timber harvest. Several of these islands could also have elevated risks due to the cumulative effects of past as well as potential additional harvest (e.g., Tuxekan, Catherine, Suemez, and Heceta Islands. However, most POG (92 percent) and most scheduled for timber harvest (95 percent) occurs on the largest islands exceeding 100,000 acres. The Forest Plan wouldl not add additional risk to islands under 1,000 acres and would minimize risks to islands under 50,000 acres, with a cumulative maximum of 2,100 acres of old-growth forest that may be harvested over the next 100 years. This analysis assumed maximum allowable harvest every decade for 100 years under the Forest Plan. Furthermore, the analysis assumed a potential harvest of nearly 600,000 acres of POG, whereas only 474,000 acres are actually scheduled for potential harvest.

In recognition of the uncertainty about island endemic species and their vulnerability, the Forest Plan contained a “survey and manage” standard and guideline designed to substantially reduce the risk to endemic mammals on these islands. If surveys indicate the presence of these taxa, proposed projects would be designed to ensure their long-term persistence on the island.

Table D-1.
Analysis of the Range of Island Sizes across the Tongass National Forest and the Amount of Productive Old-Growth at Potential Risk (in 1997)[1,2]

Island Size[3] (acres)	No. of Islands	Total Area	Total POG	No. Islands w/POG Suitable for Harvest	Acres POG	% POG	1995 Second Growth
1 to 1,000	461	68,807	43,201	0	0	0	3,660
1,001 to 10,000	58	196,503	95,647	8	2,105	2.2	13,659
10,001 to 100,000	19	502,271	272,552	7	25,759	9.5	29,710
Over 100,000	19	16,018,366	4,652,201	18	579,064	12.4	356,440
Total	**557**	**16,785,947**	**5,063,601**	**33**	**606,928[(4)]**	**12.0**	**403,469**

1 From Table 7 in Appendix N to the 1997 Forest Plan FEIS.
2 The proportion of the POG that is suitable for timber harvest over the next 100 years in the Forest Plan is a measure of relative risk to potential island endemic taxa that may be associated with old-growth forests.
3 Includes only federal lands.
4 Only 474,000 (80 percent) of these suitable acres are scheduled for harvest over the 100-year planning period.

2.2.3.3. Habitat Connectivity

The analysis in Appendix N of the 1997 FEIS noted that there is general agreement among scientists that habitat connectivity is an important component of a landscape conservation strategy (Kiester and Eckhardt 1994, Lidicker 1995). There is, however, uncertainty regarding how connectivity should be achieved in an integrated conservation strategy: through explicitly designed corridors; by designing larger reserves thereby decreasing dispersal distances and facilitating population interchange; or by using an overall matrix management design (e.g., the “50-40-11” matrix prescription designed to provide marginal foraging habitat between reserves for dispersing northern spotted owls [Thomas et al. 1990]).

In light of the uncertainty regarding a variety of approaches to provide landscape connectivity, a further review and analysis was conducted by the 1997 Forest Plan IDT. Thus, the 1997 Forest Plan incorporated a combination of all three landscape conservation design approaches to address landscape connectivity. It has not relied on a single strategy. Beach and riparian corridors of specific widths were established that provide significant within-island habitat connectivity; habitat reserves were enlarged (see Old-Growth Habitat Reserves above) often minimizing dispersal distances between many reserves; and standards and guidelines that govern management of the matrix outside reserves (including beach and riparian buffers) were partially designed to contribute to retaining a substantial old-growth forest component to provide connectivity. If site-specific project analyses identify deficiencies in landscape connectivity, the Forest Plan Old Growth Habitat LUD provided the opportunity to re-examine small habitat reserves, which may be adjusted to provide the necessary connectivity (see Small Old-Growth Habitat Reserves, below).

An additional approach to achieve landscape connectivity is to use timber harvest practices that retain some forest structure within the stand after harvest. Application of the marten and goshawk stand level management standard and guidelines was anticipated to contribute to maintenance of potentially important stand structure in landscapes with substantial amounts of even-aged clearcut harvest with little within-stand residual structure. The goshawk management standard and guideline was to be applied to the most heavily harvested and fragmented VCUs on Prince of Wales Island. The marten standard and guideline was to apply in the same VCUs plus additional VCUs in the North Central Prince of Wales, Revilla/Cleveland and Vicinity, East Chichagof, Mitkof/Kupreanof, and Etolin and Vicinity provinces. Since the marten standard and guideline applied to VCUs that currently exceeded 33 percent of POG harvested, as well as VCUs that would exceed that amount through future projects, this standard and guideline was anticipated to apply to additional VCUs in the future. Retention of these substantial amounts of within-stand structure served to minimize the adverse impacts of additional timber harvest.

Another feature of connectivity identified by the Pacific Northwest Research Station Review were critical links or “pinchpoints” connecting major landscapes within islands (Marcot in Kiester and Eckhardt 1994, p. 103). Such pinchpoints must be carefully protected (Kiester and Eckhardt 1994, p. 17). The 1997 Forest Plan IDT identified six such landscape pinchpoints, all relatively narrow areas between larger land units where future alterations in habitat could significantly reduce natural connectivity and limit the ability of land-based species to disperse or migrate. These areas and the degree of protection afforded by the 1997 Forest Plan at the time of its adoption include:

1. The portage between Tenakee Inlet and West Port Frederick on Chichagof Island is a narrow neck of land connecting northeast Chichagof Island to the main body of the rest of the island. This is in the East Chichagof biogeographic province. This area is completely protected with a large old-growth habitat reserve using the Old-Growth Habitat LUD.
2. The area connecting Lisianski Inlet with the North Arm of Peril Strait is a narrow region that connects two major portions of Chichagof Island. This area is fully protected as a Legislated LUD II area.
3. The area between Port Camden, Bay of Pillars, and Three-Mile Arm on Kuiu Island (Kuiu Island biogeographic province), a narrow neck of land connecting the northern and eastern part of the island to the rest of Kuiu Island. This area is protected with the Old-Growth Habitat LUD through a combination of several adjacent small old-growth habitat reserves.
4. The narrow area between Lindenburg Peninsula and the remainder of Kupreanof Island is largely protected by the Petersburg Creek Duncan Salt Chuck Wilderness. The remaining small area not included in the Wilderness between Portage Bay and Duncan Salt Chuck is primarily peatland; the 1,000-foot beach fringe provides additional connectivity.
5. The Neck Lake area between Whale Passage and El Capitan Passage on Prince of Wales Island (North Central Prince of Wales biogeographic province) has had significant past and on-going forest management activities. It also is a relatively narrow piece of land connecting the extreme northern end of Prince of Wales Island to the remainder of the island. A cross-island connection is nearly protected with a small reserve around Neck Lake and fully protected further south with

the very large natural setting reserve around Sarkar Lakes. Connectivity is also provided on both sides of the narrow pinchpoint with the 1,000-foot beach fringe corridor.

6. Sulzer Portage is between West Arm Cholmondeley Sound and Portage Bay at the head of Hetta Inlet on Prince of Wales Island. This relatively narrow neck of land joins the southeast part of Prince of Wales Island to the remainder of the island, connecting North Central and South Prince of Wales biogeographic provinces. This area has had considerable timber harvesting on both national forest and adjacent private lands. Due to a recent transfer of land ownership the area is now all private land, dividing the northcentral and south portions of Prince of Wales Island with a non-national forest strip 1 to 2 miles wide. Continued timber harvesting is anticipated on these private lands, with the potential of creating dispersal barriers. However, clearcuts and advanced second growth forests (50 to 100 years old) are unlikely to create complete barriers to movement for deer, wolves, marten and squirrels or other species of concern.

2.2.3.4. Summary

In summary, the Appendix N analysis noted that the 1997 Forest Plan IDT concluded that the original VPOP strategy was a sound and effective landscape approach to address the long-term conservation of old-growth associated wildlife species. VPOP used a coarse filter conservation planning approach to develop a comprehensive, multi-scale landscape conservation strategy. They incorporated the entire community of old-growth associated species into their analysis and focused on those species with the greatest viability or distribution concerns in the development of their strategy. Additional scientific information, such as conservation assessments and recommendations contained in the Pacific Northwest Research Station Review, were incorporated into the Forest Plan to further strengthen the original VPOP strategy. The VPOP Response was considered as a brief “initial response” of some possible considerations that may have been integrated into a final report. While VPOP Response recommendations were not explicitly incorporated, many of the elements of the VPOP Response were addressed in concept in the Forest Plan (wider corridors, larger reserves, protection of high-volume old-growth, etc.).

The old-growth habitat conservation strategy in the 1997 Forest Plan was carefully crafted in response to these fundamental conservation planning documents. Based upon consideration of the best available information related to conservation planning, the Appendix N analysis concluded that the 1997 Forest Plan provided a sufficient amount and distribution of habitat to maintain viable populations of old-growth associated species after 100 years of Plan implementation. Due largely to uncertainty, the 1997 Forest Plan did not, however, represent a “no risk” conservation strategy; rather it represented a balance of wildlife conservation measures that consider the best available scientific information and reflect an acceptable level of risk for continued species viability.

2.3. Modifications to the Strategy between 1997 and 2007

Since 1997, there have been 24 project analyses that have modified small or medium OGR boundaries and adjacent LUDs (Table D-2). Overall, these changes have resulted in an increase in reserve area and an increase in the amount of POG included within reserves. The net result of these amendments is that the acres suitable for timber harvest have been reduced by approximately 16,000 (Table D-2). The 2007 Forest Plan (defined as the 1997 Forest Plan, as amended through 2007) reflects these changes.

In addition to these changes in OGR boundaries, a number of ownership adjustments and other slight LUD modifications have been made. The combined effect of these changes on the areas within reserves and the matrix is shown in Table D-3. This table shows that while the total area of the Forest decreased by about 110,000 acres, primarily due to land adjustments, the acreage of development LUDs decreased by 112,000 acres and the acreage within reserves increased by about 2,000 acres over the period 1997 through 2007.

Table D-2.
Summary of Changes in Suitable Acres due to Forest Plan Amendments that Produce the 2007 Forest Plan[1]

Project Name (acres)	Small or Medium OGR	Project Year	Non-dev to Dev LUD Suitable Acres	Dev to Non-dev LUD Suitable Acres	Net Change in Suitable Acres
Canal Hoya	Small	1998	0	151	-151
Chasina	Small	1998	0	78	-78
Cholmondeley	Small/Medium	2003	894	6,873	-5,979
Control Lake	Small	1998	446	142	+304
Couverden	Small	2005	0	790	-790
Crystal Creek	Small	1998	481	1,153	-672
Doughnut	Small	2000	0	19	-19
Finger Mountain	Small	2003	0	593	-593
Fire Cove Salvage	Small	2002	186	633	-447
Kensington Mine	Small	2004	0	1,615	-1,615
Kuakan	Small	2000	416	542	-126
Luck Lake	Small	2000	257	794	-537
Madan	Small	2003	377	1,501	-1,124
Nemo Loop (Thoms Lake)	Small	1998	177	932	-755
Niblack	Small	1998	252	0	+252
Overlook	Small	2006	354	578	-224
Polk Small Sales	Small	2000	0	153	-153
Salty	Small	2000	99	126	-27
Scott Peak	Small	2006	1,089	1,962	-879
Sea Level	Small	1999	185	500	-315
Threemile	Small	2004	458	826	-368
Todahl Backline	Small	1998	2	363	-361
Tuxekan	Small	2006	431	1,614	-1,183
Woodpecker	Small	2003	180	130	+50
Total			**6,284**	**22,068**	**-15,784**

[1] The 2007 Forest Plan is defined as the 1997 Forest Plan, as amended through 2007.
Source: Non-significant Forest Plan Amendment for Tuxekan Project, October 2006

Table D-3.
Summary of Acreages in Reserves and Matrix under the 2007 and the 1997 versions of the Forest Plan

Alternative	Reserves: Old-Growth Habitat LUD	Reserves: Other Non-Development LUDs	Reserves: Total in Non-Development LUDs	Matrix	Total	Percent of Forest in Reserves
2007 Forest Plan[1/]	1,182,424	11,985,410	13,167,834	3,605,974	16,773,808	78.5%
1997 Forest Plan[2/]	1,131,059	12,034,860	13,165,919	3,717,081	16,883,000	78.0%

[1/] Based on the 2007 Forest Plan (defined as the 1997 Forest Plan, as amended through 2007) and Tongass GIS.
[2/] Based on 1997 Forest Plan table on p. 4-2 and Table 3-77 of 1997 FEIS.

Table D-4 summarizes the POG acreage in reserves and the matrix for the 2007 and 1997 versions of the Forest Plan. The 2007 acreage of POG within OGRs, including all non-development LUDs is 3,518,425, which represents 71.1 percent of all POG on the Forest (Table D-4). Within the matrix, there is an additional 925,051 acres of old growth (18.7 percent) that is protected within the Beach and Estuary Fringe, Riparian Management Areas, and other unsuitable areas. This estimate includes unsuitable areas that are not yet mapped (e.g., Riparian Management Areas along unmapped streams, unmapped unstable slopes, unmapped high vulnerability karst lands). Finally, there is an estimated 28,598 acres of

POG that is suitable, but would not be scheduled due to economics and other factors. As a result, the 2007 Forest Plan results in the protection of 90.3 percent of all existing POG on the Forest, assuming the full Allowable Sale Quantity (ASQ) is harvested each decade. Table D-4 also compares these acreages and percentages with the same acreage categories in 1997, at the time that the Forest Plan Revision was adopted.

The maximum percentages that could be harvested are similar between the 1997 Forest Plan and the 2007 Forest Plan when one looks at only the larger POG types. Under the 2008 Forest Plan, a total of 71.3 percent of the high-volume POG (SD Model types 5N, 5S, and 67) and 67.8 percent of the big-tree POG (SD Model type 67) would be included within reserves. Overall, 88.9 percent of the existing high-volume POG and 88.6 percent of the big-tree POG would not be harvested.

Table D-4.
Summary of Productive Old-Growth Acreage in Reserves, Protected in the Matrix, and Suitable for Timber Harvest in 2008

Year	POG Area in Reserves	Matrix POG Protected or Not Scheduled for Harvest	Matrix POG Suitable and Scheduled for Harvest (represents the maximum POG to be harvested)	Total Existing POG[1/]
2007 Forest Plan[2/] (acres)	3,518,425	970,176	462,556	4,951,156
2007 Forest Plan[2/] (percent)	71.1%	19.6%	9.3%	100.0%
1997 Forest Plan (acres)	3,551,482	1,038,492	473,597	5,063,571[2/]
1997 Forest Plan (percent)	70.1%	20.5%	9.4%	100.0%

[1/] Note that the Tongass land base has changed since 1997 due to land adjustments and harvest has occurred.
[2/] The 2007 Forest Plan is defined as the 1997 Forest Plan, as amended through 2007.
Sources: Table 3.9-12 in Biodiversity Section for 2008 numbers; Appendix N to the 1997 Tongass FEIS and Appendices to Appendix N for 1997 numbers.

2.4. New Relevant Science since 1997

This section describes new information related to conservation planning and science developed since 1997. It summarizes general information on conservation strategies, as well as species-specific information that are particularly relevant to the Tongass Conservation Strategy.

2.4.1. Conservation Strategies

2.4.1.1. General

Haufler (2006) conducted a comprehensive review of conservation science produced since 1997 and its relationship to the Tongass Forest Plan. In his review, he described major types of conservation strategies, as well as concepts that form the basis for those strategies (e.g., landscape ecology, corridors and landscape linkages, and habitat loss and fragmentation) and related new science (new science related to population viability was also addressed but is summarized in Section 3.0), and related these to the science behind the Tongass Conservation Strategy. This effort included a review of recent literature as well as recently completed and on-going conservation initiatives to identify approaches and strategies used by agencies and other organizations in their conservation planning efforts. This section provides a summary of that review.

The term “conservation strategy” refers to the framework and the underlying basis and assumptions used in planning to maintain or enhance biological diversity (Haufler 2006). Most conservation strategies share the common objective of conserving biodiversity, which has been succinctly defined by the United Nations Environment Programme (1991) as: “the variety of and variability within and among living organisms and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems.” To do so, the concepts of representation (i.e., addressing the range of environmental conditions in the planning area), resiliency (i.e., being capable of withstanding natural and human-caused changes in the environment), and redundancy (i.e., consisting of a sufficient number of areas to withstand larger scale stochastic events) have been emphasized as being important in delineating effective reserve designs (Shaffer and Stein 2000).

Conservation strategies can be distinguished based on whether they take a coarse filter or fine filter approach to conserving biodiversity. Coarse filter strategies focus on ecological communities or functional ecosystems where planning incorporates an appropriate mix of ecosystems that will maintain or enhance biological diversity and ecosystem integrity within a landscape (Haufler 2006). Recent approaches that form the basis of coarse filter strategies include the habitat diversity approach (i.e., maintaining or restoring adequate amounts of existing vegetation communities; Groves (2003), the historical reference approach (i.e., prioritizing conservation efforts based on a comparison of existing and historical conditions; Haufler 2000, Poiani et al. 2000), and the historic range of variability approach (i.e., maintaining the landscape within the historic ranges of variability; Aplet and Keeton 1999). However, there is little agreement on how to apply coarse filter approaches, with few examples of well designed coarse filter initiatives.

In contrast, fine filter conservation strategies focuses on species or groupings of species to address the ecological objective of maintaining the species or groupings of species within a landscape. Fine filter approaches include the use of umbrella species, indicator species, keystone species, flagship species, ecological engineers, focal species, declining species, at-risk species to represent other, co-occurring species. Groves (2003) and Noon and Dale (2002) provide an overview of these species-specific approaches. Under a fine filter strategy conservation areas are often identified using indices such as species richness, species diversity, or are based on biological hotspots, with the objective of protecting the maximum number of species (Chaplin et al. 2000). However, there is generally poor support in the literature for the fine filter approach because of the difficulty in identifying appropriate species to serve as surrogates, or whether this is even possible (Carignan and Villard 2002), and the inability of this approach to adequately represent all levels of biodiversity (e.g., landscape and ecosystem levels; Schwartz 1999, Chaplin et al. 2000, Groves 2003).

A central element in conservation planning, as indicated above under the two basic frameworks for conservation strategies, is the identification of conservation areas such as reserves or reserve networks. Conservation strategies may differ in their view of conservation areas, with some placing priority on their protected status (e.g., wilderness) such that they are kept separate from human influence (i.e., a compositionalism viewpoint; Callicott et al. 1999), with others emphasizing the functional capabilities of protected areas which may include working landscapes (the functionalism view; Callicott et al. 1999; Haufler et al. 1990, 2000). Though the latter view recognizes that reserves are an important tool for conserving biodiversity, it strives to balance human and conservation needs and focuses on providing functional ecosystems.

Another element that distinguishes conservation strategies is their primary focus. That is, whether they are concerned with rare or declining species or ecosystems or with representation of all species or ecosystems (Haufler 2006). A rarity focus typically devotes funding and effort to the identification of rare or declining elements (e.g., old-growth forest) and the protection of these elements in reserves. A representation focus strives to maintain the full spectrum of ecosystem elements (i.e., all forest structural stages) in adequate amounts and distribution across the planning landscape.

Haufler (2006) noted that most conservation strategies combine many of the approaches described. This more comprehensive approach to conservation planning enables the testing of the effectiveness of each plan element (e.g., implementing a fine filter approach to test the effectiveness of the coarse filter approach; Haufler 1999, 2000) and also addresses the shortcomings of any one strategy or view point.

2.4.1.2. Landscape Ecology

Landscape ecology and the associated concepts of scale, landscape effects, and habitat networks, have also received considerable attention in recent literature and have become a fundamental part of conservation planning. At the landscape scale, the influence of spatial arrangements, amounts, and sizes of habitat patches in landscapes, and the relationships of these factors with ecological processes are important advances (Turner 2005, Freemark et al. 2002). Both the grain (patch-based versus landscape-based) and extent (delineation of planning areas) of landscape analyses have been identified as critical elements in conservation planning, as they influence the results and implications of modeling efforts (Bassett and Edwards 2003).

2.4.1.3. Landscape Linkages and Corridors

Since the 1990s, a common element of conservation planning has been to ensure that adequate connectivity between habitat reserves is maintained to facilitate movement across the landscape and thus exchange between populations. Traditionally, connectivity has been viewed in the form of structural, often linear, elements of the landscape (i.e., riparian buffers) that literally act as corridors through which species move between larger habitat patches within the surrounding matrix. However knowledge of species ecology and dispersal capabilities, coupled with new understanding of landscape ecology, has broadened this view to include linkage zones, or areas within the landscape that may not physically connected but include appropriate habitat elements that provide functional connectivity (Tischendorf and Fahrig 2000). Landscape linkages address movement capabilities, habitat patches, landscape configurations, matrix conditions, barriers, and their ability to maintain continuous populations (Haufler 2006).

2.4.1.4. Habitat Loss and Fragmentation

Numerous recent empirical studies have evaluated the effects of habitat loss and fragmentation on a variety of species. Results of these studies indicated that 1) habitat and fragmentation are not independent, with the degree of habitat fragmentation influencing the magnitude of direct effects from habitat loss (Goodsell and Connell 2002); 2) fragmentation and resulting distribution of remaining habitat is of primary concern in managed landscapes where there has already been substantial habitat loss/conversion (Freemark et al. 2002); 3) interior and specialist species, as well as those that are rare or isolated will be the most affected by habitat loss and fragmentation (Bender et al. 1998, Davies et al. 2000), 4) habitat conversion may benefit some species (McGarigal and McComb 1999); 5) the amount and configuration of remaining habitat were influential in the landscape occupancy (Villard et al. 1998, McIntyre and Wiens 1999, Radford 2005); 6) the quality of remaining habitat may be more important than the quantity (Braden et al. 1997). Notably, studies evaluating the effects of fragmentation in various landscapes indicated that some of the negative effects of fragmentation on vertebrates observed where ecosystems have been converted to urban or agricultural uses have not been found in landscapes where timber harvest is the primary land use (Freemark 2002)

Theoretical studies have also been conducted that provide some insight on how the effects of habitat loss may operate. With (1999) described two perspectives that have resulted from these efforts. One is based on the theory of island biogeography where the objective is to identify the appropriate distribution of habitat patches which are compared to island surrounded by a matrix of non-habitat. The other is based on landscape permeability and the ability of species to move through the landscape (dispersal abilities), and views that landscape as a mosaic consisting of a spatially complex variety of habitat conditions.

The issue of habitat adequacy, or the threshold at which the amount of remaining habitat is insufficient to facilitate species persistence, has also been the subject of recent research. Risks of extinction tend to display non-linear responses as the effects of habitat fragmentation increase (With and King 1999, Flather et al. 2002). Under theoretical studies, threshold effects of habitat loss have been noted at 60 to 80 percent (Flather et al. 2002, Fahrig 1997). However, empirical studies have found the adequacy question difficult to isolate because of complexities in landscape mosaics, matrix conditions, temporal changes, and the various habitat needs of different species. Empirical studies note species losses typically above a 90 percent threshold (Radford and Bennett 2004, Virkkala and Toivnen 1999).

2.4.1.5. Relationship to the Tongass Conservation Plan

The conservation strategy was described as a "habitat-based wildlife conservation strategy that employed old-growth associated umbrella species to design a coarse filter/fine filter approach for species conservation" (Haufler 2006). Based on Haufler's (2006) review, the science underpinning the Tongass conservation strategy is supported by recent literature. New information suggests that additional consideration of windthrow effects, which may occur at greater magnitudes than once thought (Kramer et al. 2001) and have farther reaching effects on habitat selection of some species (DeGayner et al. 2005), and a finer scale analysis of the distribution of plant associations (e.g., VanHees and Mead 2005) may be warranted to enhance the existing coarse filter component of the conservation strategy (Haufler 2006). At this time, plant association mapping for the Tongass does not exist, and the development of such mapping would be an enormously expensive undertaking. In lieu of evaluating how representative are the reserves based on plant associations, ecological subsection and biogeographic province mapping was used in conjunction with old-growth types as a surrogate. Likewise, a finer-scale assessment of viability for some species, particularly endemics (see *Wildlife* section for discussion of new science related to endemism on the Tongass) may be warranted to ensure the coarse filter component of the conservation strategy is meeting the needs of all species, including those that are rare or occupy limited distributions (Haufler 2006). However, Haufler (2006) concluded that "the developments in the field of conservation science produced since 1996 indicate that the conservation strategies used in the plan are still valid at the present."

In April 2006, an Interagency Conservation Strategy Review workshop was held to review the Tongass Land Management Plan conservation strategy in light of new information since 1997 (USDA Forest Service 2007). The objectives of the workshop were to:

1. Facilitate robust discussion between an interagency workgroup and invited scientific and technical experts regarding new information attained since 1997 that may be relevant to the conservation strategy; and
2. Generate and discuss science-informed "Considerations" relative to the strategy."

Considerations included identification of the need to attain additional information or conduct additional analysis regarding a scientific question or issue, the need for change to the conservation strategy, or other investments or work. The workshop included technical presentations regarding recent and current studies on species and species groups of concern on the Tongass. A broad conclusion of the workshop was that the conservation strategy continues to be supported by science (USDA Forest Service 2007). Although the information presented emphasized that there is still uncertainty associated with managing wildlife habitat on the Tongass, the new information presented has increased our knowledge of species/habitat relationships, reinforced the idea that retaining old growth in a system of Forest-wide reserves is appropriate for many species, and reiterated that having a very conservative approach to conservation of old-growth-associated species is still warranted and supported by science.

2.4.2. Species-Specific Science

This section presents a summary of the new information for individual species that is relevant to the Tongass Conservation Strategy, with focus on those species that are directly relevant to proposed changes to the Conservation Strategy. The majority of this information was presented at the April 2006 Interagency Conservation Strategy Review workshop and is summarized in a report (USDA Forest Service 2007). Reference to this information, as well as more complete discussion of this new information, can be found throughout the *Wildlife* section in Chapter 3 of the FEIS. This section summarizes the key highlights of information with particular focus on goshawk and marten, since these two species have specific standards and guidelines amended.

2.4.2.1. Northern Goshawk (including the Queen Charlotte goshawk subspecies)

The results of 10 years of research on the Queen Charlotte goshawk in Southeast Alaska were summarized at the Conservation Strategy workshop (Flatten et al. 2001,2002; Lewis 2005; Lewis et al. 2001, 2006). This research was in various studies, some of which is published and some of which is available in agency reports. A total of 69 adult goshawks (37 females and 32 males) were radiotagged from 1992 to 2001. Using 2-year and 1-year tags on females and males, respectively, greater than 2,800 relocations were recorded over approximately 500 km^2 of the Tongass National Forest.

Nest trees are typically found in the largest trees available relative to the nest stand. Basal area was higher at the nest tree (> 60 percent) than the surrounding stand (< 60 percent). Aerial photo analysis also showed a difference between the amount of forest, productive forest, and canopy cover at the nest site versus random sites; however, although it was statistically significant, it may not be biologically significant. Eighty-nine percent of the 63 nest sites evaluated had multi-storied canopies.

Two large spatial scales (816 ha and 2,088 ha) were used to provide a summary of the vegetation surrounding 78 known nest sites based on GIS analyses. POG on NFS land represented 37 to 40 percent of the circular areas around these nest sites on average, followed by unproductive forest on NFS land at 24 percent, and NFS young growth at 9 to 10 percent. Nonforest on NFS land made up 5 percent and non-NFS land and saltwater made up the remaining 23 to 25 percent (see EIS planning record). Sixty-eight to 70 percent of the POG on NFS land inside the circles was protected in reserves or in the matrix. Use by adult males and females during the nesting and non-nesting season showed a consistently higher use of POG forest in proportion to availability. Habitat use of the 1,000-foot beach and estuary buffer was higher for females than for males during nesting and non-nesting seasons and peaked again at approximately 3,000, and 4,000 feet from the beach fringe.

Using the same approach discussed above, a hypothetical post-fledging area (PFA) was developed using a radius centered on a nest site and determined by the mean distance moved by northern goshawk juveniles (approximately 1,500 m) from the nest. Based on habitat categories of suitable (medium- and high-volume old growth), low-volume old growth, harvested, and nonproductive forest, approximately 45 percent of the mean PFA was in nonproductive forest, followed by suitable habitat (39 percent), low-volume old growth (8 percent), and harvested (4 percent). Results of this hypothetical PFA analysis indicate that about 40 percent of the PFA on average will be medium- or high-volume POG, of which 55 percent was in a Timber LUD or non-NFS lands.

Adult goshawk home ranges were large, much larger than most other home ranges documented in North America. Median home range sizes ranged from 3,900 ha to 11,800 ha for adult females during the nesting and non-nesting season, respectively. Male home ranges were slightly larger in size ranging from 4,300 ha to 11,900 ha during the nesting and non-nesting seasons, respectively.

Movements by nesting pairs within a territory between year 1 and year 2 ranged from 0.1 to 3.2 km with the majority (67 percent) moving less than 0.4 km. Female goshawks tend to move much greater distances between nests in sequential years than males with approximately 35 percent of females leaving their nesting area, re-pair, and nest in a new area the next year. However, of 24 nesting territories, 54 percent remained within 0.36 km radius of the previous years nest and all movements were within 3.2 km of the nest site. Nesting pairs split up more often and between-year nesting dispersal of adult female goshawks is much higher than anywhere else they have been studied in detail in North America.

The diet of goshawks in Southeast Alaska is dominated by a few key prey (grouse, medium-sized birds, and red squirrels, where present). Prey rich areas include the northern half of the Tongass National Forest, where blue grouse and red squirrel are the dominant prey items taken. On Prince of Wales Island (POW) and other islands where sooty grouse and red squirrel are not present, spruce grouse, Steller's jay, and ptarmigan are the dominant prey items taken. Small mammals make up a small portion of the overall diet in this area. Ten nests were monitored as part of the study and of all food deliveries to the nest, 78 percent of the goshawk diet in Southeast Alaska consisted of bird species, with grouse the most commonly delivered prey item. From a broader diet pattern using stable isotope and prey associations, forest-dwelling prey items are, not surprisingly, dominant, but there is also a component of tidal and wetland prey species in their diet.

Recent studies confirm the importance of management for prey in relation to goshawk productivity (Kenward 2007). Salafsky et al. (2007) recommend that goshawk management strategies incorporate forest management practices that increase the abundance and diversity of available prey resources. The differences in prey species abundance and distribution across the Tongass may help explain some of the variation in productivity, territory size and nest site selection (Lewis et al. 2006, see also compiled information in U.S. Fish and Wildlife Service 2007).

In a review of over 180 publications on goshawk habitat relationships, Reynolds (2004) reported that, although goshawks predominantly nest in mature and old-growth forest characterized by closed-canopy stands of large, dense trees, there is considerable variation in nest sites among populations, with goshawks in Oregon and Nevada nesting in stands with canopy cover as low as 31 percent. Reynolds (2004) also reported that outside of the nesting season, the variation in habitats used by goshawks is even greater (multiple forest age classes, edges, and openings) and is apparently related to differences among habitat in prey abundance and availability (i.e., goshawks may nest or forage more often in habitat where prey is more abundant). Reynolds (2004) concluded that the main factors limiting goshawks were habitat structure for both nesting and foraging (rather than composition) and prey. This idea was also demonstrated by Reynolds et al (1992) who used a food web-based, ecological approach to develop forest management recommendations for goshawks in the Southwest United States. Taking into account both goshawk habitat requirements and the habitat requirements of 14 of their prey species, Reynolds et al. (1992) recommended that no more than 60 percent of a desired landscape of goshawk and prey habitats consist of mature to old-growth forests, and that post-fledging family areas (i.e., the area immediately surrounding the nesting area) should include habitat attributes important to prey species, including snags, downed logs, woody debris, large trees, openings with herbaceous and shrubby understories, and an intermixing of forest vegetative stages. Reynolds et al. (2006) concluded that management prescriptions based on the ecology (e.g., composition, structure, pattern, and dynamics) of a forest ecosystem, is a more appropriate basis for developing desired forest conditions that support goshawks and their prey.

Management recommendations for goshawks have been incorporated into multiple Forest Plans across the United States. Many of these are based on Reynolds et al. (1992), which includes recommendations for goshawk habitat for a variety of spatial scales, including nest sites and post-fledging family areas. These recommendations are specific to habitats in the southwestern United States, though they have been used in other geographic areas. While information from these studies regarding goshawk habitat relationships is useful across a broad geographic areas, specific recommendations for standards and guidelines is less useful. Because of significant differences in habitat and the extent of human influences on natural processes between Alaska and the Southwest, specific management prescriptions have limited applicability to Southeast Alaska.

In addition to these findings, limited new research has shown goshawk use of young-growth stands. Although POG is still considered the optimal nesting habitat for this species, non-productive forest types and second-growth stands are also used by goshawks for movement and foraging (and sometimes nesting), emphasizing the importance of matrix lands in goshawk management (McClaren 2004, Boyce et al. 2006, Reynolds et al. 2006). Some nests have been found in maturing second-growth (previously harvested) stands (Bosakowski et al. 1999, McClaren 2003). On Vancouver Island, most second-growth stands supporting nests were 60 to 80 years old, and suitable structure was apparently achieved in as little as 50 years (McClaren 2003). Additionally, Doyle (2004b) found that blue grouse, an important prey species for goshawks on the Queen Charlotte Islands, selected stands with more open canopies indicating that there may be a threshold below which timber harvest would not adversely affect grouse, or goshawks as their predators. On Douglas Island in Southeast Alaska, goshawks have been observed to nest in 80-90 year old stands (Kim Titus, Alaska Department of Fish and Game. pers. comm., 2007).

Management of the nest stands around known goshawk nests continues to be an important factor in goshawk conservation; some Forest Plans incorporate management of an area around the nest for fledglings (USDA Forest Service 2006). With respect to nest site management, Reynolds et al. (1992) recommended nest buffers of 30 acres, with maintenance of at least 3 known nests and 3 replacement nests (totaling 180 acres) within a 600 acre post-fledging family area. Thus, they recommend that 30 percent of the post-fledging family area should be retained for nesting habitat, with rest in a variety of successional stages. Management for goshawk nests is complicated by the difficulty in finding nests, particularly in the remote terrain of Southeast Alaska, where detection rates appear to be lower than in other areas (U.S. Fish and Wildlife Service 2007). Goshawks often have multiple alternate nests within a territory, which further complicates management of nest sites (USDA Forest Service 2007). Recent research in the southwestern U.S. confirms the difficultly in managing for goshawks only at the nest scale because detectability of goshawks is highly variable among individuals as a result of extensive year-to-year and spatial variation in breeding. Goshawks do not always nest every year, often skipping nesting for one or more years; this behavior is most likely due to prey abundance and availability (Reynolds et al. 2005).

2.4.2.2. American marten

Several new studies and concerns related to the conservation of marten were presented at the Interagency Conservation Strategy Review: An Assessment of New Information Since 1997 in April 2006 (USDA Forest Service 2007). Marten experts reviewed and summarized new information relevant to Tongass management issues. New information was presented relative to the level of endemism in marten on the Tongass. Preliminary molecular analyses distinguish two lineages of marten and indicate that they have very different evolutionary histories (Stone and Cook 2002, Small et al. 2003, Cook et al. 2006). The two lineages (*americana* and *caurina*) are considered by some to be two species, but have not been formally identified as such. The *caurina* lineage is known to inhabit only two islands within the archipelago (Admiralty and Kuiu Islands; Cook et al. 2006). There are two contact zones (i.e., zones where the lineages coincide) in North America, one in Southeast Alaska and one in Montana (Cook et al. 2006). In addition, there are records that marten were introduced on many islands in Southeast Alaska in including Prince of Wales, Baranof, Chichagof and nearby smaller islands (MacDonald and Cook 2007). The authors speculate that the endemic lineage of marten (*caurina*) may have occurred on more islands than Kuiu and Admirality and may have been extripated by introductions of *americana*.

Between 1990 and 1998, studies were conducted on Chichagof Island to assess marten habitat selection at multiple scales, demographics, diet, and prey availability. Results indicated that marten numbers fluctuated greatly over time in response to food availability and trapping mortality (Flynn et al. 2004). Habitat requirements reflect a strong interaction between food, cover, climate, and predation, with forest cover being particularly important for travel, dens and resting sites, hunting and avoiding predation, and staying dry. Martens selected forest stands with increasing amounts of structure (e.g., selected stands with a greater number of large trees and multiple stories); with stronger selection occurring in winter. Important habitat features included large logs and stumps in decay classes 4 and 5 and the bases of large live trees, which they use for dens and resting sites. Habitat data were consistent with the Forest Plan definition of high value marten habitat.

Several studies have indicated that marten are sensitive to fragmentation (Hargis et al. 1999, Flynn et al. 2004). Based on metapopulation theory, spatially isolated populations will persist in suitable habitats if regularly recolonized (Ruggiero et al. 1994).

To determine whether the results of the Chichagof Island studies were applicable across the Tongass, eight study areas in Southeast Alaska were established between 2001 and 2003, representing different marten populations (Flynn et al. 2004). Hypotheses include 1) marten abundance is greater than or equal to 25 marten per large OGR (which was an assumption for the Forest Plan Conservation Strategy) and 2) marten densities would be greater on areas with habitat composition similar to OGRs, but with more diverse and abundant food resources.

This study indicated that only the Chichagof Island site had abundance estimates of greater than 25 females per OGR and only the Point Couverden and Thomas Bay sites had upper confidence intervals greater than 25 females per OGR. A large variation in small mammal abundance was observed, with long-tailed voles only abundant on Chichagof Island, Keen's mice common except on the mainland, and red-backed voles occupying a limited distribution but numerous where they occurred (e.g., Etolin Island, Point Couverden, Thomas Bay, and Yakutat). Marten fed on long-tailed voles when they were available, and generally avoided Keen's mice and red-backed voles. However, when vole numbers were low, marten switched to salmon. Marten numbers were best predicted by long-tailed vole abundance (positive correlation) and Keen's mice abundance (negative correlation); red-backed voles were not a significant factor. The ungulate index was marginally significant and fragmentation indices were correlated with marten density.

Based on these results, marten experts at the Conservation Strategy Review concluded that the OGR system appears to be an appropriate model for marten conservation, though they felt that management needed to be tailored to specific island populations (Cook and McDonald 2001, Cook et al. 2001). They believe that OGRs may not provide enough habitat in themselves to maintain healthy populations and additional conservation measures may be necessary, such as managing matrix lands as productive habitat and maintaining corridors between OGRs (Flynn et al. 2004). Studies of marten home ranges have shown that they encompass areas of timber harvest and roads, elevating the importance of matrix management in providing functional connectivity across the landscape for marten (Flynn et al. 2004).

Studies on Mitkof Island indicated that martens selected for POG and used a wide variety of POG types but used some clearcuts 26 to 40 years of age; on Mitkof these clearcuts where characterized by abundant understory forage and small mammals (Flynn et al. 2004). Home ranges of marten were well distributed across the landscape and included areas with timber harvest and roads. Although they selected against it, they seemed to readily travel across areas of noncommercial forest as well as POG and clearcuts with established conifer cover. Prey quality and quantity appear to be very important in predicting marten abundance and distribution.

2.4.2.3. Other Species

Research has also identified new endemic species, and refuted species thought to be endemic. Regardless, changing the list of endemic species considered by the panel assessment would not change the fact that they occupy limited distributions and some are sensitive to habitat conversion related to timber harvest. However, new science is continuing to emphasize the importance of the Alexander Archipelago as a center for endemism from a global perspective (Cook and MacDonald 2001, Cook et al. 2006).

Recent research on small endemic mammals in Southeast Alaska has focused on documenting distribution and increasing information regarding genetic variation. There has been little work, except for marten and flying squirrel, directed at habitat relationships. Therefore, while we know more about endemic mammalian abundance and distribution across the Tongass, there is not much additional information to support significant changes to the Conservation Strategy for endemic mammals.

Recent analyses presented at the Tongass Conservation Strategy Review Workshop (2006) updated the relationship between road density and wolf mortality related to legal and illegal hunting and trapping. This analysis was based on a regression analysis of average wolf harvest by Wildlife Analysis Area (WAA) between 1990 and 1995 against total road density for lands below 370 m elevation. Results presented the probability of an overkill (average harvest of greater than 30 percent of the population) or destructive harvest (harvest greater than 90 percent of the population occurring once between 1985 and 1999) of the wolf population on Prince of Wales Island, taking into account road density and whether the road system was connected to a main road system with access to a ferry. Results indicated that the probability of overkill for WAAs with road density greater than 0.7 miles per square mile at 40 percent, if the WAA is connected to a main road system and 13 percent if not. Results also indicated that 32 percent of WAAs on Prince of Wales Island had road densities indicative of a high probability of overkill and 52 percent had road densities indicating a high probability of having had at least one destructive harvest between 1985 and 1999. These results indicated that roads exerted a strong influence on wolf mortality, particularly when connected to main road systems. However, it is important to note that roads themselves do not decrease habitat capability for wolves, but increased density of roads may lead to higher hunting and trapping mortality through improved human access. There are other methods available to address unsustainable hunting and trapping mortality including changes to both State and Federal hunting and trapping regulations and increased enforcement.

2.5. Modifications to the Strategy under 2008 Forest Plan Amendment

The comprehensive science-based conservation strategy included in the 1997 Forest Plan is a scientifically sound foundation from which to base management decisions. Its system of large, medium and small OGRs across the Forest was implicitly designed to assure well distributed, viable wildlife populations. Alternative 5 of the 2008 Forest Plan Amendment Final EIS maintains the 2007 Forest Plan (1997 Forest Plan, as amended through 2007) old-growth conservation strategy, as described in Sections 2.2 and 2.3. Alternatives 1, 2, 3, and 6 of the 2008 Forest Plan Amendment Final EIS retain the main components of the conservation strategy (i.e., the OGR system and non-development LUDs, the beach fringe, riparian buffers); in addition, they expand the areas within the Forest-wide reserve network and incorporate some modifications to the standards and guidelines. This section describes the differences between the 2007 Forest Plan's conservation strategy, as represented by Alternative 5, and the conservation strategy proposed under Alternatives 1, 2, 3, and 6.

Alternatives 4 and 7 differ from the other five alternatives in that they eliminate or modify significant portions of the conservation strategy and these are also addressed in this section and compared with Alternative 5 as well as the 1997 Forest Plan. Alternative 4 modifies the coarse filter component by identifying Old-Growth Habitat LUDs in only four of the most heavily modified biogeographic provinces (North Central Prince of Wales, Kupreanof/Mitkof Islands, Dall Island and Vicinity, and East Chichagof Island) in addition to maintaining two individual reserves including the Wright Lake (mainland southeast of Wrangell), and Myers Chuck (Cleveland Peninsula northwest of Ketchikan) reserves and creating one near Eva Lake (northeast Baranoff Island) in an area currently designated as Semi-Remote Recreation. In addition, all VCUs outside of these biogeographic provinces would be required to retain 33 percent of their old growth with no requirement to consider spacing, location, size, shape, or composition in the design of the retained acres, as is provided by the 2007 Forest Plan Old-Growth Habitat Reserve Criteria (see Section 2.2.1.2, *Description and Design Features of the Reserve Network*). As under all other alternatives, OGRs are also provided by other non-development LUDs, although, with the exception of Alternative 7, the acreage is less under Alternative 4 than under all other alternatives. Alternative 7 maintains substantial area in non-development LUDs, but entirely eliminates the Old-Growth Habitat LUD and would not have a specific retention requirement.

Of the other alternatives, Alternatives 1, 2 and 3 all have significantly less old-growth harvest as compared to Alternative 6. This Appendix therefore focuses on effects to Alternative 6 because this is the benchmark by which to measure effects to these three other alternatives. Adverse effects to wildlife would be less under Alternatives 1, 2 and 3 based on the volume of old growth projected to be harvested and this is fully discussed in the Wildlife Section of the FEIS.

2.5.1. Changes to Forest-wide Reserve Network (coarse-filter approach)

The Forest-wide Reserve network is expanded under Alternatives 1, 2, 3, and 6, relative to Alternative 5 (the 1997 Forest Plan Revision as amended). This expansion includes additional acreage in the Old-Growth Habitat LUDs relative to Alternative 5 and relative to the original 1997 Forest Plan. The expansion of the Old-Growth Habitat LUDs is the same for all four alternatives. In addition, the acreage in non-development LUDs is expanded for each of the four alternatives, with the amount of the expansion varying by alternative. As noted above, Alternative 4 identifies a smaller area than Alternative 1, 2, 3, 5, or 6 in Old-Growth Habitat LUDs and Alternative 7 does not identify any area.

2.5.1.1. Changes to Old-Growth Habitat LUDs

The original 1997 Plan noted that small OGRs had received less analysis and mapping precision than was necessary to meet the Plan standards. Large and medium OGRs received a rigorous review to be sure that they achieved the conservation strategy objectives (1997 Forest Plan, p. 3-82). However, the small OGRs received differing levels of reviews. Therefore, the Forest Plan and the Tongass National Forest Land and Resource Plan Implementation Policy Clarification (referred to as TPIT; USDA Forest Service 1998;) provided for the further evaluation and possible adjustment of the locations of small OGRs (USDA Forest Service 1997, Forest Plan, p. 3-82).

The 1997 Forest Plan standards and guidelines for OGRs state that during project level environmental analyses for project areas that include or are adjacent to a mapped OGR, the size, spacing and habitat composition of mapped reserves may be further evaluated (USDA Forest Service 1997, Forest Plan, p. 3-82). TPIT (USDA Forest Service 1998, p. 1) stated that an interagency team of biologists (referred to as the interagency team) would jointly evaluate the location and composition of the small OGR as mapped in the Forest Plan using criteria in Forest Plan Appendix K. The objective of the interagency team review described above was to develop a consensus biological recommendation on small reserve locations that was consistent with the Forest Plan. The Forest Service line officer retained decision authority to implement recommended changes or modify them. Because changes in OGRs resulted in a change in LUD, a Forest Plan amendment was required to implement changes.

As described in Section 2.3, analysis and mapping refinement of OGRs associated with 24 project areas has been conducted since 1997 (Table D-2). These adjustments were incorporated into the Forest Plan via non-significant Forest Plan amendments. Efforts to complete this higher level of analysis and mapping on all other small reserves have been ongoing since 1997. As part of the current Forest Plan Amendment process, the Forest worked with the Alaska Department of Fish and Game (hereafter referred to as ADFG) and the U. S. Fish and Wildlife Service (hereafter referred to as FWS) to complete a more comprehensive review and mapping effort. This process was conducted in 2006 and 2007 and included the development of a biological recommendation for adjustment of OGR boundaries, a refinement of that proposal with Forest Service Ranger District staff, and a further refinement by the Forest Supervisor. This refinement process was conducted in order to consider multiple-use objectives in addition to pure biological ones. The final proposal is included in Alternatives 1, 2, 3, and 6 of the Final EIS. Alternative 5 retains the 1997 Plan (as amended) reserve network and the reserves of Alternatives 4 and 7 are not affected by this proposal.

The final proposal for modifying small OGR boundaries was based on reviewing all small OGRs and a few medium reserves. As a result, OGR locations were generally finalized for all but 13 small OGRs. OGR locations are expected to change in the future only if a project occurs near these 13 reserves or under other limited circumstances (see Appendix K to the Final EIS). The net result of the review was an increase of 39,000 acres in the Old-Growth Habitat LUD, from 1,182,000 to 1,221,000. In addition to this expansion, some areas containing Old-Growth Habitat LUDs were converted to other non-development LUDs (e.g., Special Interest Area and Semi-Remote Recreation) and remain a part of the OGR network. These areas are discussed in the next subsection and the net result of all these changes is summarized in Section 2.5.1.3.

Not only was the total acres in the Old-Growth Habitat LUD increased, but the quality of the small OGRs was also improved. Updated local information was used, in many cases, to increase the protection of key old-growth species habitat, including known goshawk nests, important black bear, mountain goat and brown bear habitat, riparian habitat, anadromous streams and beach fringe. In addition, connectivity was another consideration in updated small OGRd locations. Rationale for making these adjustments were documented in an OGR tracking table for the refinement effort (located in the planning record).

2.5.1.2. Changes in Other Non-Development LUDs

The Old-Growth Habitat LUDs discussed in the previous subsection are a critical piece of the OGR network, but many other non-development LUDs represent important parts as well. Although the area in Old-Growth Habitat LUDs is the same for Alternatives 1, 2, 3, and 6, the total area in other non-development LUD categories varies. Alternatives 4, 5, and 7 vary in both their Old-Growth Habitat LUD and their other non-development LUD acreage. The acreage in many individual non-development LUD categories is constant regardless of the alternative (e.g., wilderness, LUD II, research natural area); however, the acreage in three non-development LUD categories (other than Old-Growth Habitat) differs among alternatives. These categories include: Special Interest Area, Semi-Remote Recreation, and Remote Recreation. Special Interest Area acreage was expanded by 47,000 acres relative to Alternative 5 (the 1997 Forest Plan, as amended), under Alternatives 1, 2, 3, 4, 6, and 7. The change in Semi-Remote and Remote Recreation acreages varies by alternative. For Alternative 6, the area in these two LUDs increased by 63,000 acres compared with Alternative 5. For Alternatives 1, 2, and 3, these LUD acreages increased by 2,681,000, 1,591,000, and 717,000 acres, respectively, while for Alternatives 4 and 7 the LUD acreages decreased by 379,000 and 308,000 acres, respectively.

The net increase in non-development LUD acreage (not counting the Old-Growth Habitat LUD) relative to Alternative 5, would be 110,000 acres for Alternative 6 and would range from 763,000 to 2,728,000 acres for Alternative 3, 2, and 1 in that order, respectively. Under Alternatives 4 and 7, non-development LUDs other than Old-Growth, would decrease by 333,000 and 261,000 acres, respectively. While it is recognized that not all acres within these LUDs are old growth, there would be a net increase in the reserve system under Alternatives 1, 2, 3, and 6 that is proportional to the increase in non-development LUD acres and a proportional decrease under Alternatives 4 and 7.

2.5.1.3. Net Changes to the Forest-wide Reserve Network

The acreage in reserves, given the above changes in the Old-Growth Habitat LUD and other non-development LUDs, is compared with the acreage in the matrix for the alternatives and compared with the 1997 version of the Forest Plan in Table D-5. This comparison shows that the 1997 version of the Plan included 78.0 percent of the Forest in reserves. As a result of land adjustments and OGR changes between 1997 and 2007, the 2007 Forest Plan (equivalent to Alternative 5) now has 78.5 percent of the Forest in reserves. Alternatives 1, 2, 3, and 6 would each result in a higher percentage yet, ranging from 79.4 percent in reserves under Alternative 6 to 95.0 percent in reserves under Alternative 1. Under Alternative 4, the percentage in reserves would be reduced to 71.8 percent, and under Alternative 7 this percentage would be reduced to 69.9 percent.

Table D-5.
Summary of Acreages in Reserves and Matrix under the Alternatives compared with the Forest Plan in 1997

Alternative	Reserves			Matrix	Total	Percent of Forest in Reserves
	Old-Growth Habitat LUD	Other Non-Dev. LUDs	Total in Non-Dev. LUDs			
Alternative 1	1,221,173	14,712,270	15,933,443	840,359	16,773,802	95.0%
Alternative 2	1,221,173	13,623,148	14,844,321	1,929,485	16,773,806	88.5%
Alternative 3	1,221,173	12,748,685	13,969,858	2,803,945	16,773,803	83.3%
Alternative 4	393,360	11,652,756	12,046,116	4,727,686	16,773,802	71.8%
Alternative 5 (1997 Forest Plan)	1,182,424	11,985,410	13,167,834	3,605,974	16,773,808	78.5%
Alternative 6	1,221,173	12,095,212	13,316,385	3,457,420	16,773,805	79.4%
Alternative 7	0	11,724,107	11,724,107	5,049,695	16,773,802	69.9%
1997 Forest Plan	1,131,059	12,034,860	13,165,919	3,717,081	16,883,000	78.0%

Sources: Final EIS Chapter 2 for the Alternative numbers; Appendix N to the 1997 Tongass FEIS and Appendices to Appendix N for 1997 numbers.

A summary of POG acres in reserves and in various matrix categories is provided in Table D-6. This table presents POG acreages for the Forest-wide reserve network under Alternatives 1, 2, 3, and 6, given the above changes in the Old-Growth Habitat LUD and other non-development LUDs, as well as under Alternatives 4, 5, and 7, which do not include the above changes in the Old-Growth Habitat LUD. The table also compares these alternatives with the 1997 version of the Forest Plan. Based on these numbers, the 1997 version of the Forest Plan included 70.1 percent of the existing POG in reserves; combined with the protected and unscheduled POG in the matrix, 90.6 percent of the current POG was protected or not scheduled to be harvested. Again, Alternatives 1, 2, 3, and 6 would each result in higher percentages for both of these categories, with 72.0 percent of the POG in reserves and 91.0 percent of the existing POG protected or not scheduled for harvest under Alternative 6.

Under Alternative 5 (the 2007 Forest Plan), 71 percent of the existing high-volume POG (SD Model types 5N, 5S, and 67) and 68 percent of the existing large-tree POG (SD Model type 67) would be included within reserves (Table D-6). Overall, 90 percent of the existing high-volume POG and 89 percent of the large-tree POG would not be harvested. These percentages would all remain the same or increase under Alternatives 1, 2, 3, or 6 because of the changes made to OGRs and other LUDs, which resulted in a greater portion of the forest types consisting of larger trees being included within reserves. Under Alternative 6, for example, 73 percent of the high-volume POG and 70 percent of the large-tree POG would be included within reserves. Overall, 90 percent of the existing high-volume POG and 89 percent of the large-tree POG would not be harvested. Alternatives 1, 2, and 3 would protect higher percentages of high-volume and large-tree POG in reserves and in the matrix. Under Alternatives 4 and 7, on the other hand, lower percentages would be protected. Approximately 57 to 60 percent of the high-volume POG and 53 to 57 percent of the large-tree POG would be in reserves under Alternatives 7 and 4, respectively. Overall, 82 to 85 percent of the high-volume POG and 80 to 84 percent of the large-tree POG would be protected from harvest.

Table D-6.
Estimated Acreage and Percentage of All Existing POG, High-Volume POG, and SD67 POG in Reserves[1] and Matrix Lands (minimum protected vs. maximum harvested) [2] by Alternative

Alt.	POG Category	Amount in Reserves[1]		Amount in Matrix[2] Minimum Protected		Amount in Matrix[2] Maximum Harvested		Total Existing POG[3]	
		Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
1	All POG	4,615,995	93%	249,182	5%	85,972	2%	4,951,148	100%
	High-Volume POG	1,862,441	93%	104,444	5%	41,460	2%	2,008,345	100%
	SD67 POG	477,813	89%	43,253	8%	16,385	3%	537,451	100%
2	All POG	4,167,367	84%	569,270	11%	214,511	4%	4,951,149	100%
	High-Volume POG	1,674,500	83%	232,318	12%	101,529	5%	2,008,346	100%
	SD67 POG	425,744	79%	77,417	14%	34,291	6%	537,451	100%
3	All POG	3,866,467	78%	771,255	16%	313,426	6%	4,951,148	100%
	High-Volume POG	1,572,277	78%	294,628	15%	141,440	7%	2,008,345	100%
	SD67 POG	401,011	75%	90,844	17%	45,596	8%	537,451	100%
4	All POG	2,965,670	60%	1,329,005	27%	656,473	13%	4,951,148	100%
	High-Volume POG	1,203,702	60%	511,928	25%	292,714	15%	2,008,345	100%
	SD67 POG	307,863	57%	145,418	27%	84,169	16%	537,451	100%
5	All POG	3,518,425	71%	970,176	20%	462,556	9%	4,951,156	100%
	High-Volume POG	1,431,634	71%	378,068	19%	198,647	10%	2,008,349	100%
	SD67 POG	364,183	68%	113,501	21%	59,767	11%	537,451	100%
6	All POG	3,563,600	72%	942,410	19%	445,103	9%	4,951,114	100%
	High-Volume POG	1,458,202	73%	352,379	18%	197,760	10%	2,008,342	100%
	SD67 POG	375,671	70%	103,085	19%	58,696	11%	537,451	100%
7	All POG	2,807,478	57%	1,336,275	27%	807,396	16%	4,951,148	100%
	High-Volume POG	1,143,122	57%	502,283	25%	362,940	18%	2,008,345	100%
	SD67 POG	287,295	53%	144,188	27%	105,968	20%	537,451	100%
1997 Forest Plan	All POG	3,551,482	70%	1,038,492	21%	473,597	9%	5,063,571	100%
	High-Volume POG[4]	1,562,652	72%	373,857	17%	219,268	10%	2,155,788	100%
	SD67 POG[4]	--	--	--	--	--	--	--	--

[1] Reserves include all non-development LUDs (e.g., Old-Growth Habitat, Semi-Remote Recreation, Remote Recreation, Wilderness, National Monument, etc.).
[2] Matrix includes all development LUDs (Timber Production, Modified Landscape, Scenic Viewshed, and Experimental Forest). Maximum harvested assumes the maximum acreage permitted by the Allowable Sale Quantity is harvested each decade.
[3] Note that the Tongass land base has changed since 1997 due to land adjustments and harvest has occurred.
[4] High-volume POG numbers were derived from percentages given in Appendices 3 and 8 to Appendix N of the 1997 Tongass FEIS; numbers were not available for SD67 POG. There are differences in the method of calculation for high-volume POG between 1997 and 2008, so the absolute numbers should not be compared – only the percentages.

Sources: Table 3.9-12 in Biodiversity Section for the 2008 alternative numbers; Appendix N to the 1997 Tongass FEIS and Appendices to Appendix N for 1997 numbers.

2.5.2. Changes to Standards and Guidelines (fine-filter approach)

This section describes and provides background/rationale for the changes to standards and guidelines proposed under the seven alternatives. The first section provides a summary listing of the primary changes in standards and guidelines from the 1997 Forest Plan. Following this section, a series of sections provide background and rationale for the most important individual changes.

2.5.2.1. Overview of Changes to Standards and Guidelines by Alternative

Most of the standards and guidelines identified in the 1997 Forest Plan remain the same for all of the alternatives. The standards and guidelines for Alternative 5 would be exactly the same and most standards and guidelines related to the conservation strategy do not change under Alternatives 1, 2, 3, and 6. This includes key supporting standards, like the 1,000-foot beach buffer and riparian buffers that were deemed critically important for wildlife connectivity; these are brought forward into the amended Plan under these alternatives. However, there are four primary changes, four additional important but non-substantive changes, and some minor editorial changes to standards and guidelines that relate to Alternatives 1, 2, 3, and 6. The four primary changes associated with these alternatives are listed in a subsection below, followed by the important non-substantive changes (minor changes are not listed).

In addition, many of the changes associated with Alternatives 1, 2, 3, and 6 and several additional important changes are associated with Alternatives 4 and 7. These changes are identified in separate subsections below.

Primary Changes Associated with Alternatives 1, 2, 3, and 6

1. Added a new Forest-wide Legacy Forest Structure (hereafter referred to as Legacy) standard and guideline that requires retention of 30 percent of the acreage in harvest units greater than 20 acres in size for VCUs with high amounts of past and/or anticipated future timber harvest. This replaced the goshawk foraging standard and guideline and the marten standard and guideline that required varying degrees of retention of old growth trees in harvest units.
2. Changed the goshawk nesting habitat standard and guideline for confirmed and probable nests to allow timber harvest or other activities if, based on annual monitoring, the nest site is found to be inactive for 2 consecutive years. (note – active nest sites include sites that are occupied, whether or not there is actual nesting documented).
3. Added a stipulation to allow for alternative goshawk nest site management with projects under contract. If a new nest is located within an area that is under a timber sale or other contract, the activity may proceed if at least 300 acres of POG, including at least one contiguous block of 100 acres, remains within a 0.75-mile circular radius of the nest. Timing restrictions would apply to allow that year's brood to successfully fledge from the nest.
4. Clarified that the landscape connectivity standard was to provide connectivity between large and medium reserves only. Also, given the assessment of small OGRs done for the amendment (see below), no additional areas were determined to need additional assessment at the project level and this is reflected in the amended standard.

Other Important Clarifying Changes Associated with Alternatives 1, 2, 3, and 6

1. The endemic terrestrial mammal standard was changed to allow for use of existing data on endemic mammal distribution. Surveys would only be necessary where existing information is not adequate to assess project level effects.
2. Edited the marten road standard to clarify that road management would be considered only where road access and associated human caused mortality has been determined to be the significant contributing factor to unsustainable marten mortality and this would be done in collaboration with the Alaska Department of Fish and Game (ADF&G).
3. Edited the wolf road standard to clarify that road management would be considered only where road access and associated human caused mortality has been determined to be the significant contributing factor to unsustainable wolf mortality, and this would be done in collaboration with ADF&G. It also directs an assessment of both total and open road density when human access considerations are necessary. The wolf standard was changed so that both access management on National Forest System lands and hunter/trapper harvest regulations are considered.

4. Edited the wolf standard to clarify the use of the deer habitat capability model and standardized this to a habitat capability of 18 deer/square mile. The wolf standard was also changed to direct biologists to consider local knowledge of habitat conditions, spatial location of habitat and other factors rather than solely relying upon model results.

Changes Associated with Alternative 4

All of the changes associated with Alternatives 1, 2, 3, and 6 also apply to Alternative 4, except the Legacy standard and guideline. Neither the Legacy nor the goshawk foraging standard and guideline and marten standards and guidelines apply to Alternative 4. In addition, as noted in the introduction to Section 2.5, Alternative 4 has a standard that requires a minimum of 33 percent of POG be retained in VCUs outside of the four biogeographic provinces that include areas with designated Old-Growth Habitat LUDs.

Changes Associated with Alternative 7

All of the changes associated with Alternatives 1, 2, 3, and 6 also apply to Alternative 7, except for the Legacy standard and guideline and the goshawk nest buffer standard and guideline. Neither the Legacy nor the goshawk foraging and marten standards and guidelines apply to Alternative 7 and there would be no nest buffer standard and guideline that is specific to goshawks; only the general heron and raptor nest protection standard and guideline would apply. In addition, riparian buffers along Class III streams are not required under Alternative 7 and the beach and estuary fringe is reduced to 500 feet.

2.5.2.2. Legacy Standard and Guideline – Alternatives 1, 2, 3, & 6

Background from 1997 Tongass Land and Resource Management Plan

The Legacy Forest-wide standard and guideline is an ecological, rather than single-species approach, that retains old-growth forest structure within harvest openings greater than 20 acres in areas that have had or are anticipated to have high timber harvest. The legacy standard and guideline evolved from considerations presented at the Interagency Conservation Strategy Review workshop (summarized in USDA Forest Service 2007). This standard and guideline was developed after discussions with ADFG and FWS at several interagency meetings in 1997. It replaces the species-specific goshawk foraging and marten standards and guidelines from the 1997 Forest Plan Revision to provide protection for goshawk, marten and other wildlife species across a broader landscape. Goshawk foraging and marten standards and guidelines, that prescribed retaining canopy cover in high risk biogeographic provinces, were conservation measures added to the Forest Plan in the Record of Decision to provide additional protections and to increase the already high likelihood that implementing the Forest Plan would maintain habitat to provide for viable populations of goshawks and moderate likelihood that implementing the Forest Plan would maintain habitat to provide for viable populations of marten. This subsection provides a summary of the background for the new Legacy standard and guideline by describing the history of the goshawk foraging and marten standards and guidelines.

American Marten

The risk assessment panel convened in 1997 indicated that there was a better than equal likelihood that implementation of Alternative 11 for 100 years would result in significant gaps in marten habitat distribution on the Tongass (DeGayner 1997). Alternative 11, with modifications, was the Alternative selected in the Record of Decision for the 1997 FEIS. Their interpretation of the outcomes that were used as the basis for risk assessment is as follows (a complete description of the panel assessments with the 5 outcomes is described later in this document in the Wildlife Viability Ratings section). Outcome III, defined as providing habitat to maintain breeding populations but with significant gaps in historic distribution, was interpreted by the panelists as an array of potential conditions. At one end of this array were gaps in habitat as small as the territory of a single marten. At the other end this array was conditions with broad gaps in habitat distribution and significant limitations on population interactions. The panelists considered some part of this array of conditions as meeting the definition of viable and well-distributed. The panelists assigned a total of 91 likelihood outcome points to the sum of Outcomes 1 + II + III. This included 38 likelihood points in Outcomes I and II, which they considered to represent a viable and well distributed condition. It also includes 55 likelihood points in Outcome III, some portion of which represents a viable and well distributed condition. The panelists indicated there was a very low likelihood that marten would exist only in refugia or be extirpated from the Tongass after 100 years of Forest Plan implementation with a combined Outcome IV and V score of 9. The panelists indicated that matrix management was the feature of the 1997 Alternative 11, as rated, that contributed to the assignment of likelihood points to outcomes that were not well-distributed. They indicated that clearcut silviculture on a 100-year rotation would result in further fragmentation of marten habitat.

The panel evaluators defined the spatial scale of a gap to be one vacant marten territory. A marten territory was considered to be from one to three square miles. The consequence of a gap is some measure of reduced gene flow within the population. Panel evaluators indicated that a population can accommodate a certain, but unknown, level of gaps and still remain viable. The greater the size and number of gaps, however, the higher the risk of reducing gene flow. To avoid creation of gaps by forest management practices, panel evaluators recommended uneven aged harvest, in contrast to clear cutting in blocks, be coupled with a reduced level of timber harvest in the matrix lands. The panel recognized the high degree of natural fragmentation on the Tongass National Forest. The panel could not, however, identify the threshold of POG remaining at which a landscape or a territory would not be suitable for marten reproduction (DeGayner 1997).

The panel was very conservative in their assessment of the definition of a gap, which lead to the assignment of most points in Outcome III. The overall assessment of a moderate likelihood of maintaining viable marten hinged on the 55 likelihood points in Outcome III and the fact that some undetermined portion of this outcome likelihood represented a viable and well distributed condition. It is also important to note that the panel assessed the 1997 Alternative 11 without the additional conservation measures that were added at the decision stage. Even without these additional measures, the panel projected no likelihood that marten would be extirpated from the entire forest under this alternative. Forest Plan was strengthened at the decision stage subsequent to the panel assessment, primarily due to the level of concern about the likelihood of marten populations remaining well-distributed across the Tongass for at least 100 years.

The measures used to strengthen the alternative were based on comments provided by the panelists, information drawn from past studies on marten, and information on existing habitat conditions on the Tongass. Three different measures were applied to Alternative 11 to improve the likelihood of maintaining habitat to support well-distributed populations of marten.

1. Within the five higher risk biogeographic provinces, stands would be managed under practices other than clearcutting.
2. Access management would be used to reduce marten mortality in areas where mortality rates due to trapping/hunting have been identified as a serious risk to marten populations.
3. Additional assurance of maintaining connections between habitat blocks throughout the Tongass would be considered.

Implementation of the above strategy increased the likelihood of maintaining habitat that supports well-distributed marten populations. While it was anticipated that there would likely be gaps in this distribution, there was a low likelihood that there would be significant isolation among marten populations resulting from implementation of the 1997 Forest Plan.

Goshawk

Alternative 11 of the 1997 Forest Plan was rated as having very low likelihood of goshawks existing in refugia or being extirpated from the Tongass after 100 years of Forest Plan implementation. However, because the goshawk was considered for listing under the Endangered Species Act, Alternative 11 was reviewed at the decision stage to determine if features of the alternative could be modified to improve the projected outcome. An additional measure for goshawk habitat was prescribed for Prince of Wales Island where POG was fragmented by past management actions. In VCUs, where over 33 percent of POG has been converted to young stands by past management, any additional management of POG was restricted to 2-acre clearcuts or managed to leave significant structure in harvested stands. Taken in combination with other measures already in place in the Forest Plan, these additional measures increased the already high likelihood of providing habitat sufficient to maintain viable and well-distributed goshawk populations.

New information Since 1997

Scientific Literature: A considerable number of new studies on goshawks and marten relevant to the Tongass situation have been conducted since 1997. Many new studies and concerns related to the conservation of marten and goshawk were presented at the Interagency Conservation Strategy Review: An Assessment of New Information Since 1997 in April 2006 (USDA Forest Service 2007). This information is summarized along with other studies in Section 2.4.2.

Implementation of Goshawk Foraging and Marten Standards and Guidelines and Forest Plan since 1997: The 1997 goshawk foraging and marten standards and guidelines, coupled with the associated Tongass Plan Implementation Team (TPIT) Clarifications, are lengthy and complex. This complexity has lead to inconsistent interpretation and application across the Tongass (Conservation Strategy Review 2007). In addition, translating canopy cover to standard silviculture terminology has been problematic. The TPIT worked collaboratively to attempt to clarify these standards and guidelines in 1998 and allowed flexibility in the implementation of these standards. Unfortunately, this clarification was lengthier than the original standard and guideline and did not necessarily result in increased clarity. One result of the TPIT clarification was to allow flexibility to clump leave trees when operability concerns or ecological reasons made uniform placement difficult or impossible.

There have also been issues during the implementation of goshawk foraging and marten standards and guidelines. Recent compiled information indicates the lack of consistency in their Forest-wide application, despite the TPIT clarifications. A survey of Tongass District wildlife biologists done in 2007 indicates a high degree of inconsistency and uncertainty in the application of goshawk foraging and marten standard and guidelines (Fadden 2007a). Biologists were not consistent in their interpretation of the standards and guidelines and believed that there was not consistent interpretation Forest-wide. In addition, it was not necessarily clear to biologists how these standards and guidelines actually benefited marten and goshawk.

Review of a sample of planned timber sales since 1997 also demonstrates the inconsistency in application on the ground, with the goshawk foraging and marten standards being implemented using a simple percentage of the stand on some timber sales, using basal area on others, and using trees per acre on others (Fadden 2007b). All of the measures resulted in different effects on the ground, ranging from a clumped leave patches to partial harvest scattered across the unit. Within most timber sales reviewed, implementation of both marten and goshawk standards did take into account other leave areas (stream buffers, karst, etc.), which counted towards the final target (Fadden 2007b). Recommendations in this report included the need to simplify these standards to provide for more consistent application.

Monitoring of timber harvest implemented since 1997 indicates that, overall, timber harvest is occurring at a scale much less than was anticipated in the 1997 Forest Plan EIS. Annual timber harvest has been much less than the Forest Plan Allowable Sale Quantity (ASQ) of 267 mmbf. In 2004, actual harvest was 17 percent of the ASQ and in 2005, harvest was 24 percent of the ASQ. In addition, there is trend toward a decrease in size of traditional clearcuts and a decrease in opening size. Since 1997, the average clearcut harvest size is 11 acres (Conservation Strategy Review 2007). As a consequence, the effects on wildlife have been considerably lower than the level predicted by the 1997 Forest Plan FEIS.

The trend toward smaller opening sizes coupled with the increased use of partial harvest are factors that make timber sales less economical, as well as more difficult to log. A combination of factors including market issues and increased fuel and logging costs are also factors in timber sale economics; however, when coupled with less volume per acre and higher logging costs due to partial harvest, it has exacerbated the economic issues, particularly at the scale of an individual timber sale (as presented at the Interagency Conservation Strategy Review: An Assessment of New Information Since 1997 in April 2006; USDA Forest Service 2007).

The 1997 Forest Plan sought to provide for economic considerations while implementing conservation measures for species of concern. Monitoring of timber sale economics indicates that this approach, which has resulted in significantly smaller timber harvest unit size and more partial harvest, is likely contributing to significant difficulties in implementing economic timber sales. More information regarding timber sale economics can be found in the *Economic and Social* section of the Final EIS.

While this information indicates the challenge in providing for economic timber sales, the trends discussed above represent several positive consequences for wildlife. The main positive consequence is that more habitat for old-growth associated species is retained as old growth. The second consequence is the ameliorating effects of forest succession. Negative effects to goshawk and marten are strongly associated with the effects of past large-scale timber harvest on the Tongass. Past harvest resulted in much larger openings than are allowed under the 1997 Forest Plan, often occurring within riparian areas and beach buffers, which are high value wildlife habitats. Neither riparian areas nor beach buffers are harvested under the 1997 Forest Plan, nor would they be harvested under 2008 FEIS Alternatives 1, 2, 3, or 6. As young forests mature, they gradually become more suitable for goshawks and marten. Previously, little emphasis was given to the young second-growth component of the matrix in terms of its ability to contribute structure, function, or value to wildlife. However, there appears to be a growing perception that, with active management, young stands can contribute at least some of the values commonly associated with old-growth (Barbour et al. 2005). Key features of old-growth forest include large, old decadent trees, multiple canopy layers, standing snags, down woody debris, and a diverse and abundant herb layer. These features can be maintained or created by retaining structures and organisms at the time of regeneration harvest of old-growth forest and through active management of young, even-aged stands. Some potential approaches to even-aged management involve thinning of older, “commercial”-aged young-growth stands (Deal 2001, Deal and Tappeiner 2002, Deal et al. 2002), including red alder (*Alnus rubra*) in the reforestation of harvested areas to expedite the production of large-diameter conifers (Deal 1997, Deal et al. 2004, Hanley et al. 2006), and the initial use of alternatives to clearcutting (McClellan et al. 2000). It should be emphasized that additional research on the implementation of these techniques is needed.

For example, both pre-commercial and commercial thinning of young-growth stands have beneficial impacts to black-tailed deer by opening up the forest and promoting the growth of understory vegetation. Likewise, active young-growth management has the potential to benefit both marten and goshawk through an increase in small mammal populations (red squirrels and red-backed voles, major prey items of these species, benefit from more open forests with abundant understory vegetation) and by speeding the succession of older young-growth stands toward old-growth condition (Hanley 1996, 2005). Thinning also may benefit forest-dwelling birds, some of which are prey for goshawk (Dellasala et al. 1996). Although the time frame in which young-growth stands become suitable habitat for some old growth associated species is beyond the lifespan of the 10-15 years of this Forest Plan, it is something to be considered as part of a long-term vision for management of the Tongass. It must be noted however that their research on the effectiveness of young-growth management is on going and peer-reviewed results are not yet available. The evidence in support of the potential short and long term benefits of young-growth management for multiple values is derived from a series of demonstration projects that have tested various second-growth management methods (e.g., Zaborske et al. 2002; Deal et al. 2004; McClellan 2004, 2005; McClellan et al. 2005; Wipfli et al. 2003), retrospective assessments (Hanley and Barnard 1998), and other observations. Thus, there remains uncertainty about the true benefits of second-growth management to wildlife. Although active management will likely improve habitat conditions in young conifer stands, significant questions remain regarding the types of treatments, treatment timing, and cost/benefit tradeoffs.

This does not imply that young growth is the same quality habitat as old growth, nor does it ignore the negative consequences of the stem-exclusion phase, which is characterized by dense young trees that shade out most of the understory and thus, provide low habitat value for most wildlife species. But once stands transition out of this stage, they gradually begin to provide the components of good quality wildlife habitat, including larger trees, small canopy gaps, a diverse understory, snags and downed logs. Stands typically do not begin to take on the characteristics of old growth until they reach at least 150 years of age (Alaback 1982). However there is some evidence that some species associated with older forests may in fact use much younger stands (for example, goshawks - see Section 2.4.2.1).

Besides the benefits of succession, another benefit of aging young-growth stands is the increased potential value of these stands for commercial forest products and their ability to replace old growth trees for a significant portion of the supply of timber in Southeast Alaska in the future. Managing young-growth forests in Southeast Alaska is likely to become an increasingly important component of forest management on the Tongass in the coming years. Young-growth stands can be treated through thinning and other intermediate treatments to concentrate growth in fewer, larger trees, improve lumber quality, and/or to enhance habitat conditions for wildlife. Treatments applied to young stands may have a profound effect on the types of materials available in the future, including log diameter, knot size, and wood strength (see *Timber* section of Final EIS for more discussion).

Overall the consequence of substantially less harvest of old growth in the past decade coupled with the increased growth and potential value of young growth for wildlife is beneficial and supports that assumptions made regarding risks to species viability made in the 1997 Plan were conservative. This conclusion is supported by observations that some old growth associated species use younger forests that anticipated in the 1997 Forest Plan (for example, goshawks), that a shift to more commercial forest products coming from young growth forests is occurring and is likely to accelerate over the next two to three decades, and that the beneficial effects to wildlife by less harvest of old growth over the past decade than is greater than was anticipated under the 1997 Forest Plan. This is particularly significant in places with the oldest young growth, which includes some portions of Prince of Wales Island. Of the 187,000 acres of past harvest on Prince of Wales Island, 8,000 acres are now age 50 or older, 42,000 acres are now age 40 to 49, and 54,000 acres are now age 30 to 39. Within 20-30 years, much of the young growth on Prince of Wales Island may be approaching suitable nest habitat for goshawks.

<u>Annual Monitoring and ADFG Reports:</u> According to the 2006 Tongass National Forest Annual Monitoring and Evaluation Report, habitat capability for marten was expected to decrease slightly because of timber harvest activities and road construction across the Tongass. However since timber harvest levels have been substantially less than anticipated, this report documents that effects anticipated to marten under the Forest Plan have been less than anticipated. The most recent ADF&G Furbearer Report (Alaska Department of Fish and Game 2004) suggests that marten populations are stable or increasing across most of the Tongass; the exception potentially being near Juneau. In 2003, over 2700 marten were trapped in Southeast Alaska and both trappers and agency personal reported stable or increasing marten populations in most Game Management Units (GMUs). The two areas with the highest harvest levels are GMUs 2 and 4, which include Prince of Wales Island and Chichigof Island, areas with some of the highest past timber harvest on the Tongass. The link, if any, between habitat changes on the Tongass National Forest and changes in the marten population is difficult to determine. Fluctuations in prey abundance or spatially different trapping pressure are confounding factors. Areas on the Tongass with the most timber harvest continue to have stable or increasing marten populations and trapping regulations have not changed significantly on the Tongass.

<u>Queen Charlotte Goshawk Status Review and Findings</u>: The U.S. Fish and Wildlife Service was petitioned to list the Queen Charlotte goshawk as endangered in May 1994. In June 1995, the Service published a 12-month finding that listing was not warranted. The finding was challenged in U.S. District Court, which remanded the finding to the FWS with instructions to base the finding on the existing management plan for the Tongass National Forest, rather than one in development at the time. The FWS released a new finding (also “not warranted”) in August 1997, which was also challenged in April 1998, and which the court remanded again to the FWS in July 1999, with instructions to provide a reliable population estimate for the subspecies The government appealed this decision in the U. S. Court of Appeals, which overturned the requirement for a population estimate, but remanded the case to the District Court for further consideration of the remainder of the finding. In May 2004, the District Court remanded the finding to the FWS with instructions to evaluate whether Vancouver Island in British Columbia is a “significant portion” of the subspecies’ range and, if so, to determine whether the bird should be listed (U. S Fish and Wildlife Service 2007)

In order to reach an informed decision with respect to the court’s remaining questions on the significance of Vancouver Island and whether the subspecies should be listed, the FWS recently updated the status of the subspecies range-wide. In addition, the FWS published a new finding in November 2007 regarding the status of the Queen Charlotte goshawk. In this report, they concluded that Vancouver Island is a significant portion of the Queen Charlotte goshawk's range and that listing the subspecies on Vancouver Island is warranted. In addition to addressing the court's remand, they assessed whether listing was warranted for the Queen Charlotte goshawk beyond Vancouver Island. Their review indicated that the subspecies' populations in British Columbia and Alaska each constitute distinct population segments (DPSs) of the Queen Charlotte goshawk. Based on differences in forest management, with substantially greater habitat loss in British Columbia, they found that they had sufficient information about biological vulnerability and threats to the goshawk to determine that the entire British Columbia DPS warrants listing as threatened or endangered. They also found that the best available information on biological vulnerability and threats to the goshawk does not support listing the Alaska DPS as threatened or endangered at this time. Of note are the following key items from the FWS review:

- The majority of POG that existed in Southeast Alaska prior to large-scale logging would remain over time. Most (77 percent) of this habitat is on the Tongass.
- There is no data to indicate how much goshawk populations have declined as a result of timber harvest. Based on one approach, the FWS believes that populations may have declined by 15 percent in Southeast Alaska and as much as 45 percent in British Columbia.
- The most important factor related to goshawk demographics is adult survival. Adult survival is a function of prey abundance and availability.
- Southeast Alaska is relatively prey-poor for goshawks, especially on the islands of the south Tongass. For example, Prince of Wales Island lacks red squirrels and sooty grouse, which are important prey for goshawks on the mainland and islands in the north Tongass. Many studies from across the range of the goshawk suggest that prey availability is one of the most important factors regulating goshawk population size in Southeast Alaska.
- Studies from across the range of the goshawk suggest they select nest stands that have a higher proportion of mature and old forests than random sites.
- Goshawks use a wide range of habitats for foraging within the matrix, including non-forest, young forest, low-volume forests, and clearcuts.
- Goshawks, even juveniles, can travel relatively long distances across salt water, indicating that there are not likely to be barriers to goshawk movement among the islands in Southeast Alaska.

Importance of Retention of Forest Structure After timber harvest and Spatial Considerations

While the benefits of leaving old growth structure after timber harvest are well documented in the scientific literature, the need to leave it after timber harvest on the Tongass is not as clear, given the conservation strategy, the fact that slightly over 90 percent of the existing POG is protected under the 2007 Forest Plan and that there are economic consequences of leaving structure post timber harvest (see Section 2.3). However, past timber harvest has been concentrated in certain portions of the Tongass. While it is true that Forest-wide, the vast majority of old growth would be retained, there are biogeographic provinces and watersheds that have and are predicted to have much higher reductions in old growth than the average. For example, as reported in the 2008 FEIS, the North Central Prince of Wales biogeographic province currently has 74 percent of the original POG and it is anticipated that this would be reduced to 63 percent of the original POG after 100 years of timber harvest at maximum levels allowed by the Forest Plan under Alternative 6. Considering only large tree POG, North Central Prince of Wales province would retain 57 percent of original large-tree POG; however, the East Baranof province would retain only 31 percent. In these and similar areas, there would be elevated risk that there could be gaps in distribution of some species and reduction in connectivity between old-growth patches after 100 years of timber harvest at maximum levels allowed by the Forest Plan.

Many studies validate the importance of retention of legacy trees and patches of old growth after timber harvest for many forest associated species (Masurek and Zielinski 2004, Carey 2000). Retention of this old growth structure affects forest developmental pathways, indirectly affecting wildlife abundance by retaining necessary structural features in both mature and young forests (Deal 2007). In Southeast Alaska, many bird species utilize legacy trees as nesting, foraging, perching, and roosting sites (Sidle and

Suring 1986). The lack of these structural features within forests can negatively impact many old growth associated species (Bunnell *et al.* 1999, 2002, Aubry *et al.* 1999, Bevis *et al.* 2002, Deal 2001, 2007). Work on flying squirrels in Southeast Alaska indicates the importance of the matrix in providing adequate dispersal habitat in order to maintain connectivity between OGRs. Flying squirrels, being arboreal, require these structural components and are found primarily in mature and old growth forests but are also found at lower densities in peatland –scrub forests (Smith and Person 2007).

While numerous studies validate the importance of retention of this structure, research is not available, especially for Southeast Alaska, to guide specific silvicultural prescriptions or to help prescribe specific amounts of leave trees for individual wildlife species. Most Forest Plans in other parts of the United States have incorporated various retention prescriptions. The closest plan ecologically to Southeast Alaska is the Northwest Forest Plan that covers Oregon and Washington. The Northwest Forest Plan requires green-tree retention in at least 15 percent of the area within logging units. It is recommended that at least 70 percent of this retention be implemented in patches or clumps of up to one hectare (about 2.5 acres). In addition to this green-tree retention, the retention of snags and large decadent trees within these green-tree retention clumps is recommended. These prescriptions were developed based on the professional judgment and collective biological knowledge of individuals who have studied the ecological processes characterizing the forests of the Pacific Northwest (Aubry et al. 1999). A large-scale and long-term experiment (the Demonstration of Ecosystem Management Options (DEMO) study) to evaluate the ecological effects and public perception of green-tree retention in western Washington and Oregon is underway. Among the key findings to date are that the pattern of retention is not as important as the amount of retention; however, the retention of 2.5-acre clumps can provide refuges with ecological and mircroclimatic conditions that enable many sensitive species to persist, at least in the short term (USDA Forest Service 2007).

In Southeast Alaska, research has described the characteristics of wind-created openings (Nowacki and Kramer 1998). Understanding the range of natural wind disturbance gaps can help in the development of management prescriptions. Within the four areas studied by Nowacki and Kramer (1998), mean gap size sustaining large-scale wind events ranged from 10 to 39 acres in four study areas, with the range in size of individual gaps from 1 to 1,000 acres. Within gaps, there was also a range in the amount of remnant trees remaining after a windthrow event, with some remnant structure in most gaps. Most gaps had a range from 0 to 50 percent of the stand remaining post wind event.

The 1997 Forest Plan used a harvest unit threshold of 2 acres, for the implementation of goshawk foraging and marten standards and guidelines. No documentation of why this acre threshold was used can be found in the 1997 FEIS; however, there is reference to the practice of group selection in the timber section of the 1997 FEIS. The group selection method prescribes the removal of small groups of trees to create openings in the stand. The forest created, using this method, is a mosaic of small groups of trees of uniform age and height with the goal of regenerating an uneven-aged stand structure across the landscape. Group sizes range from 0.1 acre to approximately 2 acres in size. Research and experience with this method is extremely limited in Southeast Alaska. The ideas behind using this method in Southeast Alaska are to protect excessively steep or unstable soils and reduce the impacts to scenic and wildlife resources.

Rationale for Legacy Standard and Guideline

The legacy standard and guideline as a replacement for the species-specific goshawk foraging and marten standard and guidelines is proposed for the following reasons:

1. It provides a science-based measure of retention of old-growth habitat characteristics (large trees, down logs, snags) Forest-wide rather than only in places where there were concerns related to goshawk and marten. This will provide habitat protections in high risk biogeographic provinces across the forest for more species of concern (including endemic small mammals and forest birds) than the goshawk and marten standards and guidelines in the 2007 Forest Plan.
2. It provides an alternate method for retaining connectivity and prey base for marten and goshawk at the watershed scale. Legacy would apply in 49 VCUs Forest-wide in 7 biogeographic provinces. Goshawk foraging standards under the 2007 Forest Plan apply in 22 VCUs on Prince

of Wales Island only (1 province). Marten standards for high risk provinces under the 2007 Forest Plan apply in 12 VCUs in 2 provinces. Marten standards for moderate risk provinces in the 2007 Forest Plan apply in 107 VCUs in 6 provinces. These standards for low risk provinces apply in 112 VCUs in 6 provinces.

3. Overall, considered in combination with other improvements to the Conservation Strategy, including increased quality of small OGRs, increased old-growth protection in key areas, and increased quantity (acreage) of OGRs, habitat for viable populations of goshawk and marten across the Tongass would be maintained.
4. The Legacy standard and guideline is simpler to implement and will likely have more consistent implementation Forest wide than the previous goshawk foraging and marten standards and guidelines.

These four reasons are explained in detail below.

1. Providing a science-based measure of retention of old-growth habitat characteristics (large trees, down logs, snags) Forest-wide and the value to multiple species.
A review of current science, as described previously, supports both the value of the retention of old growth structure to a wide range of species and the value of taking a broader approach, rather than taking a single-species approach as did the goshawk foraging and marten standards. While the value of retaining old-growth forest components within landscapes managed for timber production has a sound basis in science, there is no scienific basis to support specific prescriptive standards for marten, goshawk or most individual species. In other words, while there may be a scientific basis that supports that partial harvest has less impact to goshawk or marten habitat than clearcutting, there is no scientific basis to support any specific management prescription. Clearly, there is a gradient of the value of habitat conditions for many species, with large contiguous blocks of old growth being most beneficial for many old growth associated species in Southeast Alaska and large expanses of clearcut forest being the least beneficial. But without specific studies indicating what specific prescriptions are of most value, the management decision for these prescriptions are made by considering the risk to the resource (in this case wildlife habitat needs) with the feasibility requirements for other management (in this case, economic timber harvest).

Furthermore, while 1997 Forest Plan prescribed retention of 10 to 30 percent canopy cover as a measure to help maintain connectivity for marten and to maintain foraging habitat for goshawk, there is no scientific basis to support that this relatively low amount of retained canopy cover in a stand provides measurable protection specific to goshawk or marten or their prey. Also there is no scientific basis to support that this degree of retention of canopy cover is effective for maintaining connectivity in fragmented landscapes. The studies summarized previously indicate that more than significantly more than 30 percent canopy cover would need to be retained to meet these objectives. While increased amounts of retention post timber harvest may benefit old growth associated species, including marten and goshawk, they present conflicts in providing for economical timber harvest.

Based on current science, leaving old growth structure post timber harvest in clumps is preferable to leaving the structure in a more uniform configuration across a clearcut because clumps of trees are more likely to be used by a variety of wildlife species, they may benefit other organisms in the forest, and they are more windfirm than scattered trees. As noted above, the DEMO study in western Washington and Oregon has found that many plant and animal species that are sensitive to timber harvest were able to persist in retention clumps of 2.5 acres, indicating that such patches may serve as local sources of recolonization into adjacent harvested areas as the new stand develops (USDA Forest Service 2007).

Leaving structure in clumps rather than scattered is also more efficient for logging with the consequence of reduced logging costs in cable-yarding harvest units. The recently completed logging system and transportation analysis (LSTA) for the Tongass indicates that only 35 percent of the remaining suitable old growth is planned for cable yarding (see Table 3.13-2 in the *Timber* section of the Final EIS). The remaining 65 percent is planned for ground-based logging systems, such as shovel logging, or helicopter. With ground-based or helicopter logging, there is substantial flexibility in terms of how retention trees could be left without significantly affecting logging costs. If only the normal operability ground is considered (excluding the difficult and isolated operability classes), the percentage of ground-based and helicopter yarding would still be 61 percent. Therefore, there is considerable flexibility available to project IDTs for the majority of future old-growth harvest units, to design retention spatial patterns in a way that is beneficial to wildlife and does not negatively affect timber sale economics.

The legacy standard and guideline addresses the high degree of endemism within the islands of the Tongass and a degree of uncertainty in managing for endemic species because of gaps in information about species distribution and habitat needs. While recent science addresses concerns regarding endemic mammals related to risks of extinction due to island factors and small population sizes and connectivity within islands, there remains a lack of a scientific basis to help managers develop species-specific conservation measures. Therefore, taking an ecological approach to leaving legacy that spans the entire Tongass and focuses on watersheds with a high degree of past timber harvest (harvest that occurred prior to the 1997 Forest Plan) is an approach that, in the absence of science to support other measures, will most likely help ensure connectivity for a wide range of species.

2. Providing an alternate method for retaining connectivity and prey base for marten and goshawk at the watershed scale.

The objectives of the 1997 Forest Plan goshawk foraging and marten standards and guidelines were to improve connectivity for marten by reducing fragmentation, improve habitat conditions to provide for dispersal for goshawks between OGRs and to maintain foraging habitat for both goshawks and marten in the matrix in biogeographic provinces with a high degree of past timber harvest. This was done through the retention of forest stand structure important to these species and their prey (large trees, snags, and down logs) through several standards and guidelines, including those specific to goshawk foraging and marten habitat.

The legacy standard and guideline would apply under Alternatives 1, 2, 3, and 6 for the 2008 Forest Plan Amendment Final EIS within seven high-risk biogeographic provinces, as compared to the 1997 goshawk foraging standard and guideline, which applied one biogeographic province on Prince of Wales Island, and the marten standards and guidelines, which applied in two high-risk biogeographic provinces and three additional moderate-risk biogeographic provinces (Table D-7).

One of the factors contributing to the high likelihood of maintaining sufficient habitat for viable populations of goshawks in the 1997 Forest Plan was the application of a 300-year ‘ecological’ rotation. While not a rotation as defined in traditional silvicultural terminology, the concept is applied at larger, landscape scale. Application of a 300-year ‘ecological’ rotation generally results in 1/3 of the productive forest landscape in 0-100 year-old stands (low value to goshawks or most of their prey), 1/3 in 100-200 year old stands (moderate value to goshawks and their prey), and 1/3 in 200-300 or older (old growth) stands (highest value to goshawks and their prey). These proportions of habitat within the scale of goshawk use areas (i.e., median home range of approximately 10,000 acres) across a large landscape would provide habitats with a high likelihood of sustaining well distributed populations. Both extended traditional rotations and the concept of a 300-year ‘ecological’ rotation were viewed favorably by members of the Goshawk Assessment Panel for sustaining long-term goshawk habitat (Iverson, 1996). Panel members, as did authors of the Goshawk Assessment, concluded that maintaining conifer stands in intermediate age stand structure from 100 to 200 years would, in part, supply stand structure for goshawk prey production, and thus, goshawk foraging opportunities.

Alternatives 1, 2, 3, and 6 for the 2008 Forest Plan Amendment FEIS include the Legacy standard, which requires 30 percent of a stand to be retained in higher risk VCUs for even-aged harvest units over 20 acres in size. Most (over 80 percent) of VCUs within the suitable land base are categorized as low or medium risk because these VCUs currently have more than 67 percent of their historical old growth remaining and will not have more than 67 percent harvested after 100 years of harvesting at the maximum ASQ level.. Because these VCUs will continue to be managed on at least an ecological 300-year rotation, these VCUs have a high probability of maintaining adequate wildlife habitat for many species, including marten and goshawk.

This approach addresses the potential cumulative effects from previous harvest and provides for the retention of a representation of old-growth components across all VCUs managed for timber production. In low and moderate risk VCUs, the representation of old-growth components is provided for by the mix of non-development LUDs, OGRs, and other standards and guidelines. In high risk VCUs, this is provided for by the legacy standard plus the mix of non-development LUDs, OGRs and other standards and guidelines.

Implementing the legacy standard and guideline in high risk VCUs will help ensure connectivity between OGRs within the matrix where connectivity may have been affected by past harvest practices. There is a high likelihood that VCUs with little past harvest will have a high degree of connectivity even after 100 years of implementing the Forest Plan because of the suite of protective measures that are in place under Alternatives 1, 2, 3, 5, and 6.

Table D-7 provides a summary of the number of VCUs where the legacy, goshawk, and marten standard and guidelines apply. There are two scenarios within which the legacy standard and guideline differs from the goshawk foraging and the marten standards and guidelines. First, there is no requirement to leave 30 percent legacy in harvest units 20 acres or smaller in size. Legacy would only be left in harvest units that are greater than 20 acres and this number was selected because it represents a typical harvest unit, based on analysis of the Logging System Transportation Analysis (LSTA). This typical harvest unit

Table D-7.
Number of VCUs where the Proposed Legacy Standard applies, compared with the number of VCUs where the Goshawk and Marten Standards apply, by Biogeographic Province

			Marten Standard & Guideline[1/]		
Biogeographic Province	**Legacy Standard & Guideline**	**Goshawk Standard & Guideline**	**Currently >33% Harvested[2/]**	**>33% Harvested in the Future**	**<33% Harvested Now & in the Future**
Yakutat Forelands	3	-	-	-	-
Yakutat/Glacier Bay Upland	-	-	-	-	-
East Chichagof Island	-	-	-	16	30
West Chichagof Island	-	-	-	-	-
East Baranof Island	1	-	-	-	-
West Baranof Island	4	-	-	-	-
Admiralty Island	-	-	-	-	-
Lynn Canal	-	-	-	-	-
Northern Coast Range	-	-	-	-	-
Kupreanof/ Mitkof Islands	-	-	-	22	13
Kuiu Island	-	-	-	-	-
Central Coast Range	-	-	-	-	-
Etolin Island and Vicinity	2	-	-	12	10
North Central Prince of Wales Island	31	22	9	30	31
Revilla Island/Cleveland Peninsula	3	-	3	23	19
Southern Outer Islands	5	-	-	-	-
Dall Island and Vicinity	-	-	-	-	-
South Prince of Wales Island	-	-	-	-	1
North Misty Fiords	-	-	-	-	-
South Misty Fiords	-	-	-	-	-
Ice Fields	-	-	-	-	-
TOTAL	49	22	12	103	104

[1/] Marten standards and guidelines include one level of retention in VCUs with >33 percent harvest and one level for VCUs with <33 percent harvest. The VCUs listed in the first column under marten will always follow the >33 percent harvest retention rules and the VCUs in the third column under marten will always follow the <33 percent harvest retention rules. The VCUs in the middle column start out under the <33 percent harvest retention rules and switch after the 33 percent harvest threshold is reached.
[2/] The VCUs listed in this column under marten are additional to VCUs that are counted under the Goshawk standard and guideline.

is what is available for harvest after considering landforms, land suitability, Tongass Timber Reform Act riparian buffers and other resource considerations mapped for the LSTA. For wildlife species sensitive to forest fragmentation, smaller clearcuts are better than larger clearcuts. Legacy was retained only in units greater than 20 acres in response to the challenge of providing economic timber sales while conserving wildlife habitat. This was chosen because of the lack a clear scientific basis for determining what sized clearcuts are absolute barriers to wildlife, because there is no clear scientific basis to support that 10 to 30 percent canopy cover retention mitigates the effects of clearcutting on wildlife and in order to address timber harvest logistical and economic considerations.

Because legacy only applies in openings greater than 20 acres in size, there is a risk of increased negative consequences for goshawks and marten at the stand scale than was anticipated in the 1997 Record of Decision (but not in the 1997 FEIS, see discussion in 3 below). However, considering that wildlife encounter both natural and human caused fragmentation on the Tongass, opening sizes from natural wind events range up to 1,000 acres, but are typically less than 40 acres, and there are few actual barriers (except saltwater) for many species on the Tongass, wildlife movements will continue to be facilitated through managed landscapes. While there would be openings as large as 20 acres without retention of legacy, a typical timber sale layout will have a mix of unit sizes and configurations. The combination of all the protective measures specific in the Forest Plan, including riparian buffers and implementation of other standards and guidelines, will result in timber sale layout that has significant more leave as compared to pre 1997 Forest Plan timber harvest practices.

The second scenario where legacy differs is that marten standards require two additional measures of retention that are not prescribed with the legacy standard and guideline. First, marten standards under the 2007 Forest Plan require 30 percent canopy cover retention in VCUs that would, in the future, have > 33 percent of the VCU harvested in what are considered high risk biogeographic provinces for marten. Alternatives that adopt the legacy standard and guideline would not require this additional measure; however, these VCUs are considered to be moderate risk overall, because a higher percentage of their harvest will have occurred under more protective standards and guidelines and a higher percentage of retention will be present, compared with VCUs that are rated as high risk by the legacy standard and guideline. Second, marten standards require a smaller level of retention (10-20 percent) in VCUs that would never exceed 33 percent harvest. Again, alternatives that adopt the legacy standard and guideline would not require this additional measure; these are considered to be low risk VCUs, which will have an even higher percentage of retention within the matrix due to the fact that the harvest percentage is low and/or a greater percentage of the harvest will have occurred under more protective standards and guidelines (which require more retention).

Observations from implementing the Forest Plan since 1997 indicates that there are multiple standards and guidelines that provide residual forest structure (trees, snags, down logs) that are retained within timber harvest units. Besides marten and goshawk standards, these include scenery, riparian buffers (including class III streams), soils, and karst standards. In addition, logging system limitations (such as blind leads) also result in portions of stands being retained that are often unreachable with cable logging systems. Partial harvest has also occurred more frequently than anticipated, due to a variety of factors, not just marten and goshawk standards and guidelines. These observations indicate that there is significant structure being retained within watersheds as a result of the Forest Plan standards and guidelines and this structure will provide habitat for many wildlife species, including marten and goshawk.

3. Overall, considered in combination with other improvements to the Conservation Strategy, including increased quality of small OGRs, increased old-growth protection in key areas, and increased quantity (acreage) of OGRs, habitat for viable populations of goshawk and marten across the Tongass would be maintained.

Under the 1997 Plan, the viability assessment for marten (with the assumption of the maximum timber harvest levels allowed over 100 years) of the selected Alternative indicated a moderate likelihood of maintaining viable and well distributed populations of marten across the Tongass. The viability assessment for goshawk indicated a high likelihood of maintaining viable and well distributed populations of goshawks across the Tongass. These determinations were made prior to additional conservation measures added in the Decision. The 1997 Forest Plan and the 2008 Forest Plan EIS both assume that matrix lands would be somewhat fragmented by timber harvest and recognized the risks to wildlife within a fragmented landscape. It was assumed that a consequence of implementation of timber harvest at maximum levels allowed in the Forest Plan over 100 years was that there would be a reduction in wildlife habitat capability in those watersheds that had significant amounts of fragmentation due to timber harvest, hence the importance of the reserve system. Research focused on the conservation strategy since 1997 has confirmed an assumption of the 1997 Forest Plan that for some species, the OGR system alone may not retain viable populations. This was why the Forest Plan approach of both a reserve system and matrix management was adopted in 1997. Under Alternative 6, total reserve area (non-development LUDs) has been increased by over 150,000 acres and protections are even greater under Alternatives 1, 2 and 3, when considering all additions to non-developments LUDs including small OGRs, increases to geologic special interest areas for karst and increases for other resources. A substantial portion of these additions is POG.

The potential effects to marten described for Alternative 6 in the Final EIS for the 2008 Tongass Forest Plan Amendment are within the range of effects predicted in 1997. These effects would be less under Alternatives 1, 2, and 3. The 1997 Tongass Forest Plan EIS estimated there would be a moderate likelihood that marten populations would remain viable with the selected Alternative throughout the Tongass, before the marten standard and guideline was added in the 1997 ROD to further reduce risk. Alternatives 1, 2, 3, and 6 also reduce risks to marten viability through increased protective measures for marten above and beyond what the viability panels assessed. These additional measures include increased old growth acres retained in both OGRs and other non-developments LUDs; retention of the marten road density and landscape connectivity standards and guidelines; and the addition of the legacy standard and guideline.

Furthermore, the level of risk to goshawk and marten viability described in the 1997 FEIS would be realized only under a certain set of conditions, as follows.

- Timber is harvested continually at the maximum level allowed under the Plan (the ASQ level annually) for 100 consecutive years, with no change in applicable standards and guidelines during that entire period. In essence, the panels did not assess the risks associated with a 10- to 15-year decision, but with a 100-year decision. This risk is relatively low because timber has not been harvested on the Tongass at or near the maximum ASQ level throughout a single planning cycle, let alone several. The first Tongass Forest Plan was adopted in 1979, and was in effect through May of 1997. It had an annual average ASQ of 549 MMBF of total volume. Total volume harvested from 1980 through 1996 averaged 327 MMBF annually, only 60 percent of the ASQ. Since adoption of the 1997 Forest Plan, total volume harvested has averaged 84 MMBF annually, only 32 percent of the annual average ASQ of 267 MMBF.
- If timber harvest rises to the ASQ annually over the next 10-15 years the planning process ensures that any issues that may emerge regarding sustaining viable populations of wildlife species on the Tongass will be addressed. Plans must be revisited through a public process every 10-15 years. Each time, the latest scientific information is examined to determine what changes may be needed. The Forest Service and other State and Federal agencies will continue to monitor implementation of the Forest Plan and its results. If a viability-related problem were to develop, it would be addressed.
- Standards currently in effect are far more protective than those of 20 or 40 years ago. It is highly likely that standards will continue to become more effective over the next several decades through adaptive management as the scientific understanding of how to minimize the adverse environmental effects of human activities continues to improve.

In addition, consideration of the increasing value of aging young-growth stands is crucial when assessing habitat values in the matrix. As young growth matures, habitat becomes more suitable for a variety of forest-dwelling prey. The matrix also increases in value for foraging goshawks, for providing nest sites for goshawks and to provide a variety of habitat conditions beneficial to marten. In addition, not all existing young growth will be managed in the future on an 80 to 100 year rotation. Of the approximately 440,000 acres of harvested lands on the Tongass, 45 percent is within non-developments LUDs and will be managed to enhance future old-growth habitat.

Overall, implementing the legacy standard and guideline increases the likelihood that the matrix will provide many more functions than just connectivity and will help ensure the persistence of all species on the Tongass. While adoption of this standard and guideline a degree of increased risk with respect of the conservation of goshawk and marten specifically because the legacy standard applies in less VCUs that the 1997 marten standards and guidelines applied and because it applies only in openings greater than 20 acres, this risk does not change the overall conclusion that there is a moderate to high degree of likelihood that sufficient habitat will be maintained to provide for viable populations of marten and goshawk.

4. The Legacy standard and guideline is simpler to implement and will likely have more consistent implementation Forest wide than the previous goshawk foraging and marten standards and guidelines.
The legacy standard and guideline is simpler and clearer than the goshawk and marten standards. The intent is similar – retain forest structure in units after timber harvest. The standard is clear that this structure is meant to be within the harvest units, not on the edge, though it does provide for exceptions when logging systems preclude this. The Forest Plan monitoring plan requires monitoring for a variety of wildlife questions. Adjustments can be made through this adaptive management process if it is determined that our objectives are not being met.

In addition, the goshawk foraging and marten standards and guidelines, with the TPIT clarifications, have often been implemented very similarly to how we expect the legacy standard and guideline to be implemented. Particularly in units harvested with cable yarding systems, patches of old growth have been left as a proportion of the unit, rather than as dispersed trees or as by retention of canopy cover. Observations indicate that canopy cover is difficult to measure and implement and, therefore, a portion of the stand has been left to meet the standards and guidelines. Therefore in high risk VCUs, implementation of the legacy standard and guideline will be the same on many Ranger Districts as was done using goshawk foraging and marten standards and guidelines.

2.5.2.3. Goshawk Nest Buffer Standard and Guideline – Alternatives 1, 2, 3, 4, & 6

Background

Under Alternatives 1, 2, 3, 4, and 6, the goshawk nest buffer standards and guidelines were modified to read as follows:

1. Preserve nesting habitat around all confirmed and probable goshawk nests. If, based on annual monitoring, a previously active nest is found to be inactive for 2 consecutive years, protection measures for the site may be removed.
2. When a new nest is located within an area that is under a timber sale or other contract, the activity may proceed if at least 300 acres of POG, including at least one contiguous block of 100 acres, will remain within a 0.75-mile circular radius of the nest. Timing restrictions on some activities will be applied to allow that year's brood to successfully fledge from the nest.

The purpose of change 1 was to allow for future tiimber harvest in areas if evidence indicates goshawks have discontinued use of the nest stand. Note that this considers active nest sites very conservatively and include sites that are occupied, whether or not there is actual nesting documented.

The purpose of change 2 was to allow a measure of flexibility when goshawk nests are found during implementation of a timber sale or other contract. This is of particular concern during timber sale contracts, but also could occur during implementation of other contracts. Goshawks predominately have alternate nests within a territory. When found, active nest sites are protected with a 100-acre nest buffer, but there is a high likelihood that the pair will move to an alternate nest site in subsequent years. Since timber sales are planned several years in advance of actual harvest, the likelihood of this happening before harvest, when a timber sale is under contract, is compounded. When goshawks move to an alternate nest, it is particularly problematic for management if they move into a timber sale unit or within a road location after a contract has been awarded. In this case, unless the purchaser and Forest Service can come to a mutual contract agreement, the government becomes liable to claims when the nest is buffered and the unit or portion of unit is dropped from the contract. Therefore, it is desirable to have flexibility to address these contract issues on a case-by-case basis.

New science relevant to goshawks and the conservation strategy is summarized in Section 2.4.2.1.

Rationale

The use of alternate nest sites within a territory coupled with the year-to-year variation in actual nesting makes it difficult to determine if goshawks are actively nesting within a nest stand or territory. Research indicates that goshawks commonly have multiple alternate nests within a territory. Alternate nests may occur within the 100 acre nest buffer or could elsewhere within the territory. Within one study in Southeast Alaska, only 54 percent of alternate nests occurred within 100 acres of known nests, indicating that goshawks commonly move nests outside known nest stands (USDA Forest Service 2007). This, coupled with the difficulty in finding nests in Southeast Alaska means there is some risk that observers will fail to detect an active nest within the territory. In addition, because goshawks do not necessarily nest every year and may go several years between successful nesting attempts, there is some risk that managers will not be absolutely certain a nest site is abandoned after inventorying for only 2 years. It is labor intensive to find goshawk nests and verify actual reproduction in a territory. This is even more costly in the remote, inaccessible terrain of Southeast Alaska. Since goshawks may not attempt to nest for 2 or more years and individual goshawks are highly variable in the number of years between successful nesting attempts, the only method for managers to be absolutely assured that goshawks are no longer using a territory would be cost prohibitive. Using 2 years allows some measure of assurance that managers will not inadvertently harvest an active nest stand, but this is not without risk. There is some risk that a once active nest stand will be logged because not all nesting goshawks are detected and because some goshawks pairs may return to nest in a stand after two or more years absence. In addition, there is some risk that the nest stand may become unsuitable for future nesting.

Standards and guidelines outline relatively conservative criteria for what constitutes confirmed and probable nests. Observers do not need to actually find the nest to confirm a stand as a nest stand requiring a 100 acre buffer. A confirmed stand is one where evidence suggests nesting is highly likely and mangers can be relatively assured that they have identified the actual nest tree. Characteristics of confirmed nests include goshawks observed on or near a nest; nestlings or branchers (young not able to fly) observed on or near a nest; goshawk feathers or eggs obtained from the nest or one or more nest structures indicative of goshawk were found with goshawk prey remains, but without positive identified goshawk on the nest and without positive identified feathers from nest. A probable nest is one where evidence suggests nesting is likely nearby, but there is less assurance that managers know where the actual nest tree is. Characteristics of probable nests include aggressive, territorial breeding season adults vocalizing or attacking an observer (without locating a nest); or adults observed during the breeding season in a territory and recently fledged young were observed (without locating a nest).

The fact that timber harvest occurs at all within a goshawk nest territory presents some risk that the goshawk pair will not successfully nest and may ultimately abandon the territory. However, most goshawk nesting habitat on the Tongass will not be affected by timber harvest. Assuming goshawks occupy suitable habitat across the entire the Tongass, most goshawk territories would be protected by virtue of the fact that the majority (71 to 72 percent) of existing POG is protected in reserves (Table D-8).

Providing protection for goshawk nest stands continues to be an important component of goshawk conservation measures in the Amended Forest Plan under Alternatives 1, 2, 3, 5 and 6. Goshawk nests and nest territories are protected in a variety of ways, including the implementation of 100-acre nest buffers within timber harvest areas. Within the matrix, an additional 17 to 18 percent of the existing POG would be protected within the matrix by a suite of buffers and standards and guidelines. Finally, at least an additional 1 percent of existing POG would not be scheduled and would not be harvested primarily because of economics; however, based on the recent history of harvest levels on the Tongass, this percentage could be substantially higher. In total, over 90 percent of the existing POG would be protected over the life of the Forest Plan under Alternatives 5 and 6.

Table D-8.
Summary of POG Protection under Alternatives 5 and 6.

	Alternative	Protected in Reserves (OGRs, Wilderness, Nat. Mon., LUD II, and other Natural Setting LUDs	Protected in Matrix (beach fringe, riparian and other areas protected from harvest by standards and guidelines)	Minimum POG Not Scheduled for Harvest	Total protected
% of 1954 POG *	Alternative 5	65.3%	16.9%	0.8%	83.0%
	Alternative 6	66.2%	15.9%	1.1%	83.2%
% of 2006 POG	Alternative 5	71.0%	18.4%	0.9%	90.3%
	Alternative 6	72.0%	17.3%	1.2%	90.5%

* The % of 1954 POG is the % of POG that was present in 2005 compared to the amount of POG that was estimated to be present prior at the onset of large-scale timber harvest.

It is not possible to estimate how many goshawk nests will be found in the future within units in active timber sales under contract. However, it is likely to be a relatively rare circumstance; since 1997, this issue of has occurred only once, where the nest moved multiple times within the timber sale contract area.

There is no scientific basis in Southeast Alaska to support a management strategy for goshawks that relies on retaining a prescribed threshold of suitable habitat in matrix lands instead of having perpetual nest buffer protections, as was done for management of goshawks in the southwest. While such a strategy would ideally provide flexibility to address timber harvest and goshawk nest conflicts, there are no studies that guide development of a habitat threshold. Science supports that the retention of old growth in matrix lands is an important component of goshawk conservation, especially within biogeographic provinces that are anticipated to be at higher risk for goshawks because they do not maintain a 300-year ecological rotation (Iverson et al.1996). But there are no known thresholds for how much old growth can be harvested before goshawks will abandon a territory. However, as described in Iverson et al. (1996), one estimate of the minimum proportion of old growth in breeding use areas in Southeast Alaska was 23 percent for males and 28 percent for females, respectively. It is instructive to assess the quality and protection status of habitat around known nest sites on the Tongass. Such information supports that known goshawk nests, many of which have been found during timber sale planning and thus are in matrix lands, have a high degree of habitat protection.

During the 1997 Forest Plan process, stand-level analysis was conducted to examine past timber harvest at various spatial scales around known goshawk nests. It also examined additional future risk to known goshawk nesting areas compared to land allocations and standards and guidelines in the Forest Plan. A sample of 36 known goshawk nest areas in Southeast Alaska was used for this analysis. This sample of nests is biased towards goshawks discovered in landscapes predominantly allocated to timber management and may not necessarily be representative of the entire goshawk population in Southeast Alaska. Within this sample, relatively little POG had been harvested around known goshawk nests. The proportion harvested increased with distance from the nest, with 3 percent (range: 0 to 50 percent) within the 0.25 mile radius (radius area = 140 acres), 12 percent (range: 0 to 57 percent) within a 1-mile radius (radius area = 2,040 acres), and 14 percent (range: 0 to 61 percent) within a 3-mile radius (radius area = 18,000 acres). Only 2 of 36 nests (6 percent) had any harvest within the 140-acre area around the nest and only 60 acres within the 0.25 mile radius had been harvested after the nest was discovered. Similarly, only 160 acres at three nests had been harvested within a 1-mile radius once the nest was located.

In addition, this analysis indicated that a total of 20 of 36 (56 percent) goshawk nest sites known at that time occurred in a protected natural setting LUD. Nearly 40 percent of the entire area of all three spatial analysis areas (0.25-, 1-, and 3-mile radii from the nest) would be protected in a reserve in the Forest Plan, despite potentially being a biased sample toward landscapes predominantly allocated to timber harvest. This reiterates the importance of the non-development LUDs in the overall protection of goshawk nest sites.

A summary of recent research given at the Conservation Strategy Review Workshop (US Forest Service 2007) looked at hypothetical post-fledging areas (PFAs) around 78 known goshawk nests, which indicated that these contained, on average, 39 percent medium- and high-volume old growth, 45 percent productive forest, 8 percent low-volume forest and 4 percent clearcuts. Results of this hypothetical PFA analysis indicated that an average of about 40 percent of the PFAs were medium- or high-volume POG, of which 55 percent was in the development LUDs or non-National Forest System lands.

More detailed analysis was done for the Forest Plan amendment looking at the same issue of protection of habitat around known goshawk nests but included an assessment of two different sized hypothetical PFAs. Both measurements have similar results and therefore, the issue of the actual size or shape of the circle is probably not biologically meaningful. For a 1-mile radius circle, 27 percent of circle was protected POG, 13 percent was POG mapped as suitable for harvest, 10 percent was young growth, 24 percent was unproductive forest, 5 percent was non-forest, non-NFS lands was 14 percent (this land contains POG, young growth, unproductive forest, and non forest), and saltwater was 9 percent. However, this analysis was done using the mapped suitable POG. If the difference between as the mapped suitable and what is actually suitable on the ground (due to a variety of factors, such as steep slopes, new streams, and other standards and guidelines) and scheduled for harvest, the acres of POG protected would increase to about 31 percent of the circle and the acreage of POG not protected would decrease to about 9 percent of the circle.

All of these analyses indicate that goshawk nests on the Tongass are afforded a relatively high level of protection, including both nests that occur within non-development LUDs and those in the matrix lands of development LUDs. In most cases there would be other potential nesting habitat within the goshawk's territory if nest stand was inadvertently logged. The analysis described above is a potential future monitoring tool to see whether newly found goshawk nests in the matrix have similar conditions.

There is the risk that timber harvest will occur within an occupied or historic goshawk nest stand, given that goshawks do not always respond during surveys and thus, there is some risk of overlooking goshawks during timber sale planning. This risk exists with or without changing this standard. However, the risk is reduced during the entire process from planning to layout to contract implementation since stands are visited multiple times and, therefore, it is less likely that a truly occupied stand would be overlooked. In addition, the Tongass will continue to do goshawk surveys for timber sale planning prior to NEPA decisions.

Overall, at least 90 percent of existing POG would be protected or not be scheduled for harvest under either Alternative 5 or 6 after 100 years (assuming the maximum timber harvest levels allowed in these Alternatives). While there is some uncertainty in how many nest stands would be affected by this change in standard and guideline, given the degree of POG retention within goshawk territories in the matrix that provide potential habitat for both alternate nest sites and foraging habitat and that the vast majority of nesting habitat is protected over the life of the Plan, implementation of this standard may affect nest occupation by individual pairs but not substantially affect goshawk populations across the Tongass.

Overall, nest protection within the matrix, while an important component of the conservation strategy, is a relatively small component of the overall conservation strategy because timber harvest will occur within a small portion of suitable goshawk habitat. The U.S. Fish and Wildlife Service, in their 2007 finding (Federal Register 2007. Vol. 72 no. 216 pp. 63123-63140) acknowledged this issue of goshawk nest protections and concluded the following, which confirms the value of the key components of the conservation strategy for goshawks:

> "Nest buffers of 100 ac (40 ha) of POG, as specified in the Forest Plan, are intended to protect individual nests from disturbance. Larger buffers would likely enhance goshawk conservation by providing better habitat for fledglings in the immediate vicinity of the nest, but lack of larger buffers is not expected to reduce fecundity or survival to an unsustainable level because OGRs, which typically protect much larger patches of old growth forest, and other retained forest patches are reserved in each watershed, and we expect goshawks to nest in these reserves as the forest

around them is increasingly harvested. In some cases, suitable nesting habitat in nearby reserves may already be occupied by nesting pairs, but the territoriality of goshawks is likely to prevent this in most cases."

They also discuss concerns that have been raised about the adequacy of the conservation strategy to maintain goshawk populations and conclude that:

"In spite of the shortcomings discussed above, we find that the full suite of standards, guidelines, and land designations contained in the 1997 Forest Plan are likely to provide adequate habitat protection to sustain goshawks in Southeast Alaska into the foreseeable future, largely because adequate amounts of old and mature productive forest will be protected in reserves, retention areas, and inoperable stands, in large and small patches, throughout the harvested matrix. "

2.5.2.4. Landscape Connectivity – Alternatives 1, 2, 3, 4 (partially), & 6

The Forest-wide Landscape Connectivity standard and guideline was changed to clarify when the issue of connectivity was important to assess during project implementation. It was also changed given that changes in the small OGR boundaries have improved connectivity between all medium and large OGRs and no areas will need specific consideration during project implementation (see *Biodiversity* and *Wildlife* sections of the Final EIS).

The conservation strategy did not assume that there was connectivity between small OGRs and the mediums and large OGRs. Connectivity would be provided for by beach fringe, riparian buffers, other standards and guidelines, other unsuitable POG, and unscheduled POG. While it may be desirable to consider local connectivity issues within a project area during NEPA analysis, this is not necessary in order to provide for viable and well distributed populations – this was provided by the Forest-wide reserve network of old growth in non-development LUDs.

The other portion of this standard that was added was to consider young-growth treatments that accelerate old growth conditions on unsuitable acres. There are significant acres of young growth in non-development LUDs that could provide connectivity quicker with active management.

Under Alternative 4, this standard and guideline would only apply within the four biogeographic provinces that include small OGRs (see *Biodiversity* and *Wildlife* sections of the Final EIS).

2.5.2.5. Endemic Mammals – Alternatives 1, 2, 3, 4, 6, and 7

The Forest-wide Endemic Terrestrial Mammal standard and guideline was changed to clarify what kinds of information should be used for assessing endemic mammals during NEPA analysis. The standard allows for use of existing information on endemic mammals to be used for project planning where available. The Forest has invested significant funds into numerous cooperative projects with several universities as well as with the Pacific Northwest Research Station. The result of this investment is a significantly better understanding about mammalian distribution in Southeast Alaska, than existed prior to the 1997 Forest Plan (for example, MacDonald and Cook 2007). This is not to imply that we have information on species distributions on all islands of Southeast Alaska. However, on many islands, particularly the larger islands, there is adequate presence/absence data for NEPA analysis. There is some inherent risk to endemic mammals under all alternatives because of their inherent endemism, their distribution amongst islands, and the lack of complete knowledge of their distribution and habitat relationships.

Other guidelines added to the 1997 Plan in response to the panel assessments would also benefit both the endemic and widely-distributed mammals. The connectivity guideline will provide additional measures to maintain connectivity of large and small reserves and other non-development LUDs in places where beach fringe and riparian habitat management areas do not provide adequate connectivity. Guidelines for structural retention for goshawk and marten habitat as well as the legacy standard and guideline will also benefit other mammal species. The increased quality and quantity of the OGR system under Alternatives 1, 2, 3, and 6 will also benefit many endemic mammals, particularly those as most risk, which includes the Prince of Wales flying squirrel.

2.5.2.6. Marten – Alternatives 1, 2, 3, 4, 6, and 7

The American marten Forest-wide standard and guideline was changed to clarify when to consider road density management. The standard clarifies that consideration of access as an issue for marten management should only occur when it is demonstrated that mortality is exceeding sustainable levels and that the most significant factor causing this human access on roads.

This change does not change the intent of the standard; however, it clarifies when it should be implemented. Other minor edits were also done to this standard and guideline that do not change the intent of the standard, but clarify it for more consistent implementation.

2.5.2.7. Wolf – Alternatives 1, 2, 3, 4, 6, and 7

The Alexander Archipelago Wolf Forest-wide standard and guideline was changed to clarify when to consider road density management. It also incorporated information from the Conservation Strategy Review that indicated that both open and total road density were important factors to consider when assessing road effects on wolves. The standard clarifies that consideration of access as an issue for wolf management should only occur when it is demonstrated that mortality is exceeding sustainable levels and that the most significant factor causing this human access is roads.

This change does not change the intent of the standard; however, it clarifies when it should be implemented. Other minor edits were also done to this standard and guideline that do not change the intent of the standard, but clarify it for more consistent implementation. It continues to outline the need for a cooperative interagency analysis to identify regions where wolf mortality is apparently excessive. In such areas we would attempt to determine if the mortality is unsustainable and identify the probable causal factors of the excessive mortality. If road access and specific roads are identified as contributing to excessive mortality, then road closures or access management recommendations can be made and actions taken. In addition, seasons, harvest methods and bag limits need to be considered as population management tools by the ADF&G and Federal Subsistence Board as a cooperative approach to managing wolf mortality at a sustainable level.

The 1997 Forest Plan did not prescribe a rigid open road density limit and one is not proposed in this amendment. The Wolf Assessment Panel recommended not using a specific road density "rule of thumb." This was contrary to recommendations in Suring et al (1993) where a road density limits from 1 to 1.25 mile of open road per square mile were recommended, depending on geographic location. Establishing a rigid road density level was not done because the resulting arbitrary closure roads to meet this density was determined to provide no management assurance that wolf conservation objectives would be achieved. Furthermore, it could unnecessarily limit overall public use of an established road system that may otherwise have no specific adverse impact on wolf mortality. Management recommendations for road and access management, if necessary, would result from the site-specific analysis discussed above that would identify a problem requiring a local and cooperative management resolution. Road densities above or indeed below these referenced densities may be appropriate to effectively manage road-access related wolf mortality. This approach is also taken by the amended Forest Plan.

Changing the standard and guideline to consider total rather than just open road density takes into account updated science supporting the relationship between wolf mortality and both open and closed roads. The standard and guideline also retains a range of road densities, based on research from several locations, including Alaska, Minnesota, and other states, that guide managers to determine the need to take action to address wolf mortality concerns. Based on research described in Section 2.4.2.3, the risk of unsustainable wolf mortality is higher on islands with roads that connect to communities than islands with no roads or roads that do not connect to a community. Given this variability in risk, adopting a range instead of one number allows better consideration of more site specific management that directly addresses actual human use.

2.5.2.8. Elimination of Legacy and Goshawk/Marten Standards and Guidelines – Alternatives 4 & 7

Alternatives 4 and 7 were developed because of the need to evaluate alternatives that satisfied higher timber volume demand levels than the 2007 Forest Plan. As such, methods of increasing timber volume levels were evaluated that caused the least impact to the conservation strategy. The elimination of the requirement to leave legacy or reserve trees within harvest units, as prescribed by the Legacy and the Goshawk and Marten standards and guidelines, was one of the key methods identified. As noted above and in Section 3, neither of these standards and guidelines were assumed for the viability panel ratings.

2.5.2.9. Minimum 33 Percent POG Retention – Alternative 4

Alternative 4 is different from the other alternatives in that it identifies Old-Growth Habitat LUDs in only four biogeographic provinces (North Prince of Wales Island, Kupreanof/Mitkof, Dall Island, and Northeast Chichagof), in addition to several individual reserves (Myers Chuck, Lake Eva, Wright Lake) in other provinces. This concept was first analyzed under Alternative 6 in the 1997 FEIS. Overall, Alternative 4 includes only 393,360 acres of Old-Growth Habitat LUDs, compared with 1,182,424 acres for Alternative 5. In order to provide for a minimum level of POG in VCUs outside of these four provinces, a new standard would require that a minimum of 33 percent of POG be retained in each VCU that occurs outside of the four biogeographic provinces. However, this requirement would not have a major effect on POG retention because few VCUs would result in less than 33 percent POG retention and the majority of those that would occur within the four biogeographic provinces.

2.5.2.10. Reduction of Beach Fringe – Alternative 7

Additional modifications were made to the standards and guidelines under Alternative 7 to respond to public comments so that this alternative could provide a higher level of timber volume and improve timber sale economics, while minimizing effects on the conservation strategy. This item and the next two items fall into this category; however, the reduction of the beach fringe is the most significant. Under Alternative 7, the beach fringe buffer would be reduced from 1,000 feet to 500 feet from the shoreline. This concept was first analyzed under Alternative 2 in the 1997 FEIS. Because this low-elevation band typically contains larger trees, is more easily accessible, and adds a substantial amount of suitable forest land, this modification has a large effect on available timber volume and average timber sale economics. On the other hand, it would negatively affect many wildlife and plant species that use or inhabit beach fringe habitats more extensively than most other Tongass habitats, and would negatively affect old-growth connectivity.

2.5.2.11. Elimination of Class III Stream Buffers – Alternative 7

As noted in Section 2.5.2.10, additional modifications were made to the standards and guidelines under Alternative 7 to respond to public comments so that this alternative could provide a higher level of timber volume and improve timber sale economics, while minimizing effects on the conservation strategy. The elimination of the requirement to leave riparian buffers along Class III streams is one of these modifications. It would not produce a substantial additional timber volume, but could result in more economic timber sales, since Class III stream buffers are thought, by many, to be a key factor in timber sale economics.

2.5.2.12. Elimination of Goshawk-Specific Nest Buffer Standard and Guideline – Alternative 7

As noted in Section 2.5.2.10, additional modifications were made to the standards and guidelines under Alternative 7 to respond to public comments so that this alternative could provide a higher level of timber volume and improve timber sale economics, while minimizing effects on the conservation strategy. Elimination of the goshawk-specific nest buffer standard and guideline is another modification that contributes to this goal. Only the general heron and raptor nest protection standard and guideline would apply to confirmed or probable goshawk nests. This means that active nests would receive forested 600-foot wind-firm buffers, where available, and that road construction through the buffer would be discouraged. Disturbance during the active nesting season would be prevented and protection measures could be removed if the nest is inactive after 2 consecutive years of monitoring.

3. WILDLIFE VIABILITY RATINGS

3.1. Historical Background for Tongass Viability Ratings

Direction under the National Forest Management Act (36 CFR 219.19:43048) states that “fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area.” For planning purposes, a viable population is defined as “one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area.” Furthermore, “habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that individuals can interact with others in the planning area.”

To meet these requirements, decision-makers for the 1997 Forest Plan revision effort relied in part on the findings of structured risk assessment panels, consisting of subject matter experts. The panels were charged with the task of providing unbiased scientific information on the relative risk associated with implementing each plan alternative to the continued persistence across the landscape of selected species or species groups. These risk assessment panels consisted of four evaluators (drawn from various Federal agencies and Alaska state government), a local subject matter expert available as a resource person, a facilitator, a scribe, and a silent observer (Shaw 1999).

The approach of using professional judgment to assess viability risk had been used in the Pacific Northwest for the development of the Northwest Forest Plan (FEMAT 1993, Starkey 1998). In addition, this approach was selected for the Tongass because of the considerable uncertainty regarding the ecology and distribution of many wildlife species and there was generally inadequate information on which to base predictive models. In addition, the timeframe for the planning process was too short to facilitate the collection of additional data on which to base predictive models (Shaw 1999).

Thus, seven wildlife panel assessments were conducted: one for goshawk, marten, brown bear, wolf, marbled murrelet, "other terrestrial mammals," which included both endemics and widely distributed species, and black-tailed deer. These old-growth associated species and species groups were selected because collectively their ecologies incorporated the breadth of forest habitat features and other attributes of environmental variation represented across the Forest (Shaw 1999)., and because they were thought to be representative of a subset of species that are sensitive to disturbance and potentially at risk of either becoming locally extirpated or jeopardizing cultural or subsistence uses. Risk assessment panels were also conducted for sustainability of the fisheries resource, old-growth forest ecosystems, the social and economic values of forest resources to residents of southeast Alaska, and subsistence use of forest resources (e.g., black-tailed deer and salmon), but these are not discussed further in this appendix.

Panel assessments were initially conducted in fall 1995 and winter 1995-96 to evaluate the risks of nine draft Forest Plan alternatives. Following public comment, and taking into account results of these panel assessments, some plan alternatives were modified and additional plan alternatives were developed that were not subject to the panel assessment process. Consequently, a second set of risk assessment panels was convened in the spring of 1997, which evaluated seven alternatives including a modified version of Alternative 2 (equivalent to 2008 Alternative 7) and a new Alternative 11 (equivalent to 2008 Alternative 5); Alternative 6 (similar to 2008 Alternative 4) was not reevaluated. Evaluators were the same during both panel assessments for the marten and the other terrestrial mammals group, but one or more evaluators changed for the other panel assessments.

In the 1997 FEIS, which was developed before the second set of panels was conducted, Alternatives 10 and 11 were not subjected to risk assessment panels as were the full array of draft alternatives. In the description and analysis of panel results in the 1997 FEIS (Chapter 3, *Biodiversity* and *Wildlife* sections), there was a strong correlation between the acres of POG scheduled for harvest in an alternative and the mean outcome scores for that alternative. As the number of acres harvested increased among alternatives, the mean outcome scores also increased, resulting in greater risk that habitat may not be sufficient to maintain viable and well distributed populations.

Based upon this strong relationship that emerged, the likely effects of Alternatives 10 and 11 were inferred from the acres of old-growth forest scheduled for harvest in these two alternatives, the features of these alternatives as compared to the paneled alternatives, and the relative importance of these features as judged from panel discussions for individual species. Using this approach the likely effects of Alternatives 10 and 11 were discussed in the *Biodiversity* and *Wildlife* sections of the FEIS. Because this strong relationship facilitated development of an effects analysis and time and expense of reconvening all panels was a consideration, alternatives 10 and 11 were not originally subjected to panel risk assessment.

To examine if these inferences were appropriate and presented an accurate analysis of likely effects of implementing Alternatives 10 and 11. This second set of six risk assessment panels included the northern goshawk, Alexander Archipelago wolf, brown bear, American marten, fisheries resources, and other terrestrial mammals. These panels followed the same process as the panels conducted in late 1995 and early 1996. The conclusions from this second set of panels were consistent with the inferences made based on the strong relationship between acres harvested and viability scores (see Appendix N to the 1997 FEIS).

Therefore, this same approach for making inferences is being used in the 2008 Forest Plan Amendment FEIS. Additional factors which solidify the accuracy and reasonableness of this approach are that all of the 2008 alternative harvest levels are within the range of harvest levels analyzed by the panels and four of the seven 2008 alternatives are similar to alternatives directly evaluated by the panel assessments.

Section 3.2 describes the 1995/1996 and 1997 panel assessment process and Section 3.3 summarizes the wildlife panel assessment results. Section 3.3 reviews recent science related to viability analysis and Section 3.4 describes the application of the 1995/1996 and 1997 panel assessments to the 2008 alternatives. Finally, Section 3.5 presents an alternative approach to addressing viability.

3.2. Description of the 1995/1996 and 1997 Panel Assessment Process

3.2.1. Panel Process

The panel assessments evaluated alternatives in terms of their ability to maintain habitat sufficient to support the continued existence of well-distributed, viable wildlife populations across the Tongass over a 100-year planning horizon (10 decades of implementation). The panels were conducted with a modification of the Delphi process that was used, tested, and judged effective in the President's Northwest Forest Plan.

To assess relative levels of risk to wildlife species or species groups, a likelihood approach was used where evaluators individually assigned 100 "likelihood" points by alternative to five potential outcomes, based on the available scientific information. Outcomes included:

- Outcome I: Habitat is of sufficient quality, distribution, and abundance to allow the species to maintain well-distributed breeding populations across the Tongass. The concept of well distributed must be based on knowledge of the species' distributional range and life history.
- Outcome II: Habitat is of sufficient quality, distribution, and abundance to allow the species to maintain breeding populations distributed across the Tongass. However, some local populations are more ephemeral because of reduced population levels and increased susceptibility to environmental extremes and stochastic events associated with reduced habitat abundance and distribution. Vacated habitats may become recolonized in the future.
- Outcome III: Habitat is of sufficient quality, distribution, and abundance to allow the species to maintain some breeding populations, but with significant gaps in the historic distribution in the Forest. These gaps are likely permanent and will result in some limitation of interactions among local populations. The significance of gaps must be judged relative to the species' distributional range and life history.

- Outcome IV: Habitat only allows continued species existence in refugia, with strong limitations on interactions among local populations. The significance of extirpations across islands or regional landscapes must be evaluated relative to the species' distribution, range, and life history.
- Outcome V: Habitat conditions result in species extirpation from Federal land.

Likelihood points assigned to these outcomes do not represent absolute probabilities per se, rather they represent a relative measure of how likely future outcomes are, based on reasoned professional judgment (Shaw 1999). Thus they can be used to compare alternatives, and serve as a measure of the evaluators' certainty about a particular outcome, but by themselves do not represent the percent probability of a given outcome.

For each species, evaluators independently assigned outcome scores to each alternative. For the endemic and widely distributed groups, evaluators selected what they determined to be the most vulnerable species or group of species, which varied by alternative due to the location of activities proposed under each alternative and the geographic distribution of many island endemics (Shaw 1999). However, like the single-species panels, each group was assigned only 100 points per alternative. The only species for which likelihood ratings were not used was the Sitka black-tailed deer, for which the panel assessment relied on the deer habitat capability model to predict potential outcomes (See *Wildlife* section in Chapter 3 for a description).

Panel evaluators were instructed to evaluate the effect that implementation of the alternatives for 100 years would have on the abundance and distribution of habitats suitable to support well distributed and persistent populations of species assessed. One hundred likelihood outcome points were distributed among five possible outcomes. In addition, panel evaluators were asked to appraise features used to construct alternatives (e.g., reserves, beach buffers) as to their contribution to maintaining habitat for species assessed. These qualitative appraisals of specific features and the panel discussions were used by the authors of the written summaries prepared for each panel, to interpret the quantitative evaluation of alternatives as indicated by the assignment of likelihood points by outcome and to identify important ecological considerations. (Summary reports for each panel were developed and are included in the planning record and at http://www.fs.fed.us/pnw/tlmp_app/.)

In the presentation of panel assignment of likelihood outcome points in each table below, the 'after' likelihood outcome ratings are used to compare among alternatives since these second ratings benefit from professional interaction and a likely greater understanding of differences among features in alternatives. The 'before' ratings occurred following presentations on alternatives and local information on each species, but before the merits of individual alternatives were discussed among panel evaluators. The average rating for all panelists also is used, rather than focusing on differences among individual evaluators.

3.2.2. Concepts of Viable and Well Distributed Populations

In the discussion and analysis of the first set of panel results in the 1997 FEIS, Outcomes I and II were often combined as an expression of likelihood of sustaining habitat sufficient to support viable and well distributed populations. Conversely, Outcomes III, IV, and V were often combined in effects analysis as representing increased risks of not maintaining the habitat necessary to sustain viable and well distributed populations. By virtue of its description, Outcome III was difficult to interpret due to the statement that "significant gaps" would be created and the "significance of gaps must be judged relative to the species distributional range, and life history." There was considerable variability in the interpretation of this concept by individual panelists. The original panelists convened in late 1995 and early 1996 were not specifically queried about the relationship between outcomes and the maintenance of viable well-distributed populations. These conclusions were generally inferred, based largely upon whatever discussion occurred during panel deliberations. In general, the IDT inferred that Outcome III represented a condition where gaps were significant enough to substantially preclude interaction among populations of the species. In this condition, a species would not be well distributed, and continued existence of the species across the planning area would be at risk.

Because of the difficulty the IDT encountered in interpreting the first set of panel results relative to the maintenance of well distributed and viable populations, the second set of panelists were provided an opportunity to directly and explicitly discuss these issues. The same five outcomes were used in the second panels conducted in 1997. However, focused discussion provided additional information relative to Outcome III and the panelists' interpretation of gaps in distribution, well distributed populations, and viability.

Outcome III, defined as providing habitat to maintain breeding populations but with significant gaps in historic distribution, was interpreted as an array of conditions. For some of the panels, one end of this array was any condition where gaps in habitat existed as small as the territory of a single animal or single pair of animals of the species being assessed. At the other end, this array could include conditions with broad gaps in habitat distribution and significant limitations on population interactions. The panelists considered some part of this array of conditions as meeting their concept of viable and well distributed. They indicated that the concepts of well distributed and viable, as they used them for the purposes of assessing risk, were not necessarily synonymous. Their views on well distributed habitat dealt primarily with the likelihood that modified habitat would, because of gaps, no longer be able to support a continuous territory-to-territory distribution of resident individuals or groups. That is, some previously occupied territories might become permanently vacant within a 100-year timeframe.

The panelists interpreted viability as a condition in which populations could continue to interact and interbreed within their historic distribution across the Tongass National Forest. They felt that a distribution that included some gaps could still be considered viable as long as there was still interaction among the population segments on the forest and those population segments were distributed across the species range. For example, the marten panel understood that their concept of a habitat gap being as wide as a previously occupied home range likely had little if any effect on species interaction or interbreeding. Thus, in the panelists' interpretation, the criterion of well distributed was more restrictive than the criterion of viable.

The panelists were not providing a legal interpretation of the requirement in the National Forest Management Act of 1976 (NFMA) regulations to provide for viable populations. In the discussion of population viability in the NFMA regulations, the concept of "well-distributed" is tied to the ability to continue interactions among individuals of a species, not necessarily to the maintenance of a territory-to-territory distribution of the species. The interpretation of well distributed is expressed most clearly in the stipulation that maintenance of a viable population requires providing habitat to support "at least a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area" (36 CFR 219.19). This has been interpreted to mean that the condition of viable and well distributed allows for gaps within a species distribution as long as the population segments of the species continue to interact and are distributed throughout the planning area. Thus, the concept of well distributed used by the panelists was more stringent than the concept as applied in the NFMA regulations.

It is difficult to determine how many likelihood points were assigned to the outcome of a viable population since the panelists considered that only some part of the array of conditions under Outcome III met their definition of viable. Thus, the likelihood of maintaining habitat sufficient to support well distributed and viable populations is appropriately presented as being within the span of scores that bracket Outcome III. Consequently, in some of the tables in the following discussions, ratings are expressed as being greater than the sum of likelihood scores for Outcomes I and II, but less than the sum of likelihood scores for Outcomes I, II and III. Expression of data as a range also illustrates the uncertainty in the process and the variability in the professional judgments regarding the concepts of viable and well distributed populations. Use of a range also avoids presenting a single absolute value that might suggest a level of precision that does not exist in this assessment process.

Finally, in some of the following tables, 1995/1996 panel outcome scores are expressed in the same manner of bracketing scores as for the 1997 scores discussed above. Expression of the first panel information in this manner is for comparative purposes only. These combinations do not infer any conclusions on behalf of the 1995/1996 panels because they did not specifically discuss viable and well distributed populations relative to the specific outcomes.

3.3. Summary of 1995/96 and 1997 Panel Assessment Results for Wildlife

3.3.1. Northern Goshawk

3.3.1.1. General Observations on the Goshawk Panels

Panelists noted the apparent low relative density of nesting goshawks in Southeast Alaska. Less than 40 total nest sites had been identified by the time of the assessments after nearly 5 years of inventory effort across the Forest (Iverson 1996a). Low prey diversity compared to other goshawk populations across North America was considered a principle factor, resulting in a higher sensitivity to habitat modifications which may reduce prey diversity and abundance.

The primary factor used by panelists in rating the likelihood of alternatives to support a viable and well-distributed goshawk population was net proportion of all old growth on the Tongass that would be harvested in 100 years (Iverson 1996a, 1997a). This was based on science current at the time of the panel assessments that indicated the strong selection by goshawks for POG forest and the avoidance of all other habitat types (especially early and mid seral conifer forests), though panelists noted that the reliance on this factor was somewhat general due to the lack of more specific information on goshawks in Southeast Alaska and what specific old-growth acres would be harvested.

The 1995 panel assessment used 20 percent of the POG harvested as a threshold level beyond which local persistence and viability were concerns (Iverson 1996a). Most notable was north Prince of Wales Island where in excess of 20 percent of the POG had been harvested. Significant concern arose over this and increased proportions of unsuitable early seral forest on the landscape. This concern was generated from the relatively low density of nesting goshawks discovered relative to the inventory effort in those landscapes. In addition, potential signs of ecological stress was indicated by large home ranges, nonbreeding, and differential winter and breeding use areas. Thus, qualitative judgments concluded that alternatives resulting in this or a greater percentage of the net POG harvested could result in negative overall landscape consequences to sustaining resilient, adaptable, and well distributed goshawk populations in Southeast Alaska. While such thresholds were considered by the 1997 panel, they did not make any conclusions regarding harvest thresholds due to the lack of information and other uncertainty (Iverson 1997a). They suggested that to draw conclusions relative to harvest thresholds, further information was needed on the demographic performance of goshawks under different situations.

In addition, alternatives that proposed standards and guidelines to maintain important landscape components such as riparian, beach and estuary buffers were rated as having higher likelihoods of supporting well-distributed goshawk populations. These habitats are used by goshawks when old-growth forest is present and they also generally support greater prey diversity and net prey productivity. The ability of stands to provide structure adequate to support prey populations and goshawk foraging opportunities was also considered important and related to the length of rotation and harvest method proposed under the alternatives.

The concept of habitat reserves was seen as a less important landscape design feature, since management of the landscape matrix as a whole was felt to have a greater net influence on goshawk habitat suitability, distribution and persistence. Large (40,000 acre) and medium (10,000 acre) habitat reserves as proposed were generally considered too small to sustain more than one or two pairs of goshawks. Roads were not considered an adverse element, thus roadless features of reserves did not generally contribute to overall habitat suitability.

Panelists concluded that at some, albeit low, minimum level, forest management was not considered adverse to overall goshawk habitat suitability and likely contributed to stand diversity.

Given the wide ranging nature of goshawks, the panels emphasized the importance of matrix management to providing habitat capable of supporting viable and well-distributed goshawk populations. However, elements of the reserve system (i.e., large and medium habitat reserves and legislated conservation areas) were deemed important because by default they reduced the net acreage of old-growth harvested.

3.3.1.2. Goshawk Panel Results

The final average panel ratings for northern goshawk are displayed in Table D-9. Alternative 1 in 1997 essentially represents a no-harvest alternative. Nearly two-thirds of all likelihood points were assigned to Outcome I, which indicates that well distributed goshawk breeding populations would be maintained across the Tongass. However, Outcome II received nearly a third of likelihood scores, suggesting that even with no further reduction in old-growth forest, goshawk populations would likely experience reductions and local persistence may be more ephemeral or irregular as a result of the local concentration of habitat loss from past timber harvest. Implied in this conclusion is that additional harvest would be additive to an existing effect.

Because of the significant amount of legislatively reserved lands and the net amount of POG that would likely remain under even the most aggressive timber harvest alternatives, panelists believed there was little chance for total extirpation of the goshawk population from Southeast Alaska. The highest rating for Outcome V (extirpation) was only 8 (for 1997 Alternative 7). Moderately high net scores for Outcomes I and II occurred for 1997 Alternatives 4 and 5 (65 and 74-85, respectively). These alternatives had in common the use of extended 200-year rotations. Panelists generally believed that forest structure resulting from mid-seral mature forest developmental stages (100 to 200 years old) was more beneficial to goshawks and their prey than a combination of reserves and shorter, 100-year rotations.

The 1997 panel assigned 71 likelihood points to 1997 Alternative 11 for the sum of Outcomes I and II, and 97 likelihood points to the sum of Outcomes I, II and III. Even though this alternative was based on a 100-year rotation, its ratings were second highest of all alternatives that proposed to continue timber harvest, only slightly lower than the rating given to Alternative 5. In addition, Alternative 11 was rated as having very low likelihood of goshawks existing in refugia or being extirpated from the Tongass after 100 years of Forest Plan implementation with a combined Outcome IV and V score of 3.

Alternatives 3, 6, and 10 (1997) had intermediate combined Outcome I and II scores of 52, 50, and 48, respectively. In spite of partial or complete application of habitat reserves, the higher overall old-growth harvest levels, coupled with the 100-year rotation perpetuated a less suitable early seral forest stand structure and was a drawback for these alternatives. Conversely, panelists attributed moderate uncertainty that either of these two alternatives would maintain well distributed populations, with a combined score of Outcomes III, IV and V of 48 (1997 Alternative 3), 50 (1997 Alternative 6), and 53 (1997 Alternative 10). This suggested there was a nearly even chance that either permanent gaps in the distribution would occur or goshawks may exist only in refugia under these three alternatives in 100 years; and in either case interaction between individuals would likely diminish. The forest-wide system of old-growth habitat reserves proposed in 1997 Alternatives 3 and 10 alone imbedded in a matrix of early seral forest structure managed on a 100-year rotation were rated by the panelists to be of insufficient size to support goshawk populations without gaps in distribution or refugia populations occurring.

Alternatives 2, 7 and 9’ (1997) were rated by panelists as having a relatively high likelihood (76-80, 88, and 77-92, respectively) that in 100 years gaps in distribution would be likely to occur or populations would exist only in isolated refugia or be extirpated (Outcomes III, IV, or V). When Alternative 9 was analyzed in 1997 with a lower harvest, results were nearly the same producing a likelihood of 90.

Variation in ratings for alternatives assessed in both 1995 and 1997 ranged up to 18 points based on the sum of likelihood points assigned to Outcomes I, II and III (Table D-9). Of those alternatives reviewed in both 1995 and 1997, 1997 Alternatives 1, 5, 2, and 9' were ranked in order (based on average weighted outcomes) from least to highest risk to goshawk habitat in both of the assessments. The 1997 panels also confirmed the judgment in Chapter 3 of the 1997 FEIS, based on a detailed analysis of VCUs, that 1997 Alternatives 5 and 11 had the highest likelihood of sustaining goshawk habitat across the forest of all alternatives that proposed to continue timber harvest. However, the analysis in Chapter 3 resulted in a conclusion that 1997 Alternative 11 had a slightly higher likelihood of maintaining goshawk habitat than 1997 Alternative 5.

Table D-9.
Northern Goshawk Panel Results[1]

Outcomes	Pre 1954	1	5	11	4	10	3	6	8	2	9	9’	7
	1997 Forest Plan Revision FEIS Alternatives												
1997 Panel													
I	89	63	35	23		8				1	0	0	
II	11	38	50	48		40				19	10	8	
III	0	0	15	28		48				61	61	61	
IV	0	0	0	3		5				16	26	29	
V	0	0	0	0		0				5	3	3	
Potential POG Harvest (1,000s of acres)	- 414	0	463	475	495	670	571	732	--	853	1,042	1,403	1,200
1995 Panel													
I		66	23		23		17	6	0	0		0	0
II		31	51		42		35	44	27	24		23	12
III		3	25		29		34	33	41	40		42	40
IV		0	1		6		14	17	29	33		32	40
V		0	0		0		0	0	3	4		3	8
Potential POG Harvest (1,000s of acres)	--	0	572	--	618	--	736	954	955	1,107	--	1,403	1,557
Range Between Outcomes I + II and I + II + III													
1997 Panel	100	100	85-100	71-97	--	48-96	--	--	--	20-61	10-61	8-61	--
1995 Panel	--	97-100	74-99	--	65-94	--	52-86	50-83	27-68	24-64	--	23-66	12-52

[1] Mean likelihood outcome scores by evaluators in 1997 are shown at the top of the table. Scores from the 1995 panel are shown in the middle of the table. Scores were assigned by both panels for Alternatives 1, 2, 5, and 9’. Alternatives 1 and 9’ are identical between panels in both features and acres of POG harvested. Alternatives 2 and 5 are identical in features but with fewer acres of POG harvested in 1997 relative to 1995. A range for all alternatives is shown at the bottom of the table for the likelihood of maintaining habitat to support viable and well distributed goshawk populations. Only ‘after’ scores are shown. The - 414,000 value for POG harvest under Historic represents the acreage harvested since 1954.

3.3.1.3. Effects of Added Habitat Management Measures

Even though 1997 Alternative 11 was rated second highest in terms of viability among all alternatives that proposed to continue timber harvest and had a very low likelihood of goshawks existing in refugia or being extirpated from the Tongass after 100 years of Forest Plan implementation, because it was the selected alternative and because the goshawk had been considered for listing under the Endangered Species Act, 1997 Alternative 11 was reviewed to determine if features of the alternative could be modified to improve the projected outcome.

The conservation assessment for northern goshawk (Iverson et al. 1996) evaluated the effect of various management practices on goshawk nesting and foraging habitat, and also identified specific geographic locations where goshawk habitat had been highly fragmented. Based on this information, an additional measure for goshawk habitat was prescribed for Prince of Wales Island where POG had been fragmented by past management actions. This measure applied in VCUs where over 33 percent of POG had been converted to young stands by past management. In those VCUs, any additional management of POG was to be either restricted to 2-acre clearcuts or be managed to leave significant structure in harvested stands.

This standard and guideline applied to management activities in VCUs on Prince of Wales Island with a high percentage of past harvest. Approximately 55 percent of the total original POG had been converted to young forest in these VCUs. For any additional harvest of POG in these VCUs, the standard and guideline had the effect of either implementing a 200-year uneven-aged management regime or leaving structure equivalent to 30 percent of the cover of the original stand. Neither of these practices was expected to produce high-value nesting habitat, but they were expected to result in moderate to high value foraging habitat (Iverson et al. 1996). This structure, in combination with matrix management provisions for beach fringe and riparian management areas, was believed to facilitate goshawk dispersal among large and medium reserves on Prince of Wales Island. Goshawks were also considered to benefit in other provinces by the measures put in place for marten and for connectivity. Again, these had the effect of facilitating dispersal among goshawk populations in reserves. Taken in combination with other measures already in place in 1997 Alternative 11, these increased the already high likelihood of providing habitat sufficient to maintain viable and well-distributed goshawk populations and, had they been added prior to the panel assessments, may have increased the likelihood points.

3.3.2. American Marten

3.3.2.1. General Observations on the Marten Panels

Forest structure at the stand scale and integrated across the landscape was the most important factor in panel ratings and discussion due to the close association of marten with lower elevation and higher volume old growth and because these stands have also received a disproportionate amount of timber harvest (Iverson 1996b, 1997b). Structural complexity, associated with older forest stands, was also deemed important for providing habitat to support adequate prey populations of small mammals. The ability of alternatives to provide structural complexity was related to the proposed harvest rotation, which was a primary factor in the panel ratings. The panels considered 100 years an inadequate amount of time to produce structural elements such as large trees, snags, and downed logs that are used by marten and provide prey habitat. Maintaining the old-growth forest within the beach and riparian habitat zones was considered important by panelists, particularly for landscape connectivity and prey habitat diversity.

Both marten panels agreed that large and medium reserves as designated by the VPOP provide important habitat features for marten (Iverson 1996b, 1997b). Both panels indicated, however, that the VPOP approach to establishing a system of well distributed OGRs was only minimally acceptable for marten. The approach was judged to be minimal primarily because its spatial distribution of reserves could allow for the creation of “gaps” in marten distribution within harvested matrix lands.

Roads were a minor consideration in panel ratings in relation to their impact on human access. As with wolves, it was not the direct effect of the number of road miles or road density proposed under the alternatives, but rather increased trapping pressure and related mortality resulting from increased access which could be mitigated through appropriate road management, seasons, and bag limits.

3.3.2.2. Marten Panel Results

The final average panel ratings for American marten are displayed in Table D-10. Alternative 1 (1997) provided the greatest likelihood of maintaining well distributed marten populations across their current range on the Tongass. It had a mean likelihood rating of 54 (in 1995) to 84 (in 1997) for Outcome I. The 1995 panelists indicated that even with no further timber harvest and road construction, there was still a reasonable likelihood that local populations would be reduced or gaps that limit populations would be created with little interaction within the species range, as indicated by a combined score of 46 for Outcomes II and III. Concentration of past timber harvest in specific provinces and past harvest primarily in the high-volume classes which were concentrated at lower elevations contributed to this conclusion. In contrast, however, the much higher ratings given by the 1997 panel indicated they thought that past timber harvest would create few gaps in marten distribution (combined score of only 17 for Outcomes II and III).

Panelists concluded that there was no likelihood of extirpation of marten from the entire Tongass National Forest under all alternatives in 1997 and under most alternatives in 1995. In 1995, Alternatives 2, 9, and 7 were considered to have some chance of extirpation (likelihood scores of 15-25 for Outcome V). Anticipated timber harvest, especially in the remaining high-volume class stands at lower elevation, and road construction, contributed to this conclusion.

The likelihood that in 100 years an alternative would result in either significant gaps in distribution, populations existing in relatively isolated refugia, or local extirpations, may be an indication that marten populations would not remain well distributed across the forest. This cumulative likelihood is the sum of Outcomes III, IV, and V. From this perspective, 1995-1997 Alternatives 2, 7, 8, 9 and 9’ were given cumulative ratings of 80 to 91, depending on the panel and the alternative. Alternative 6 (1995) also had a relatively high cumulative likelihood outcome of 72. Extensive planned roading, continued fragmentation of habitat, and most importantly, a significant reduction in the important high-volume old-growth forest component were factors cited by panelists that contributed to these conclusions. Even (1995-1997) Alternatives 3, 10, and 11, with their significant reserve components had combined Outcome III, VI, and V ratings of 56 to 70, suggesting a better-than-even chance that well distributed populations may not be maintained across the Tongass in 100 years. All of these alternatives had in common a 100-year timber harvest rotation.

Alternatives 4 and 5 (1995-1997) were rated intermediate by the panelists in their likelihood of maintaining persistent and well distributed marten breeding populations, with combined scores for Outcome I and II of 60 and 66-70, respectively. Extended 200-year timber harvest rotations was the most important design feature for sustainable approaches to providing marten habitat.

Alternative 10 (1997) was intermediate between 1997 Alternatives 2 and 3 in both design features and acres of old growth harvested; thus risks to maintaining viable marten populations were considered intermediate between these two alternatives. In spite of having a system of large, medium and unmapped small reserves that would reduce risks relative to 1997 Alternative 2, the 100 year rotation, only a 500-foot beach fringe, and smaller riparian buffers in 1997 Alternative 10 was considered as possible long-term risks to marten.

Table D-10.
American Marten Panel Results[1]

	1997 Forest Plan Revision FEIS Alternatives												
Outcomes	**Pre 1954**	**1**	**5**	**11**	**4**	**10**	**3**	**6**	**8**	**2**	**9**	**9'**	**7**
1997 Panel													
I	90	84	1	0		0				0	0	0	
II	9	9	65	36		30				19	13	11	
III	1	8	29	55		59				64	53	50	
IV	0	0	5	9		11				18	35	39	
V	0	0	0	0		0				0	0	0	
Potential POG Harvest (1,000s of acres)	- 414	0	463	475	495	670	571	732	--	853	1,042	1,403	1,200
1995 Panel													
I		54	17		15		4	3	3	3		3	3
II		25	53		45		40	25	17	6		6	6
III		21	24		37		41	42	42	55		46	27
IV		0	6		3		15	30	35	21		24	39
V		0	0		0		0	0	3	15		21	25
Potential POG Harvest (1,000s of acres)	--	0	572	--	618	--	736	954	955	1,107	--	1,403	1,557
Range Between Outcomes I + II and I + II + III													
1997 Panel	99-100	93-100	66-95	36-91	--	30-89	--	--	--	19-83	13-66	11-61	--
1995 Panel	--	79-100	71-95	--	60-97	--	44-85	28-70	20-62	8-64	--	9-55	9-36

[1] Mean likelihood outcome scores by evaluators in 1997 are shown at the top of the table. Scores from the 1995 panel are shown in the middle of the table. Scores were assigned by both panels for Alternatives 1, 2, 5, and 9'. Alternatives 1 and 9' are identical between panels in both features and acres of POG harvested. Alternatives 2 and 5 are identical in features but with fewer acres of POG harvested in 1997 relative to 1995. A range for all alternatives is shown at the bottom of the table for the likelihood of maintaining habitat to support viable and well distributed goshawk populations. Only 'after' scores are shown. The - 414,000 value for POG harvest under Historic represents the acreage harvested since 1954.

Alternative 11 (1997) had additional features that further increased the likelihood of maintaining viable goshawk populations relative to 1997 Alternative 3, such as mapped small reserves in all watersheds, and allocation of four additional medium and small reserves. The 1,000-foot beach and riparian protection were similar among 1997 Alternatives 11 and 3, but 1997 Alternative 11 had substantially fewer old growth acres scheduled for harvest (475,000) and thus lower risk than 1997 Alternative 3 (571,440). Total acres harvested in 1997 Alternative 11 was even fewer than 1997 Alternative 4 (495,000), in spite of the 200-year rotation. Alternative 11 (1997) did not have a two-aged silvicultural prescription that maintained forest structure considered important by panelists, but the net acres old growth disturbed might have offset either the potential advantage of two-aged management in 1997 Alternative 3 or two-aged management and a 200-year rotation in 1997 Alternative 4.

Of those alternatives reviewed in both 1995 and 1997, Alternatives 1, 5, 2, and 9' were ranked in order from least to highest risk to marten habitat in both assessments (Table D-10). The 1997 panel results also were consistent with conclusions drawn concerning the relative ranking of all alternatives based on other evidence in Chapter 3 of the 1997 FEIS and other information in the planning record. This includes the conclusion that outcomes of 1997 Alternative 11 would be similar to those of 1997 Alternative 3.

3.3.2.3. Effects of Added Habitat Management Measures

American martens were one of the primary species considered in the design of the original VPOP strategy. By design, each large HCA was intended to support at least 25 female martens, medium HCAs to support at least 5 female martens, and small HCAs at least 1 female. Each large HCA was designed to support a population with high likelihood of at least short-term persistence. The design distance between large HCAs was 25 miles, approximating the maximum dispersal distance recorded for marten, and medium and small HCAs were spaced more closely. Forested corridors were to provide for dispersal among HCAs. All corridors were to be at least 330 feet wide, and riparian and beach fringe habitats were considered appropriate corridors where they provided connections among the HCAs. This network of interconnected HCAs was intended to support a number of local populations that could interact as a metapopulation, thus providing for long-term viability.

Three of the scientists involved in the Kiester and Eckhardt (1994) review identified limitations in this strategy for marten. Benkman, Lidicker, and Powell questioned the use of the maximum marten dispersal distance to establish spacing among HCAs. Benkman cautioned that this strategy would only work if the medium and small HCAs provided connections among the large HCAs. Lidicker added that the condition of the matrix ought to be considered when establishing distances among HCAs. Powell indicated that marten would generally not travel directly between HCAs, so the actual distances they would have to cover would exceed the design distance. None of these reviewers commented directly on the size of large or medium HCAs, but both Benkman and Powell noted that the small HCAs would be unlikely to support even one pair of marten by themselves. A number of the reviewers in Kiester and Eckhardt (1994) commented in general that the utility of corridors for wildlife dispersal had not been demonstrated. None of these comments were specific to marten, possibly because marten are known to make extensive use of riparian zones (Bissonette et al. 1989, Clark et al. 1987).

The VPOP strategy is most fully represented in 1995-1997 Alternative 3. The risk assessment panel convened in 1995 rated this alternative intermediate between 1995 Alternative 1 (no further harvest) and 1995 Alternative 9 (continuation of the existing plan). They indicated that there was a better than equal likelihood that implementation of this alternative for 100 years would result in significant gaps in marten habitat distribution on the Tongass. They projected no likelihood that marten would be extirpated from the entire forest under this alternative.

The risk assessment panel convened in 1997 gave Alternative 11 a similar risk rating to that given to Alternative 3 in 1995. Alternative 11 (1997), as rated by the panel, provides for a wider beach fringe buffer than 1997 Alternative 3, but it also relies more heavily on even-aged management in the matrix. Panelists noted that the projected matrix conditions had a significant influence on their ratings. The panelists convened in 1997 also clarified their interpretation of the outcomes that were used as the basis for risk assessment. Outcome III, defined as providing habitat to maintain breeding populations but with significant gaps in historic distribution, was interpreted as an array of conditions. At one end of this array was any condition where gaps in habitat existed as small as the territory of a single marten. At the other end, this array could include conditions with broad gaps in habitat distribution and significant limitations on population interactions. The panelists considered some part of this array of conditions as meeting the definition of viable and well-distributed. The panelists assigned a total of 91 likelihood outcome points to the sum of Outcomes 1 + II + III. This included 36 likelihood points in Outcomes I and II, which they considered to represent a viable and well distributed condition. It also included 55 likelihood points in Outcome III, some portion of which represents a viable and well distributed condition. The panelists indicated there was a very low likelihood that marten would exist only in refugia or be extirpated from the Tongass after 100 years of Forest Plan implementation with a combined Outcome IV and V score of 9. The panelists indicated that matrix management was the feature of 1997 Alternative 11, as rated, that contributed to the assignment of likelihood points to outcomes that were not well-distributed. They indicated that clearcut silviculture on a 100-year rotation would result in further fragmentation of marten habitat.

Alternative 11 (1997) was strengthened subsequent to the panel assessment because that assessment indicated a level of concern about the likelihood of marten populations remaining well-distributed across the Tongass for at least 100 years. The measures used to strengthen the alternative were based on comments provided by the panelists, information drawn from past studies on marten, and information on existing habitat conditions on the Tongass. Three different measures were applied to 1997 Alternative 11 to improve the likelihood of maintaining habitat to support well-distributed populations of marten.

The first directs the management of high quality marten habitat in five biogeographic provinces where marten habitat was considered to be at higher risk. These five biogeographic provinces were identified by the VPOP risk assessment as the highest risk provinces of the 21 provinces across the Tongass National Forest (Suring et al. 1993). High value habitat is defined in the Interagency Marten Habitat Capability Model (Suring et al. 1993) as consisting of high-volume old-growth stands at elevations below 1,500 feet. Within the high-risk provinces, these stands were to be managed under practices other than clearcutting. In VCUs where 33 percent or more of the POG had been or was projected to be harvested, further harvest in any high-value marten habitat would retain at least 30 percent canopy closure, 8 large live trees per acre, 3 large decadent trees per acre and 3 logs per acre. Where less than 33 percent of POG had been harvested, further harvest in high-value marten habitat would retain 10-20 percent canopy closure, 4 large live trees per acre, 3 large decadent trees per acre, and 3 logs per acre. These habitat management measures were based on studies showing marten use higher in partially logged areas than clearcut areas (Soutiere 1979); a study reported by Hargis and Bissonette (1997) and Hargis et al. (1999) indicating that the proportion of clearcut harvesting at a landscape scale is a key determinant of marten success; and numerous studies showing the importance of large wood structure to marten (Baker 1992, Buskirk et al. 1989, Corn and Raphael 1992, Raphael and Jones (1997).

The second measure provided for access management to reduce marten mortality in areas where mortality rates due to trapping/hunting had been identified as a serious risk to marten populations. The third measure provides additional assurance of maintaining connections between habitat blocks throughout the Tongass. It required an analysis of the effectiveness of features such as small reserves, beach fringe and riparian buffers in providing for connection between old-growth blocks in medium and large reserves and other natural setting LUDs. Where these measures do not provide for full connectivity, additional habitat was to be allocated to provide for connectivity of old-growth habitats.

With all measures in place, 1997 Alternative 11 was modified to provide for a network of large and medium-sized HCAs, capable of supporting 25 and 5 female marten each, respectively. Connection between HCAs was provided by protected habitats in riparian and beach fringes, small HCAs, and additional old-growth habitat designated for connectivity where these protected habitats were not adequate. Connections through the riparian and beach fringe were believed to be effective for marten based on studies that have shown preferential use by marten of riparian zones (Buskirk et al. 1989, Raphael and Jones (1997), Spencer and Zielinski 1983). The matrix between the reserves also contained significant, although fragmented, old-growth habitat. An average of 57 percent of the pre-1954 POG was estimated to remain unharvested in the matrix areas through the planning horizon of 100 years. The percent of old growth remaining in the matrix varies by province, but in those provinces considered at highest risk the additional habitat measures described above were to be applied in the matrix. In addition to all of the above habitat measures, road access was to be managed to reduce marten mortality where mortality had been identified as a significant risk.

Full implementation of the above strategy was believed to increase the likelihood of maintaining habitat that would support well-distributed marten populations. While there would likely be gaps in this distribution, it was estimated that there was low likelihood that there would be significant isolation among marten populations resulting from implementation of 1997 Alternative 11.

3.3.3. Alexander Archipelago Wolf

3.3.3.1. General Observations on the Wolf Panels

Important assessment factors for wolves were deer habitat capability, wolf mortality, and wolf dispersal capabilities; genetic information indicating the existence of the Alexander Archipelago subspecies was new at the time of the panel assessments and was also considered, though not as a major factor. Deer habitat capability was ranked as the most important factor influencing panel evaluators' ratings because of the close link between wolf persistence and deer habitat capability (Iverson 1996c, 1997c). Thus, alternatives that contributed to greater deer habitat capability, as determined by the deer habitat capability model (see *Wildlife* section of Chapter 3 for a description), and thus greater numbers of deer, were ranked as more likely to sustain viable and well-distributed wolf populations. Deer habitat capability can be reduced directly by timber harvest, which may increase deer vulnerability to predators, especially in winters of heavy snowfall.

Roads were a primary factor associated with wolf mortality identified by the panels; however, the panels agreed that the main issues were related to human access and attitudes (i.e., issues of season and bag limits, proper access management, and human education), rather than the miles of road or road densities proposed by the alternatives. It was recognized that increased road densities contributed to increased legal and illegal mortality. Thus, the value of maintaining roadless refugia was identified as a means of providing deer habitat capability and controlling human access, and alternatives that maintained such areas were ranked as more likely to sustain viable and well-distributed wolf populations.

Wolf population distribution and the interaction of populations with respect to gaps was also an issue discussed by the panel, given the dispersal capabilities of wolves. A gap in wolf distribution was defined as approximately 100 square miles between populations, or the estimated size of a wolf pack territory on Prince of Wales Island. The most current genetic information available at the time suggested that interchange among wolf populations was occurring across major island groups in Southeast Alaska. However, there was disagreement on this point between local experts and evaluators since direct ecological evidence suggested the existence of dispersal barriers or at least severe limitations to such dispersal, especially between Prince of Wales Island and neighboring islands and the mainland, as demonstrated by available radio-telemetry data (Iverson 1996c). The panel did highlight the potential ecological concerns associated with insular populations of wolves.

3.3.3.2. Wolf Panel Results

The final average panel ratings for Alexander Archipelago wolf are displayed in Table D-11. For all 1997 alternatives, it was concluded that there was virtually no chance of extirpation of the wolf from the Tongass National Forest (Outcome V). All alternatives had only 1 of a possible 100 points assigned to this outcome, with the exception of Alternatives 9 and 9' in the 1997 panel, which had 3 points assigned. This likely represents a chance catastrophic event that, in combination with normal Forest Service activity, would result in the complete extirpation of wolves.

Alternative 1 (1997) provided the greatest relative likelihood of maintaining stable well distributed wolf populations across their current range on the Tongass. However, panelists indicated that even with no action, past management activity that reduced deer habitat capability on some portions of the forest (north and central Prince of Wales Island were specifically identified) would at least result in some likelihood of locally reduced population levels (the sums of Outcomes II, III, and IV were 12 – 19, depending on the panel). Outcome II for Alternative 1 was explained as the likely result of natural fluctuations in wolf populations in response to prey availability and other environmental factors.

Table D-11.
Alexander Archipelago Wolf Panel Results[1]

		1997 Forest Plan Revision FEIS Alternatives											
Outcomes	**Pre 1954**	**1**	**5**	**11**	**4**	**10**	**3**	**6**	**8**	**2**	**9**	**9'**	**7**
1997 Panel													
I	89	88	55	58		54				20	18	18	
II	8	6	29	25		26				43	30	30	
III	1	3	13	14		16				34	44	44	
IV	1	3	3	3		3				3	6	6	
V	1	1	1	1		1				1	3	3	
Potential POG Harvest (1,000s of acres)	- 414	0	463	475	495	670	571	732	--	853	1,042	1,403	1,200
1995 Panel													
I		80	48		34		59	26	7	35		3	3
II		14	34		39		25	38	43	25		31	26
III		3	16		24		14	31	40	30		48	51
IV		2	1		2		1	4	9	9		18	19
V		1	1		1		1	1	1	1		1	1
Potential POG Harvest (1,000s of acres)	--	0	572	--	618	--	736	954	955	1,107	--	1,403	1,557
Range Between Outcomes I + II and I + II + III													
1997 Panel	97-98	94-97	84-97	83-97	--	80-96	--	--	--	63-97	48-92	48-92	--
1995 Panel	--	94-97	82-98	--	73-97	--	84-98	64-95	50-90	60-90	--	34-82	29-80

[1] Mean likelihood outcome scores by evaluators in 1997 are shown at the top of the table. Scores from the 1995 panel are shown in the middle of the table. Scores were assigned by both panels for Alternatives 1, 2, 5, and 9'. Alternatives 1 and 9' are identical between panels in both features and acres of POG harvested. Alternatives 2 and 5 are identical in features but with fewer acres of POG harvested in 1997 relative to 1995. A range for all alternatives is shown at the bottom of the table for the likelihood of maintaining habitat to support viable and well distributed goshawk populations. Only 'after' scores are shown. The - 414,000 value for POG harvest under Historic represents the acreage harvested since 1954.

Because of the intensity of proposed harvest activity and anticipated significant regional reductions in deer habitat capability, Alternatives 2, 7 and 9 were rated by the 1995 panel to have some likelihood (range 9-19) of creating populations that would exist in refugia with severely restricted interaction between them (Outcome IV) (Iverson 1996c); the points for this outcome were dropped considerably by the 1997 panel, ranging from 3 to 6 for Alternatives 2, 9, and 9' (Iverson 1997c).

The likelihood of an alternative resulting in a situation in 100 years where either gaps in distribution occur, populations exist in refugia, or total extirpation may be a general indication that wolf populations would not remain well distributed across the Tongass compared to historical distributions. This cumulative likelihood is considered the sum of Outcomes III, IV, and V. The 1995 and 1997 versions of Alternatives 7, 8, 9, and 9' all had relatively high cumulative likelihood outcomes, ranging from 50 to 71. Moderate likelihoods existed for Alternatives 2 (40) and 6 (36). These cumulative outcomes are generally directly related to the total harvest levels and associated reductions in deer habitat capability and all have in common a 100-year timber harvest rotation timber management regime.

Overall, the results of the 1995 and 1997 evaluations were consistent. Of those alternatives reviewed in both 1995 and 1997, Alternatives 1, 5, 2, and 9' were ranked in order from least to highest risk to wolf habitat in both assessments (Table D-11). In the 1997 evaluation, Alternatives 11, 10, and 5 were all given relatively high ratings, and these were similar to ratings given to Alternative 3 in 1995. These results are consistent with the discussion of alternatives in Chapter 3 of the 1997 FEIS, except that the analysis in Chapter 3 clearly distinguished Alternative 11 as the most favorable for wolves among the alternatives that propose to continue timber harvest, primarily due to the more extensive reserve system in Alternative 11.

3.3.4. Brown Bear

3.3.4.1. General Observations on the Brown Bear Panels

Important assessment factors identified by the brown bear panel included acres harvested, roads and access management, large reserves and legislated conservation areas, and riparian habitat management. Alternatives that harvested more acres were given a lower likelihood of maintaining habitat sufficient to support a viable and well distributed brown bear population. The driving force behind this relationship were the cumulative effects of timber harvest (i.e., the combination of clearcuts, road construction, and risks to salmon populations on bears), though direct effects, such as the temporary displacement of bears due to their tendency to avoid recently clearcut areas, were also taken into account (Iverson 1996d, Meade 1997). Likewise, alternatives that did not include effective access management or proposed a greater number or road miles were rated as having a lower likelihood of supporting viable and well-distributed brown bear populations. This was related to the potential for direct effects such as the increased potential for brown bear mortality due to legal hunting, illegal killing, and defense of life and property, as well as the creation of either temporary or permanent gaps in the distribution of the brown bear population. Indirect effects associated with the extent of proposed road construction related to the risks posed to anadromous salmon, the primary food source of brown bears (the panels relied on the 1996 fish and riparian panel results to assess this).

Large OGRs and legislated conservation areas where timber harvest is not permitted were considered a critical factor in the rating of these alternatives due to their function in providing roadless refugia for brown bears. Thus, alternative that allocated a greater number of acres to these reserves were rated as having a higher likelihood of supporting viable and well-distributed brown bear populations. The spatial distribution of these areas was also taken into account, as was the likelihood that they would persist in a roadless state over time.

Two aspects of riparian habitat management were identified as being important to brown bears: the maintenance of riparian habitat capable of sustaining salmon habitat and populations over time and providing sufficient forest cover to maintain important brown bear feeding and loafing areas. Alternatives that provided greater protection to riparian areas were considered more likely to provide adequate travel corridors to foraging areas, loafing areas, and vegetative cover capable of reducing adverse encounters among brown bears (i.e., sows with cubs) and between bears and humans.

3.3.4.2. Brown Bear Panel Results

Average panel ratings are shown in Table D-12. Panelists unanimously agreed that brown bears were not likely to be extirpated in 100 years from the Tongass National Forest under any alternative. All panelists rated Outcome V as 0 for all alternatives; wilderness and LUD II (legislated) areas essentially assured brown bear persistence somewhere in Southeast Alaska in 100 years. Alternative 1 was rated highest in total likelihood of maintaining brown bears in their current distribution, with combined scores of Outcomes I and II of 93, although certain populations would experience some reduction in overall density (a 76 score for Outcome II). The likelihood rating of 6 for Outcome III was due to the extent of past roading and an anticipated future growth in human use of existing roads, in spite of little or no additional timber harvest.

Due to the planned extensive timber harvest and associated road construction, Alternatives 7 and 9' had the highest likelihoods of limiting distribution of brown bears such that they might exist only in isolated refugia, with Outcome IV scores of 40 and 25-41, respectively.

Panelists generally agreed that either Outcomes III, IV, or V would not represent well distributed populations based upon the assessment criteria they were provided. Alternatives 2, 7, 8, 9, and 9' all had scores over 50 for Outcomes III, IV, and V combined. All of these alternatives had in common relatively extensive planned timber harvest and all were managed with a 100-year rotation. The panelists believed that these five alternatives presented the greatest relative long-term risk to the maintenance of well distributed brown bear populations in 100 years.

Alternative 3 ratings did not appear to reflect the panelists' conclusion that riparian habitat protection was a significant feature in brown bear management. Alternative 3 hds the widest riparian buffers on most channel types, yet was rated similarly to Alternatives 4, 5, 6, 10, and 11 with combined Outcome I and II scores of 60, 55, 65-67, 51, 56, and 68, respectively. The extended rotations in Alternatives 4 and 5 inferred greater dispersion of future timber harvest into roadless watersheds and were rated similar to Alternatives 3 and 6 in spite of much less total planned harvest of old growth. Alternative 11 had the highest likelihood of maintaining viable long-term brown bear populations due the extensive reserve system that should significantly address the road issue that is adverse to bears. It also has strong riparian protection. Nonetheless, all these alternatives had a reasonable likelihood of maintaining brown bear populations at least in their current distribution in spite of the potential for development of temporary gaps in distribution.

Subpopulations in Southeast Alaska were rated separately. Panelists generally had greater concerns for the mainland bear populations than the populations on Chichagof/Baranof and Admiralty Islands. The mainland population was rated consistently lower than Chichagof/Baranof for all alternatives in combined Outcomes I and II. These ratings supported discussion that focused significant concern on the low density population that may already exist in relatively isolated regions. Anticipated future roading and human access development would exacerbate this natural situation and place these populations at additional risk.

Overall, the results of the 1995 and 1997 evaluations were consistent. Of those alternatives reviewed in both 1995 and 1997, Alternatives 1, 5, 2, and 9 were ranked in order from least to highest risk to brown bear habitat in both assessments (Table D-12). However, the panel results suggested that Alternatives 5 and 11 would produce similar outcomes for brown bears, while analysis based on the components of the alternatives (Chapter 3 of the 1997 FEIS) indicated that Alternative 11 was more effective than Alternative 5 in reducing risk to bears. Alternative 11 has a much greater reserve system than Alternative 5, including additional large reserves on Northeast Chichagof Island in a landscape that was identified as high risk by the 1995 panels. In addition, Alternative 11 provides more substantial riparian protection than Alternative 5, and this feature was identified as important for bears.

Table D-12.
Brown Bear Panel Results[1]

	1997 Forest Plan Revision FEIS Alternatives												
Outcomes	**Pre 1954**	**1**	**5**	**11**	**4**	**10**	**3**	**6**	**8**	**2**	**9**	**9'**	**7**
1997 Panel													
I	81	16	0	0		0				0	0	0	
II	19	76	65	68		56				49	16	16	
III	0	6	33	25		33				41	63	59	
IV	0	0	3	8		11				10	21	25	
V	0	0	0	0		0				0	0	0	
Potential POG Harvest (1,000s of acres)	- 414	0	463	475	495	670	571	732	--	853	1,042	1,403	1,200
1995 Panel													
I		40	8		8		10	6	1	4		0	0
II		53	59		47		50	45	28	35		14	16
III		8	34		37		36	38	50	38		45	44
IV		0	0		8		4	11	21	24		41	40
V		0	0		0		0	0	0	0		0	0
Potential POG Harvest (1,000s of acres)	--	0	572	--	618	--	736	954	955	1,107	--	1,403	1,557
Range Between Outcomes I + II and I + II + III													
1997 Panel	100	93-100	65-98	68-93	--	56-89	--	--	--	49-90	16-79	16-75	--
1995 Panel	--	94-100	67-100	--	55-92	--	60-96	51-89	29-79	39-77	--	14-59	16-60

[1] Mean likelihood outcome scores by evaluators in 1997 are shown at the top of the table. Scores from the 1995 panel are shown in the middle of the table. Scores were assigned by both panels for Alternatives 1, 2, 5, and 9'. Alternatives 1 and 9' are identical between panels in both features and acres of POG harvested. Alternatives 2 and 5 are identical in features but with fewer acres of POG harvested in 1997 relative to 1995. A range for all alternatives is shown at the bottom of the table for the likelihood of maintaining habitat to support viable and well distributed goshawk populations. Only 'after' scores are shown. The -414,000 value for POG harvest under Historic represents the acreage harvested since 1954.

3.3.5. Other Terrestrial Mammals

3.3.5.1. General Observations on the Other Terrestrial Mammals Panels

This panel identified two groups of mammals associated with POG for evaluation: widely distributed taxa (widely distributed group), and endemic taxa (endemic group).

Widely distributed group included:

- black bear (Ursus americanus)
- Canada lynx (Lynx canadensis canadensis)
- wolverine (Gulo gulo luscus)
- fisher (Martes pennanti)
- northern flying squirrel (Glaucomys sabrinus zaphaeus)
- river otter (Lutra canadensis mira)
- mountain goat (Oreamnos americanus columbiae)
- silver-haired bat (Lasionycteris noctivagans)
- California Myotis (Myotis californicus caurinus)
- Keen's Myotis (Myotis keenii keenii)
- little brown Myotis (Myotis lucifugus alascensis)
- long-legged Myotis (Myotis volans longicrus).

The endemic group included:

- Prince of Wales Island flying squirrel (*Glaucomys sabrinus griseifrons*)
- beaver (Castor canadensis phaeus)
- Keen's mouse (Peromyscus keeni sitkensis)
- red-backed vole (Clethrionomys gapperi stikinensis)
- red-backed vole (Clethrionomys gapperi solus)
- red-backed vole (Clethrionomys gapperi wrangeli)
- red-backed vole (Clethrionomys gapperi phaeus)
- Admiralty Island meadow vole (Microtus pennsylvanicus admiraltiae)
- Sitka meadow vole (Microtus oeconomus sitkensis)
- ermine (Mustela erminea aiascensis)
- ermine (Mustela erminea initis)
- ermine (Mustela erminea celenda)
- Admiralty Island ermine (*Mustela erminea salva*)
- Suemez Island ermine (*Mustela erminea seclusa*)

Because multiple species were considered by the panel, likelihood scores given to the most vulnerable or sensitive taxon within a group were applied to the entire group in 1995, thus these panel ratings result in conservative scores. The 1997 panel assessment rated the species as a group due to the underlying uncertainty level for the ratings of the endemic group due to the lack of ecological knowledge for many of the species.

The panel recognized that certain endemics may yet be discovered while other endemics may be more common than originally thought. The panel identified that the greatest concern for endemic species was their restricted ranges, which naturally increased their risk of extinction, and that being an endemic species equated to increased risk. Thus the panel predicted that all of the proposed alternatives had some likelihood of causing extirpation within the endemic group and likelihood increased with higher levels of timber harvest proposed. For the endemic group, Alternative 2 was determined to have a low likelihood of maintaining viable and well-distributed populations due to the absence of a reserve network and the amount of timber harvest proposed. Alternative 6 and 11 were both determined to have a moderate likelihood of maintaining viable and well-distributed endemic mammal populations, with Alternative 11 being the best, due to proposed harvest levels and rotation length (100 versus 200 years).

3.3.5.2. Other Terrestrial Mammals Panel Results

Average panel ratings are shown in Tables D-13 and D-14. Alternative 1 was generally considered by the panels as the alternative least likely to negatively impact taxa under consideration. The panels predicted a higher likelihood that the *widely distributed group* would experience ephemeral range distribution gaps (Outcome II) in both 1995 and 1997; the *endemic group* was predicted to occur more frequently in refugia (Outcome IV) in 1995, but the 1997 panel predicted a higher likelihood for Outcome II, as for the widely distributed group. Panelists assigned these outcomes based upon historical levels of timber-related activities. The panels suggested that Alternative 1 could be improved by restoring old growth in extensively harvested areas (northern Prince of Wales Island for example).

Alternatives 5 and 11 were regarded by panelists as the second and third least likely alternatives to negatively impact taxa under consideration. The panels offered higher likelihoods that the *widely distributed group* would experience both ephemeral and permanent range distribution gaps (Outcomes II and III) that could affect viable populations well-distributed across the planning area. Little brown Myotis was cited as one animal whose local populations would be more ephemeral under this alternative; it was predicted that fisher could experience significant gaps in its historic range. The *endemic group* would more likely have range distribution gaps or be restricted to refugia under Alternatives 5 and 11 (Outcomes III and IV). These circumstances would increase the risk of extirpation as a result of isolation. Prince of Wales Island flying squirrel was noted as one animal that would likely only exist in refugia. Panelists stressed that reserves should be carefully located within the ranges of vulnerable wildlife and that corridors be truly functional.

Panelists ranked Alternatives 3, 4, 6, and 10 as intermediate among the alternatives in terms of likelihood of negatively impacting taxa under consideration. For the *widely distributed group*, likelihood scores were fairly evenly distributed among Outcomes II, III, and IV; scores for outcome extremes (I and V) were consistently lower for these alternatives. Likelihood scores were similarly distributed for the *endemic group*, except scores were higher for Outcome V, particularly for Alternatives 3 and 6 in 1995. For most of these alternatives, local populations of Sitka mouse could become more ephemeral (Outcome II); northern flying squirrel could experience permanent gaps in its historic range or exist only in refugia (Outcome III or IV); fisher could exist only in refugia (Outcome IV).

The panel considered Alternatives 2, 7, 8, 9, and 9’ to be most likely among alternatives to create wildlife viability problems. The panel predicted that implementation of these alternatives would result in high likelihoods that both the *widely distributed and endemic groups* would exist only in refugia (northern flying squirrel for example) or would become extirpated (Keen’s Myotis for example). It was suggested that these alternatives could be improved by incorporating longer rotations, uneven-aged management, and higher levels of riparian habitat protection.

For the widely distributed group, it was determined that Alternative 2 had a very high likelihood of resulting in conditions of either refugia or extirpation in 100 years (not viable; combining Outcomes IV and V). Conversely Alternative 11 was rated as having a relatively high likelihood of not resulting in conditions of refugia or extirpation in 100 years because of its forest-wide reserve system. Alternative 6 was rated as being in between Alternatives 2 and 11 (Table D-13).

There was general consistency in the 1995 and 1997 evaluations of other terrestrial mammals, although there was variation in the ratings assigned to alternatives by the two panels. Of those alternatives

Table D-13.
Widely Distributed Mammals Panel Results[1]

Outcomes	Pre 1954	1	5	11	4	10	3	6	8	2	9	9'	7
						1997 Forest Plan Revision FEIS Alternatives							
1997 Panel													
I	75	24	3	10		3				0	0	0	
II	17	45	36	28		23				3	0	0	
III	7	28	53	44		53				15	9	4	
IV	1	4	6	16		19				68	68	70	
V	0	0	3	3		4				15	24	26	
Potential POG Harvest (1,000s of acres)	- 414	0	463	475	495	670	571	732	--	853	1,042	1,403	1,200
1995 Panel													
I		23	3		1		5	5	5	0		0	0
II		44	38		34		31	19	10	9		3	3
III		25	49		41		34	25	20	18		9	8
IV		9	9		21		19	36	33	29		35	31
V		0	3		3		11	15	33	45		54	59
Potential POG Harvest (1,000s of acres)	--	0	572	--	618	--	736	954	955	1,107	--	1,403	1,557
Range Between Outcomes I + II and I + II + III													
1997 Panel	92-99	69-97	39-92	38-82	--	26-79	--	--	--	3-18	0-9	0-4	--
1995 Panel	--	67-92	41-90	--	35-76	--	36-70	24-49	15-35	9-27	--	3-12	3-11

[1] Mean likelihood outcome scores by evaluators in 1997 are shown at the top of the table. Scores from the 1995 panel are shown in the middle of the table. Scores were assigned by both panels for Alternatives 1, 2, 5, and 9'. Alternatives 1 and 9' are identical between panels in both features and acres of POG harvested. Alternatives 2 and 5 are identical in features but with fewer acres of POG harvested in 1997 relative to 1995. A range for all alternatives is shown at the bottom of the table for the likelihood of maintaining habitat to support viable and well distributed goshawk populations. Only 'after' scores are shown. The - 414,000 value for POG harvest under Historic represents the acreage harvested since 1954.

Table D-14.
Endemic Mammals Panel Results[1]

	1997 Forest Plan Revision FEIS Alternatives												
Outcomes	**Pre 1954**	**1**	**5**	**11**	**4**	**10**	**3**	**6**	**8**	**2**	**9**	**9'**	**7**
1997 Panel													
I	59	6	1	3		1				0	0	0	
II	26	34	9	16		13				0	0	0	
III	13	31	45	36		34				8	8	4	
IV	2	28	41	41		46				70	71	73	
V	0	1	4	4		6				23	21	24	
Potential POG Harvest (1,000s of acres)	- 414	0	463	475	495	670	571	732	--	853	1,042	1,403	1,200
1995 Panel													
I		13	5		4		8	8	6	0		0	0
II		20	18		14		15	18	11	5		3	3
III		18	16		19		21	18	16	11		9	8
IV		43	51		50		36	28	28	30		29	26
V		8	10		14		20	30	39	54		60	64
Potential POG Harvest (1,000s of acres)	--	0	572	--	618	--	736	954	955	1,107	--	1,403	1,557
Range Between Outcomes I + II and I + II + III													
1997 Panel	85-98	40-71	10-55	19-55	--	14-48	--	--	--	0-8	0-8	0-4	--
1995 Panel	--	33-51	23-39	--	18-37	--	23-44	26-44	17-33	5-16	--	3-12	3-11

[1] Mean likelihood outcome scores by evaluators in 1997 are shown at the top of the table. Scores from the 1995 panel are shown in the middle of the table. Scores were assigned by both panels for Alternatives 1, 2, 5, and 9'. Alternatives 1 and 9' are identical between panels in both features and acres of POG harvested. Alternatives 2 and 5 are identical in features but with fewer acres of POG harvested in 1997 relative to 1995. A range for all alternatives is shown at the bottom of the table for the likelihood of maintaining habitat to support viable and well distributed goshawk populations. Only 'after' scores are shown. The - 414,000 value for POG harvest under Historic represents the acreage harvested since 1954.

reviewed in both 1995 and 1997, Alternatives 1, 5, 2, and 9' were ranked in order from least to highest risk to habitat of the widely-distributed group in both assessments (Table D-13). Differences between Alternatives 2 and 9' were slight in both assessments. Additionally, ratings of all these alternatives improved substantially from the 1995 to the 1997 assessment. The same pattern held true for the

endemic mammal group (Table D-14). Relative rankings of the four alternatives reviewed by both panels remained constant, but the ratings for each of the alternatives improved from the first to the second panel. These results also generally support the conclusion drawn in Chapter 3 of the 1997 FEIS that, of the alternatives that propose to continue harvesting timber, Alternative 11 poses the least risk to these species groups. However, the difference for these species between Alternative 11, as evaluated by the panelists, and Alternative 5 is small. Subsequent to the assessment by the panelists, additional measures were added to Alternative 11 to benefit these species groups.

3.3.5.3. Effects of Added Habitat Management Measures

As noted above, the other terrestrial mammals associated with POG were broadly divided into two groups: widely-distributed species and endemic species. A total of 26 taxa within these two groups were explicitly considered by the panels asked to provide judgments for the other terrestrial mammals. Two of these 26 taxa, northern flying squirrel and river otter, were the focus of specific measures in the original VPOP strategy. Small HCAs were adopted by the VPOP committee to provide for distribution of northern flying squirrels in every major watershed (i.e., every 10,000 acres). The size of these HCAs was intended to allow them to support 20 to 40 squirrels. VPOP also recommended that travel corridors be maintained between patches of flying squirrel habitat. They considered beach fringe and riparian zone to be suitable corridors, and recommended that additional corridors be designated in areas where these did not provide adequate connectivity.

The Prince of Wales river otter is strongly associated with saltwater beach fringe and freshwater riparian habitats (Larsen 1983, Noll 1988, Woolington 1984). VPOP's conservation recommendation for river otter was maintenance of beach fringe, estuary fringe, and riparian habitat associated with streams and lakes.

The review of Kiester and Eckhardt (1994) provided little comment on this aspect of the VPOP strategy. However, one of the common themes of many of the reviews was the lack of knowledge of all the taxa present on the Tongass and the distribution of species among islands. Kiester and Eckhardt (1994) recommended a thorough biological survey of the Tongass, and an evolutionary analysis of small mammals. Lidicker (in Kiester and Eckhardt 1994) recommended that no timber harvest take place on islands less than 1,000 acres or those that could be considered unique because of their isolation or known presence of endemics.

In the 1995 evaluation, the VPOP strategy, most fully embodied in Alternative 3, was assessed as having the third highest likelihood, for those alternatives that propose continuing timber harvest, of maintaining both the widely-distributed and the endemic groups of mammals. In this assessment, substantial likelihoods of not maintaining species well-distributed were projected for all alternatives, including Alternative 1 which called for no further timber harvest. These results were based, at least in part, on effects of past harvest, lack of knowledge of many of the mammal species, and risks inherent to endemic species. Alternative 11, as evaluated in the 1997 panel assessments, differed in several important ways from Alternative 3. It eliminated all islands less than 1,000 acres from the timber base as recommended by Lidicker (in Kiester and Eckhardt 1994). It extended the beach fringe to 1,000 feet, but also relied more heavily on short-rotation clearcutting than did Alternative 3. Of the alternatives evaluated in 1997 that propose continued timber harvest, it ranked second highest in likelihood of maintaining viable populations of the widely-distributed and endemic mammals. Despite its favorable ranking relative to the other alternatives, it still was projected to have substantial likelihood of not maintaining well-distributed populations. Alternative components that were viewed favorably by this panel included the presence of a reserve system, the amount of old growth that would be retained in the matrix, and a process for site-specific analysis particularly related to endemic mammals.

In response to the 1997 panel assessment, additional guidelines were added to Alternative 11 to increase the likelihood that viable populations of endemic mammals would be maintained. These guidelines require that surveys for endemic mammals be completed prior to projects that would substantially alter vegetation on islands of 50,000 acres or less. Surveys were also to be conducted on larger islands if an initial assessment indicates high likelihood that endemic mammals are present on the site. Where endemic taxa are detected by the surveys, projects were to be designed to provide for continued persistence of the taxa. As an additional measure, ongoing research of endemic taxa on the Tongass was to be accelerated.

Other guidelines added to Alternative 11 in response to the panel assessments also benefited both the endemic and widely-distributed mammals. The connectivity guideline provided additional measures to maintain connectivity of large and small reserves and other non-development LUDs in places where beach fringe and riparian habitat management areas do not provide adequate connectivity. Guidelines for structural retention for goshawk and marten habitat also benefited other mammal species.

The Prince of Wales flying squirrel may be considered the greatest viability concern among the endemic mammals that were specifically considered by the panels, and the northern flying squirrel may be of greatest concern among the widely-distributed mammals. According to Carey (1991), habitat factors important to northern flying squirrels include large, live trees; large snags; fallen trees; multilayered canopies; and connectedness of habitat either through large contiguous areas of habitat or through corridors of suitable habitat. Alternative 11 provided these features through its system of large and medium HCAs interconnected with small reserves and matrix habitats. Each large HCA should have the capability to support 100 or more northern flying squirrels, medium HCAs to support more than 50 squirrels, and small HCAs to support 20 to 40 squirrels. These individual populations should have the capability to persist over short to intermediate periods of time. Interactions among these populations through the matrix would allow them to function as a metapopulation conferring high probability of long-term persistence. Dispersal through the matrix was facilitated by the beach fringe and riparian habitat management areas, by the overall amount of old forest remaining in the matrix, and by additional measures prescribed under Alternative 11 to provide for connectivity. These additional measures could include relocating small reserves to better serve a role as connectors, thus providing for small squirrel populations at locations intermediate between the larger populations.

These same components of Alternative 11 also reduced risks to the endemic species and the Prince of Wales flying squirrel. In addition, the 200,000-acre reserve designated on Prince of Wales Island, by itself, was expected to support a moderately large population of squirrels. Another feature of Alternative 11 that was to further reduce risk to Prince of Wales flying squirrels was the requirement to survey for endemic mammals on islands of 50,000 acres or less, or in other areas where there is a high likelihood of species presence. Application of this measure to Prince of Wales Island was expected to result in additional project-specific measures reducing risk to the squirrels. Finally, implementation of mitigation measures for goshawk and marten on Prince of Wales Island was expected to result in the retention of structural features important to flying squirrels such as snags, logs, and large live trees.

Implementation of the survey requirement was expected to substantially reduce risks to other endemic species. This requirement, in combination with the ongoing research on endemic taxa, is responsive to Kiester and Eckhardt's (1994) recommendation to conduct a biological survey on the Tongass.

3.3.6. Marbled Murrelet

3.3.6.1. General Observations on the Marbled Murrelet Panel

Only one panel was conducted for the marbled murrelet (Smith 1996). The panel noted the lack of distributional and ecological information about marbled murrelets, especially in Southeast Alaska. They appeared to make the following general assumptions about harvest practices and other components of the alternatives relative to marbled murrelets and in particular to nesting habitat.

1. The best or most important habitat is found within large contiguous blocks of high-volume, low-elevation old-growth forest. In Yakutat and Glacier Bay this may include stands of large mature Sitka spruce.

2. The main concern with fragmenting or reducing such habitat is an increase in predation rates (more edge and less interior).
3. Canopy cover above the nest (highest in the high-volume stands) is another critical factor in keeping predation rates lower.
4. The maintenance of old-growth forest reserves, and extended rotations, are both seen as ways to retain suitable nesting habitat. Large reserves, and rotations greater than 200 years, are favored; an alternative that would provide both Forest-wide would be ideal (assuming timber harvesting is to continue). Rotations averaging 100 years are not long enough to provide suitable habitat.
5. Riparian and beach fringe old growth, due to its linear nature (more edge, less interior), is considered less suitable nesting habitat than interior old growth. Alternatives with higher amounts of riparian and beach fringe protection may work against murrelets by pushing harvest into critical nesting habitat. Conversely, higher riparian protection could lead to improved habitats overall through a synergistic effect resulting from more interconnectivity.
6. The retention of spatially-explicit small OGRs (as in the one/watershed in Alternatives 3) is favored over the "33 percent residual" concept of Alternatives 5 and 6.

3.3.6.2. Marbled Murrelet Panel Results

Average panel ratings are shown in Table D-15. Based on these ratings, the nine alternatives rated fell roughly into four groups. Alternative 1 was by itself with all of its outcome points assigned to Outcomes I or II. The very low level of timber harvest, all of it under a 200-year rotation, resulted in a rating considerably higher (in terms of ensuring viability) than the other alternatives. The assignment of points to Outcome II was primarily a result of the amount of low-elevation, high-volume old growth already harvested.

Alternatives 3, 4 and 5 all rated fairly high, with at least 74 percent of the points in Outcomes I or II. Alternative 5, offering extended rotations and reserves in critical areas, had the highest viability scores of this group, although the panel would have preferred spatially-identified small reserves rather than the 33 percent residual old growth concept. The full reserve system and greater riparian protection, combined with two-aged management, of Alternative 3 was favored somewhat over the Forest-wide uneven-aged management, but no reserves, of Alternative 4.

Alternatives 2, 6, and 9 each had most of their points (67-74 percent) assigned to Outcomes II or III, and except for Alternative 9 have over 90 percent in Outcomes I-III, providing moderate to high viability ratings (although not all panelists felt Outcome III would meet viability requirements). The rationale for these scores varied by alternative. Alternatives 6 rated highest of this group due largely to their reserve systems, two-aged rather than even-aged timber harvesting, and watershed-specific residual old growth requirements. The 100-year rotations in each were a drawback. Alternatives 2 and 9 rated somewhat lower than Alternatives 6, neither of the former having a reserve system and both using even-aged harvest with 100-year rotations.

Finally, Alternative 7, similar to Alternatives 2 and 9 and with a higher timber harvest level, had the lowest viability rating, assigning 2/3 of its points to Outcomes III or IV.

Table D-15.
Marbled Murrelet Panel Results[1]

Outcomes	1997 Forest Plan Revision FEIS Alternatives												
	Pre 1954	1	5	11	4	10	3	6	8	2	9	9'	7
1997 Panel													
I													
II													
III													
IV													
V													
Potential POG Harvest (1,000s of acres)	- 414	0	463	475	495	670	571	732	--	853	1,042	1,403	1,200
1995 Panel													
I		85	45		36		41	26	25	18		16	10
II		15	46		38		40	33	38	34		29	20
III		0	6		24		19	36	31	40		38	45
IV		0	3		3		0	5	6	9		18	23
V		0	0		0		0	0	0	0		0	3
Potential POG Harvest (1,000s of acres)	--	0	572	--	618	--	736	954	955	1,107	--	1,403	1,557
Range Between Outcomes I + II and I + II + III													
1997 Panel	--	--	--	--	--	--	--	--	--	--	--	--	--
1995 Panel	--	100	91-97	--	74-97	--	81-100	59-95	63-94	52-91	--	45-83	30-75

[1] Mean likelihood outcome scores by evaluators in 1997 are shown at the top of the table. Scores from the 1995 panel are shown in the middle of the table. Scores were assigned by both panels for Alternatives 1, 2, 5, and 9'. Alternatives 1 and 9' are identical between panels in both features and acres of POG harvested. Alternatives 2 and 5 are identical in features but with fewer acres of POG harvested in 1997 relative to 1995. A range for all alternatives is shown at the bottom of the table for the likelihood of maintaining habitat to support viable and well distributed goshawk populations. Only 'after' scores are shown. The - 414,000 value for POG harvest under Historic represents the acreage harvested since 1954.

Marbled murrelet likelihood outcome ratings were also highly correlated (0.98) with acres of POG planned for harvest over a 100 year rotation. Alternative 10 was very similar in design to Alternative 3, but did not have the extended beach nor option 1 and 2 riparian buffers, both features considered important by panelists, thus presented greater relative risks than Alternative 3. The system of large and medium and unmapped small old-growth habitat reserves in Alternative 10 was also an important feature, thus superior in design with lower relative risk that Alternative 2.

Alternative 11 harvested almost the lowest amount of old growth (Table D-15), had the most extensive forest-wide reserve system with very large reserves in heavily harvested provinces, and had an extended beach and significant riparian protection. The only possible drawback of Alternative 11 was the 100-year timber harvest rotation in the matrix, viewed as unfavorable by panelists. However, an average of nearly 57 percent of the original 1954 POG would remain in all watersheds under timber management contributing to a diversity of stands and habitat mosaics, clearly superior to extensive even-aged stands. Thus, Alternatives 1 and 11 were believed likely offer the highest likelihood of maintaining well distributed viable murrelet populations.

Commentary on the Panel Ratings. The marbled murrelet is second only to the Other Terrestrial Mammals panel with respect to the lack of local information available to assess long-term viability. Viability concerns for the marbled murrelet in southeast Alaska intensified due to listing of this species as threatened under ESA in California, Oregon, and Washington and the very close habitat affinity with coastal old growth forests (Ralph et al. 1995). Information to substantiate this concern in southeast Alaska is only indirect relative to the loss of nearly one million acres of POG coastal temperate rainforests throughout southeast Alaska (including all ownerships). These are generally the more productive sites at low elevation, presumably some of the best murrelet nesting habitat (DeGange 1996). However the strength of the association between murrelet nesting habitat and highly POG forest has not been established; indeed two of the six nests located in Southeast Alaska to date have been on the ground.

Short term (10-15 years) risks to murrelet viability are difficult to assess but are likely minor especially given the magnitude of recent conservative population estimates of over 365,000 marbled murrelets in southeast Alaska (DeGange 1996). Further, murrelets appear to be highly mobile traveling up to 50-60 miles per day on foraging flights (DeGange 1996) suggesting at least the possibility of relatively high population interaction throughout southeast Alaska. Short term risks are likely proportional to the amount of additional old growth planned for harvest among alternatives (1, 11, 5, 4, 3, 10, 6, 2, 9 and 7 in order of increasing risk) within the planning period covered by the Forest Plan Revision. While large block reserves in general may be a preferable conservation strategy, the small (1,600 acre) block reserves (Alternatives 3, 10, 11 and parts of 5 and 6) in each watershed may significantly contribute to maintenance of nesting habitat and well distributed populations in the absence of additional information on nesting habitat relationships. Forest-wide Standards and Guidelines protect nesting habitat around any identified murrelet nests. However, only six murrelet nests have been found so this standard is not considered as a viable conservation strategy in itself. Rather it serves to protect habitat surrounding the few nests that may be located for long term monitoring and studies to understand murrelet habitat relationships.

Under the assumption that POG habitat is the preferred murrelet nesting habitat, then the loss of an additional 1.5 million acres in some alternatives, in addition to the million acres already lost, could contribute to a long-term viability concern. This concern may become greater if future research reveals a significant murrelet selection for high volume low elevation forests that are sought for timber production, similar to the situation documented in the Pacific Northwest (Ralph et al. 1995). DeGange (1996) suggested that long rotations may be beneficial components to a murrelet conservation strategy, he concluded that a reserve system was more likely to present a viable conservation strategy for murrelets given significant unknowns about this elusive specie; protecting intact landscapes/ecosystems is a better hedge against uncertainty.

The significant reserve system in Alternative 11, especially in at-risk landscapes with significant past timber harvest (reserves partially discussed under Wolf) may make this alternative superior to all others (except Alternative 1). The reserve system in additional to significant matrix protection should provide a reasonably high likelihood of sustaining well-distributed viable murrelet populations throughout southeast Alaska.

Even over long time periods, there is less relative concern for the marbled murrelet compared to other old growth associated vertebrates assessed by panels. Average murrelet scores for Outcome I and II rated higher than all other species in all alternatives except for the wolf in Alternatives 2 and 3.

3.4. New Science Relevant to Wildlife Viability Assessment Since 1997

The process of assessing wildlife risk through a structured panel assessment process is one of a variety of methods for conducting a viability assessment. Beissinger and McCullough (2002) compiled a reference which consists of a set of review papers on population viability analysis. This section presents a summary of the science that is relevant to wildlife viability assessment since 1997. It is largely based on a review of recent science relative to population and species viability assessment conducted by Haufler (2006).

Numerous factors influence the viability of any species. However, habitat is the greatest overall factor affecting viability of a species (Wilcove et al. 1998). Reed et al. (2006) identified four broad classes of factors influencing viability of a species; population size and structure, habitat, demography, and relationships between demographic rates and habitat and between demographic rates and population size. In addition, many other minor factors can play a role. Given this myriad of potential influences on the viability of a species, it is not surprising that quantification of species viability has been a difficult task. Consequently, most assessments of species viability in a planning or impact assessment context have been conducted qualitatively, usually with the use of expert opinion in relation to projected future conditions.

Species viability assessment based on habitat has ranged from expert assessments of future population status based on projected habitat conditions to more complex analyses of individual home ranges and their contributions to species persistence in spatially-explicit individually-based population viability models (Noon et al. 1999). Individually-based spatially explicit models may be the most realistic (Breininger et al. 2002), but these approaches also require many model parameters that may not be known with any accuracy, and include various assumptions that may be difficult to test. The spatial description of habitat quality produced from this approach can be used for a variety of habitat-based population viability assessments (Akcakaya and Atwood 1997, Akcakaya 2000). Lawler and Schumaker (2004) evaluated habitat surrogates for population parameters of red-shouldered hawks and goshawks, and found poor relationships between predicted habitat quality and observed habitat quality.

Various models for population viability assessment (PVA) have been proposed and developed (see review by Akcakaya and Sjogren-Gulve 2000), most involving theoretical relationships of demographic data. The idea behind PVA has been to determine an estimate of the extinction risk to a species based on current demographic conditions and alternative future conditions. Given the complexities of species viability described above, it is not surprising that sufficient data generally do not exist to conduct a thorough population viability analysis. For example, Green and Hirons (1991) reported that data suitable for population modeling were available for only 2 percent of threatened bird species, taxa about which we know the greatest amount, while Samson (2002) reported that suitable data existed to conduct a PVA for only 3 of 119 species at risk in the Northern Great Plains. Beissinger and Westphall (1998) discussed use of PVAs in endangered species management. They suggested caution in use of predictions produced from such analyses because of the unreliability of data available for such models as well as the lack of understanding of both periodic fluctuations and density dependent factors, and varying model assumptions that can cause changes in results. They suggested that PVAs consider relative rather than absolute rates of extinction, be limited to short projections, and use models compatible with the available data.

A number of different demographic-based approaches have been proposed for assessing species viability. As with habitat-based approaches, these range from relatively simple approaches to much more complex approaches (Haufler 2006). Incidence function models are relatively simple models designed to provide an estimate of the risk of extinction (Hanski 1999). This approach requires the presence or absence of species of interest to be determined for various habitat patches in a landscape over a time. Appropriate time frames are difficult to estimate, as different populations have different generation times and vulnerability to extinction events. This approach assumes relatively static habitat conditions (Ralls et al. 2002), an unlikely condition for management planning or impact assessments.

A second demographic-based approach is the use of population trend information (Morris et al. 1999). This approach requires the population of a species to be consistently monitored over time to determine any changes in the population size. Morris et al. (1999) recommended a minimum of 7 years of trend data for accurate analysis. Even with this information, the population trend applies only to that time interval and landscape studied.

A number of population simulation models have been developed that address questions of productivity and survival rates of a population (Haufler 2006). These models require detailed information on the demographics of the population under evaluation, data that are seldom available (Bessinger and Westphal 1998).

Certain populations may be limited by the spatial distribution of their habitat, where dispersal among patches is a relatively rare event, so that population demographics within a patch are largely independent of other habitat patches within the landscape. When this arrangement occurs, it is known as a metapopulation (McCullough 1996, Hanski and Gilpin 1997). A number of metapopulation models have been developed that attempt to address population persistence in patches as balanced by dispersal rates among patches. Such models, to be accurate, require information on the status of a population within a habitat patch, including the habitat quality, population size, and internal-patch demographic parameters. In addition, the distribution, and size of other patches in the landscape and rates of successful dispersal among the patches must be known. Dispersal data are one of the least known and most difficult parameters to assess for a population, and small errors in assessment of dispersal can cause large errors in projections of metapopulation models (Reed et al. 2002). In addition, even if these population parameters are collected, as with other demographic parameters, they are usually not transferable to other conditions than those in which they were collected.

Concerns over habitat fragmentation have led many to assume that populations are regularly being converted to metapopulations, and to view any system with a patchy distribution as a metapopulation (Hanski and Simberloff 1997, Harrison and Taylor 1997). However, this is generally not correct, as actual metapopulations are rare (Harrison and Taylor 1997). Hanski (1999) discussed the basic parameters that need to be considered to conduct a metapopulation analysis.

Smith and Zollner (2005) argue that using the most vulnerable species, or evaluating single species without reference to others, to assess impacts of land management likely underestimates the probability of extinction of wildlife species across the planning area because the risk of local extirpation increases with the number of extinction prone species considered. Additionally, the management alternative that poses the greatest risk to the most vulnerable wildlife species may not pose the greatest risk to the wildlife community as a whole (Smith and Zollner 2005). The authors present an alternative method for assessing risk to wildlife viability that considers the risk of "any" extinction among species at risk in the planning area. To accomplish this, an equation is used which calculates the joint probability of at least one extinction among the set of selected species (derived from panel assessment ratings or population viability analysis), which can then be used to conduct a relative comparison of alternatives. That is, it takes into account the marginal, or individual, extinction probability of each species. This approach is used here as an alternate method for comparing the effects of the alternatives on wildlife viability (see Section 3.6 and the *Wildlife* section of Chapter 3 for further discussion).

Global climate change has been a subject of increasing interest and focus in the past 10 years. A number of publications have discussed biodiversity conservation in the face of global warming. Saxon (2003) presented a good discussion of this topic. He recommended that conservation planning occur across ecoregions, and that these ecoregions be identified based on abiotic factors including climate, but also based on other abiotic factors than climate as this factor is likely to change. With climate change expected to have a greater effect on more polar regions, incorporating the potential consequences of global warming relative to conservation planning in Alaska is warranted.

3.5. Application of Panel Assessments to the 2008 FEIS Alternatives

The 1997 Forest Plan Revision Final EIS wildlife analysis relied in part on the expert panel evaluations of alternatives in terms of the estimated relative risks to a species or habitat of concern, as described in Sections 3.2 and 3.3. The 2008 Forest Plan Amendment FEIS also relies in part on these panel evaluations. Of the seven alternatives analyzed in the 2008 FEIS, four of them are very similar to or based on alternatives analyzed during the panel assessments. In addition, the harvest levels of all 2008 alternatives are within the range of the 1997 alternative harvest levels, given that a no-harvest alternative was analyzed in 1997. As described in Section 3.1, there was a strong correlation between the acres of POG scheduled for harvest in an alternative and the mean outcome scores for that alternative resulting from the panel assessments (Section 3.3). As the number of acres harvested increased among alternatives, the mean outcome scores also increased, resulting in greater risk that habitat may not be sufficient to maintain viable and well distributed populations. Therefore, the panel evaluations can be used to make inferences about the 2008 alternatives.

The accuracy of this approach was tested in 1997 (Section 3.1). The 1997 FEIS, which was developed prior to the 1997 panel assessments, evaluated two alternatives, which had not been assessed by the panels, by making inferences based on harvest acres; these inferences and the resulting alternative evaluations were generally confirmed based on the 1997 panel assessments (see Appendix N to the 1997 FEIS).

The relationship between the 2008 alternatives and the 1997 alternatives in terms of equivalency of features, land base, and acreage of POG potentially harvested is summarized in Table D-16, for use in rating the 2008 alternatives in terms of the panel assessments.

Based on the equivalencies given in Table D-16 and supplemental information, viability ratings for the 2008 alternatives were developed and are summarized in Table D-17. The ratings were based on the midpoint of the range between the sum of Outcomes I+II and the sum of Outcomes I+II+III for each alternative. The midpoint of the range between these sums was used as the index of viability because viability was generally assumed by panelists to lie between the sum of Outcomes I+II and the sum of Outcomes I+II+III (USDA Forest Service 1997(Appendix N, p.N-3). The 2008 alternatives were evaluated by applying the equivalencies or rankings in Table D-17 to the panel assessment midpoint values as shown in the tables in Section 3.3. The midpoint values were then transferred to ratings using the key provided in the footnote to Table D-17. Further explanation for these ratings is provided in the following subsections.

3.5.1. Northern Goshawk

Alternatives 1, 2, and 3 in 2008 would both have midpoint values above 91, based on applying Table D-16 equivalencies and rankings to Table D-9. Therefore, they are expected to have very high viability ratings for goshawks. Alternatives 5 and 6 in 2008 are both similar to 1997 Alternative 11, which had a midpoint value of 84. In addition, 2008 Alternatives 5 and 6 both include supplemental measures, which may have a positive effect on viability; 2008 Alternative 5 includes the goshawk and marten standards and guidelines and 2008 Alternative 6 includes the legacy forest structure standards and guidelines. Neither of these measures were evaluated by either of the panels, so their value for goshawks was not considered. As a result of this and the 84 midpoint value for 1997 Alternative 11, 2008 Alternatives 5 and 6 are rated in the high category for goshawks. Alternative 4 in 2008 is rated as moderately high, because the midpoint value for 1997 Alternatives 10, 3, and 6, ranges from 66.5 to 74. Alternative 7 in 2008 is equivalent to 1997 Alternative 2, which had a midpoint value of 40.5. This value falls within the moderate range.

Table D-16.
Relationship of 2008 Alternatives to 1997 Alternatives for Use in Rating 2008 Alternatives in Terms of Panel Assessments

2008 Alternatives	Equivalency or Ranking in terms of 1997 Alternatives*
Alternative 1 84,000 acres of potential POG harvest	2008 Alternative 1 has a lower POG harvest than any of the 1997 alternatives with POG harvest. Ratings for this alternative should be between 1997 Alternative 1 with 0 harvest and 1997 Alternative 5 (with 463,000 acres of harvest) or 1997 Alternative 11 (with 475,000 acres of harvest). Based on the low POG harvest levels, ratings would be closest to (but greater than) Alternative 1.
Alternative 2 223,000 acres of potential POG harvest	2008 Alternative 2 has a lower POG harvest than any of the 1997 alternatives with POG harvest. Ratings for this alternative should be between 1997 Alternative 1 with 0 harvest and 1997 Alternative 5 (with 463,000 acres of harvest) or 1997 Alternative 11 (with 475,000 acres of harvest). Based on harvest levels, ratings would be in the middle of the range between Alternative 1 and Alternatives 5 or 11.
Alternative 3 325,000 acres of potential POG harvest	2008 Alternative 3 has a lower POG harvest than any of the 1997 alternatives with POG harvest. Ratings for this alternative should be between 1997 Alternative 1 with 0 harvest and 1997 Alternative 5 (with 463,000 acres of harvest) or 1997 Alternative 11 (with 475,000 acres of harvest). Based on harvest levels, ratings would be closer to (but less than) Alternatives 5 or 11.
Alternative 4 644,000 acres of potential POG harvest	2008 Alternative 4 is similar to 1997 Alternative 6 in terms of features and land base. The acres of POG harvest are lower for the 2008 Alternative 4 at 644,000 compared with the 1997 Alternative 6 at 732,000. However, only the 1995 version of Alternative 6 was evaluated by the viability panels, and the acres of POG harvest are considerably lower in 2008 vs. 1995 (644,000 vs. 954,000, respectively). The alternative that was reviewed by the viability panels and is the closest to the 2008 Alternative 4 is the 1997 Alternative 10 (670,000 acres of harvest). So ratings for 2008 Alternative 4 are expected to be between 1995 Alternative 6 and 1997 Alternative 10; being closer to the latter alternative.
Alternative 5 479,000 acres of potential POG harvest	2008 Alternative 5 is similar to 1997 Alternative 11 in terms of features, land base, and POG harvest (481,000 vs. 463,000 acres of harvest, respectively). Therefore, the ratings for this alternative would be similar to the ratings for 1997 Alternative 11.
Alternative 6 472,000 acres of potential POG harvest	2008 Alternative 6 is similar to 1997 Alternative 11 in terms of features, land base, and POG harvest (472,000 vs. 463,000 acres of harvest, respectively). Therefore, the ratings for this alternative would be similar to the ratings for 1997 Alternative 11.
Alternative 7 826,000 acres of potential POG harvest	2008 Alternative 7 is similar to 1997 Alternative 2 in terms of features, land base, and POG harvest (826,000 vs. 853,000 acres of harvest, respectively). Therefore, the ratings for this alternative would be similar to the ratings for 1997 Alternative 2.

* POG harvest levels in 1997 are based on values given to the panels, which were different, in some cases from the final scheduled acres given in the 1997 FEIS.

Table D-17.
Viability Ratings (likelihood of maintaining habitat to support viable and well distributed populations) assigned to the 2008 Alternatives based on the Equivalent Panel Assessment Ratings from the 1995/1997 Panel Assessments

Species	Alternatives						
	1	2	3	4	5	6	7
Goshawk	Very High	Very High	Very High	Moderately High	High	High	Moderate
Marten	Very High	High	High	Moderate	Moderate	Moderate	Moderate
Wolf	Very High	Very High	High	High	High	High	Moderately High
Brown Bear	Very High	High	High	Moderately High	High	High	Moderately High
Widely Distributed Mammals	High	Moderately High	Moderately High	Moderate	Moderate	Moderate	Moderately Low
Endemic Mammals	Moderate	Moderate	Moderate	Moderately Low	Moderate	Moderate	Very Low
Marbled Murrelet	Very High	Very High	Very High	High	Very High	Very High	Moderately High

[1] Ratings were based on the midpoint of the range between Outcomes I+II and Outcomes I+II+III for each alternative, as determined by applying the equivalencies or rankings in Table D-17 to the panel assessment results tables in Section 3.3. The midpoint values were then transferred to ratings using the following key:
Very High: 91-100, High: 81-90, Moderately High: 66-80, Moderate: 35-65, Moderately Low: 20-34, Low: 10-19, Very Low: 0-9.

In addition, these ratings may be conservatively low. Information from recent studies indicates that goshawks may make more use of second growth and other forest types than was assumed during the panel assessments (Bosakowski et al. 1999; McClaren 2003, 2004; Boyce et al. 2006, Reynolds et al. 2006). As noted in Section 3.3.1.1, the primary factor used by panelists in their ratings was the proportion of POG that would be harvested in 100 years. The panels assumed a strong selection by goshawks for POG and the avoidance of all other habitat types. In addition, the level of old-growth harvest that was envisioned by the panels over the past 10 years has not materialized. As a result, nearly the same amount of old growth still exists on the Tongass and the large quantities of older second growth are now 10 years closer to becoming useful goshawk habitat. Therefore, if the panels were repeated today, the ratings could be slightly higher.

Given these factors, the rankings of the 2008 alternatives relative to the 1997 selected alternative (Alternative 11) would be as follows: Alternatives 4 and 7 in 2008 would have lower viability ratings than 1997 Alternative 11, and 2008 Alternatives 1, 2, 3, 5, and 6 would have higher ratings. These higher ratings are because of a smaller managed land base, the addition of goshawk/marten (in the case of 2008 Alternative 5) or legacy (in the case of 2008 Alternatives 1, 2, 3, and 6) standards and guidelines, and new science about goshawk habitat use in Southeast Alaska. The slight change in the goshawk nest standard and guideline (see Section XX), is not expected to affect viability.

The same relative ratings are also expected to hold for the 1997 Forest Plan versus the 2008 alternatives (i.e., 2008 Alternatives 4 and 7 would have lower viability ratings and 2008 Alternatives 1, 2, 3, 5, and 6 would have higher viability ratings than the 1997 Forest Plan). These conclusions follow the same reasoning as given in the above paragraph for most of the alternatives. Table D-18 summarizes this reasoning.

Table D-18.
Goshawk Viability Ratings for the 2008 Alternatives Relative to the 2007 Forest Plan[1/]

Alternatives	Comparison with 2007 Forest Plan1/	Viability for Alternative relative to 2007 Forest Plan1/
Alternative 1	Acreage in protected POG is considerably higher in Alt 1 due to expanded OGRs (i.e., more acreage in Old Growth Habitat, Special Interest Areas, Semi-Remote Recreation, and other non-development LUDs). 2007 Forest Plan has goshawk S&G, marten S&G, and unmodified goshawk nest S&G, while Alt 1 has legacy S&G.	Alt. 1 has higher viability rating
Alternative 2	Acreage in protected POG is considerably higher in Alt 2 due to expanded OGRs (i.e., more acreage in Old Growth Habitat, Special Interest Areas, Semi-Remote Recreation, and other non-development LUDs). 2007 Forest Plan has goshawk S&G, marten S&G, and unmodified goshawk nest S&G, while Alt 2 has legacy S&G.	Alt. 2 has higher viability rating
Alternative 3	Acreage in protected POG is considerably higher in Alt 3 due to expanded OGRs (i.e., more acreage in Old Growth Habitat, Special Interest Areas, Semi-Remote Recreation, and other non-development LUDs). 2007 Forest Plan has goshawk S&G, marten S&G, and unmodified goshawk nest S&G, while Alt 3 has legacy S&G.	Alt. 3 has higher viability rating
Alternative 4	Acreage in protected POG is considerably lower in Alt 4 due to OGRs in only four provinces and less acreage in non-development LUDs in general. 2007 Forest Plan has goshawk S&G, marten S&G, and unmodified goshawk nest S&G, while Alt 4 does not have goshawk/marten S&Gs or legacy S&Gs.	Alt 4 has lower viability rating
Alternative 5	Same as the 2007 Forest Plan	Alt 5 has the same viability rating
Alternative 6	Acreage in protected POG is higher in Alt 6 due to expanded OGRs (i.e., more acreage in Old Growth Habitat, Special Interest Areas, and Semi-Remote Recreation). 2007 Forest Plan has goshawk S&G, marten S&G, and unmodified goshawk nest S&G, while Alt 6 has legacy S&G.	Alt. 6 has a similar viability rating
Alternative 7	Acreage in protected POG is considerably lower in Alt 7 due to OGRs in only four provinces and less acreage in non-development LUDs in general. 2007 Forest Plan has goshawk S&G, marten S&G, and unmodified goshawk nest S&G, while Alt 7 does not have goshawk/marten S&Gs or legacy S&Gs.	Alt 7 has substantially lower viability rating

1/ The 2007 Forest Plan is defined as the 1997 Forest Plan, as amended through 2007. It is represented by Alternative 5.

3.5.2. American Marten

Alternative 1 in 2008 would have a midpoint value suggesting a very high viability rating for marten, based on applying Table D-16 equivalencies and rankings to Table D-10. Based on the level of POG harvest, 2008 Alternatives 2 and 3 are expected to have a high rating. Alternatives 5 and 6 in 2008 are both similar to 1997 Alternative 11, which had a midpoint value of 64. In addition, 2008 Alternatives 5 and 6 both include supplemental measures, which were not considered in the panel assessments and these measures may have a positive effect on viability; 2008 Alternative 5 includes the goshawk and marten standards and guidelines and 2008 Alternative 6 includes the legacy forest structure standards and guidelines. As a result of this and the 64 midpoint value for 1997 Alternative 11, 2008 Alternatives 5 and 6 are rated at the upper end of the moderate category for marten. Alternative 4 in 2008 is also rated as moderate, because the midpoint value for 1997 Alternatives 10, 3, and 6, ranges from 49 to 64.5. Alternative 7 in 2008 is equivalent to 1997 Alternative 2 with a midpoint value of 51, which is also in the moderate range.

Information from recent studies indicates that the marten in Southeast Alaska may represent two species, or at least, two different genetic lineages of one species. If there are actually two species, it could indicate a greater viability concern for some islands on the Tongass (e.g., Kuiu - the endemic lineage of marten is currently only documented on Kuiu and Admiralty Islands). However, there is no information indicating that there are ecologically meaningful differences (e.g., differences in habitat use) between the two lineages.

Given these factors, the rankings of the 2008 alternatives relative to the 1997 selected alternative (Alternative 11) would be as follows: Alternatives 4 and 7 in 2008 would have lower viability ratings than 1997 Alternative 11, and 2008 Alternatives 1, 2, 3, 5, and 6 would have higher ratings. These higher ratings are because of a smaller managed land base, the addition of goshawk/marten (in the case of 2008 Alternative 5) or legacy (in the case of 2008 Alternatives 1, 2, 3, and 6) standards and guidelines.

The same relative ratings are also expected to hold for the 2007 Forest Plan versus the 2008 alternatives (i.e., 2008 Alternatives 4 and 7 would have lower viability ratings and 2008 Alternatives 1, 2, 3, 5, and 6 would have higher viability ratings than the 2007 Forest Plan). The moderate viability rating for marten in the 2007 Forest Plan was based on the 1997 plan without the additional conservation measures for marten added in the Decision. With those additional measures, the likelihood of maintaining habitat for viable populations of marten was strengthened. Similarly, Alternative 6 strengthens this likelihood by retaining the additional measures that were added for the 1997 Decision except for the replacement of the Legacy standard for one of the marten measures. This, plus the other additions described in Chapter 2, is why both Alternatives 5 and 6 would have higher viability ratings than the 1997 Forest Plan These conclusions follow the same reasoning as given in the above paragraph for most of the alternatives and are similar to those given in Table D-18 for goshawks.

3.5.3. Alexander Archipelago Wolf

Alternatives 1 and 2 in 2008 would have midpoint values suggesting a very high viability rating for the wolf and Alternative 3 would have a high rating, based on applying Table D-16 equivalencies and rankings to Table D-11. Alternatives 5 and 6 in 2008 are both similar to 1997 Alternative 11, which had a midpoint value of 90. As a result, 2008 Alternatives 5 and 6 are rated at the high end of the high category. Alternative 4 in 2008 is also rated as high, because the midpoint value for 1997 Alternatives 10, 3, and 6, ranges from 79.5 to 91. Alternative 7 in 2008 is equivalent to 1997 Alternative 2 with a midpoint value of 80, which is in the moderately high range.

Given these factors, the rankings of the 2008 alternatives relative to the 1997 selected alternative (Alternative 11) would be as follows: Alternatives 4 and 7 in 2008 would have lower viability ratings than 1997 Alternative 11, and 2008 Alternatives 1, 2, and 3 would have higher ratings. Alternatives 5 and 6 in 2008 would have similar ratings, albeit slightly higher. The same relative ratings are also expected to hold for the 2007 Forest Plan versus the 2008 alternatives (i.e., 2008 Alternatives 4 and 7 would have lower viability ratings and 2008 Alternatives 1, 2, 3, 5, and 6 would have higher viability ratings than the 2007 Forest Plan).

3.5.4. Brown Bear

Alternative 1 in 2008 would have a midpoint value suggesting a very high viability rating for the brown bear, based on applying Table D-16 equivalencies and rankings to Table D-12. Based on the level of POG harvest, 2008 Alternatives 2, 3, 5, and 6 are expected to have high ratings. Alternative 4 in 2008 would be rated as moderately high, because the midpoint value for 1997 Alternatives 10, 3, and 6, ranges from 70 to 78 and averages below 76. Alternative 7 in 2008 is equivalent to 1997 Alternative 2 with a midpoint value of 69.5, which is also in the moderately high range.

Given these factors, the rankings of the 2008 alternatives relative to the 1997 selected alternative (Alternative 11) would be as follows: Alternatives 4 and 7 in 2008 would have lower viability ratings than

1997 Alternative 11, and 2008 Alternatives 1, 2, and 3 would have higher ratings. Alternatives 5 and 6 in 2008 would have similar ratings, albeit slightly higher. The same relative ratings are also expected to hold for the 2007 Forest Plan versus the 2008 alternatives (i.e., 2008 Alternatives 4 and 7 would have lower viability ratings and 2008 Alternatives 1, 2, 3, 5, and 6 would have higher viability ratings than the 2007 Forest Plan).

3.5.5. Other Terrestrial Mammals

Alternative 1 in 2008 would have a midpoint value suggesting a high viability rating for widely distributed mammals and a moderate rating for endemic mammals, based on applying Table D-16 equivalencies and rankings to Tables D-13 and D-14. Based on the level of POG harvest, 2008 Alternatives 2 and 3 are expected to have moderately high ratings for widely distributed mammals and moderate ratings for endemic mammals, respectively. Alternatives 5 and 6 in 2008 are both similar to 1997 Alternative 11, which had a midpoint value of 60 for the widely distributed group and 37 for the endemic group. In addition, 2008 Alternatives 5 and 6 both include supplemental measures (see Section 3.3.2.3), which were not considered in the panel assessments and these measures may have a positive effect on viability; these measures include the survey requirement, connectivity guideline, and goshawk and marten standards and guidelines for 2008 Alternative 5 and the survey requirement, connectivity guideline, and legacy standards and guidelines for 2008 Alternative 6. As a result of this and the midpoint values for 1997 Alternative 11, 2008 Alternatives 5 and 6 are rated at the high end of the moderate category for the widely distributed group and at the low end of the moderate category for endemics. Alternative 4 in 2008 is also rated as moderate for the widely distributed group because the midpoint value for 1997 Alternatives 10, 3, and 6, ranges from 36.5 to 54. This alternative is rated as moderately low for endemics (midpoint ranges from 31 to 35). Alternative 7 in 2008 is equivalent to 1997 Alternative 2 with midpoint values of 10.5 and 4 for the widely distributed and endemic groups, respectively. This places it in the moderately low and very low categories for the widely distributed and the endemic groups, respectively.

Given these factors, the rankings of the 2008 alternatives relative to the 1997 selected alternative (Alternative 11) would be as follows: Alternatives 4 and 7 in 2008 would have lower viability ratings than 1997 Alternative 11, and 2008 Alternatives 1, 2, 3, 5, and 6 would have higher ratings. The same relative ratings are also expected to hold for the 2007 Forest Plan versus the 2008 alternatives (i.e., 2008 Alternatives 4 and 7 would have lower viability ratings and 2008 Alternatives 1, 2, 3, 5, and 6 would have higher viability ratings than the 1997 Forest Plan).

3.5.6. Marbled Murrelet

Alternatives 1, 2, and 3 in 2008 would have midpoint values suggesting a very high viability rating for the marbled murrelet, based on applying Table D-16 equivalencies and rankings to Table D-15. Alternatives 5 and 6 in 2008 are both similar to 1997 Alternative 11, which was not rated by the panel; however, based on the values assigned to the 1995 versions of Alternatives 3, 4, and 5, the 2008 Alternatives 5 and 6 would also fall into the very high viability category. Alternative 4 in 2008 is rated as high, because the midpoint value for the 1995 versions of Alternatives 3 and 6 range from 77 to 90.5. Alternative 7 in 2008 is equivalent to the 1995 version of Alternative 2, but with less harvest. It is given a moderately high viability rating for the marbled murrelet because the midpoint value for the 1995 version of Alternative 2 was 71.5.

Given these factors, the rankings of the 2008 alternatives relative to the 1997 selected alternative (Alternative 11) would be as follows: Alternatives 4 and 7 in 2008 would have lower viability ratings than 1997 Alternative 11, and 2008 Alternatives 1, 2, and 3 would have higher ratings. Alternatives 5 and 6 in 2008 would have similar ratings, albeit slightly higher. The same relative ratings are also expected to hold for the 2007 Forest Plan versus the 2008 alternatives (i.e., 2008 Alternatives 4 and 7 would have lower viability ratings and 2008 Alternatives 1, 2, 3, 5, and 6 would have higher viability ratings than the 2007 Forest Plan).

3.6. Alternative Approach to Viability Evaluation for Alternative Comparison

To determine whether the alternatives provided sufficient habitat to sustain all indigenous wildlife across the planning area, and as a means to compare the alternatives, the 1997 Forest Plan FEIS relied, in part, on the findings of structured panel assessments. As described above, these panel assessments provided estimates of the relative risk, in the form likelihood points or scores for a certain outcome. Results from this assignment of likelihood points do not represent probabilities in the classic sense of frequencies; rather, they represent degrees of belief in future outcomes that are based on reasoned professional judgment and expressed in a probability-like scale (Shaw 1999). Scores from individual panel members were averaged to produce a likelihood score for five possible outcomes related to population distribution for each species: occupancy of historic range (Outcome I), temporary gaps in distribution (Outcome II), permanent gaps in distribution (Outcome III), existence in refugia (Outcome IV), and extirpation from Federal lands (Outcome V).

Other considerations to assess viability were presented in Section 3.4. In order to increase the confidence in our viability assessment, an alternate method for alternative comparisons to address viability was used, The tool with the most applicability to the Tongass, given the lack of level of information required for most other tools, is the analysis presented by Smith and Zollner (2005). They argued that using the most vulnerable species to assess impacts of land management likely underestimates the probability of extinction of wildlife species across the planning area because the risk of local extirpation increases with the number of extinction prone species considered. Since the Tongass is an island archipelago with natural inherent risks of species extripation, this method presents a conservative method to further assess viability risks. The authors present an alternative method for assessing risk to wildlife viability that considers the risk of “any” extinction among species at risk in the planning area. To accomplish this, an equation is used which calculates the joint probability of at least one extinction among the set of selected species. That is, it takes into account the marginal, or individual, extinction probability of each species, as determined by population viability analysis or panel assessment, to compare the relative, rather than absolute, risk of extinction among land management alternatives (see Smith and Zollner (2005) for the equation and for statistical details).

This method was used to rank the 2008 FEIS alternatives in terms of relative level of risk of any of the evaluated species existing in refugia or being extirpated using the 1997 FEIS panel assessment ratings. It is important to note that, since the panel scores for outcomes do not represent probabilities, this approach simply produces risk indices. Two risk indices were calculated: one is based on the likelihood that any species will exist in refugia or be extirpated after 100 years of Forest Plan implementation and the other is based on the likelihood that any species will be extirpated.

This method (which applies the binomial theorem) requires that responses of species at risk to management alternatives be independent (i.e., they cannot respond identically to the management scenario or be ecologically dependent on each other as in predator/prey interactions; Smith and Zollner 2005). The individual species and groups selected for risk assessment panel evaluation were chosen because their ecologies likely incorporate the breadth of forest habitat features and other attributes of environmental variation represented across the Forest (Shaw 1999) and are, therefore, assumed to be independent for this analysis; however, it is recognized that some degree of correlation between components is inherent in all ecological communities.

Table D-19 presents the risk indices for 2008 Alternatives 4, 5/6, and 7, which are equivalent or similar to 1997 Forest Plan FEIS Alternatives 6, 11, and 2 (which were evaluated by the panels), respectively. Applying this risk assessment method indicates that, when all evaluated species are considered jointly, Alternatives 4 and 7 would have the greatest risks. This difference is driven primarily by potential risks to the endemic and widely distributed mammals groups, which have the highest risks of any species or group evaluated (Table D-19). The risk index for extirpation was near 40 percent for both Alternatives 4 and 7, but only 8 percent for Alternatives 5 and 6. The risk index for any species existing in refugia or

Table D-19.
Risk Indices associated with the joint probability that any (i.e., at least one) wildlife species among those evaluated would become restricted to refugia or be extirpated

Species	Risk Index for	Outcome Scores and Risk Index[1/] Alt 4*	Alt 5 or 6	Alt 7
Goshawk	Species existence in refugia or extirpation	17	3	21
	Species extirpation from NFS lands	0	0	5
Marten	Species existence in refugia or extirpation	30	9	18
	Species extirpation from NFS lands	0	0	0
Wolf	Species existence in refugia or extirpation	5	4	4
	Species extirpation from NFS lands	1	1	1
Brown bear	Species existence in refugia or extirpation	11	8	10
	Species extirpation from NFS lands	0	0	0
Murrelet***	Species existence in refugia or extirpation	5	1	9
	Species extirpation from NFS lands	0	0	0
Endemics[2/, 3/]	Species existence in refugia or extirpation	58	45	93
	Species extirpation from NFS lands	30	4	23
Widely	Species existence in refugia or extirpation	51	19	83
distributed[2/, 3/.]	Species extirpation from NFS lands	15	3	15
Combined Risk Index for a Species Being Restricted to Refugia or Being Extirpated [2/]		90	66	>99
Combined Risk Index for a Species Being Extirpated[2/]		41	8	38

[1/] Derived from the 1995 (Alternative 4) and 1997 (Alternatives 7 and 11) panel assessment ratings for Outcomes IV and V; Alternatives 4, 5, and 7 are equivalent to the 1997 Forest Plan FEIS Alternatives 6, 11, and 2, respectively. See Smith and Zollner (2005) for equation and further statistical discussion. Values are relative.

[2.] Endemic group includes small mammals whose known distribution in southeast Alaska (beaver, ermine, voles, etc); wide ranging group includes

[3/] Within each guild, evaluators selected what they considered to be the most sensitive species or group of species to evaluate the effect of each alternative on the guild, sometimes consisting of a few or even one species, depending on geographic distribution of species or management actions (Shaw 1999). For the risk assessment these groups were treated similarly to the single species panels.

being extirpated was greater than 99 percent for Alternative 7, 90 percent for Alternative 4, and 66 percent for Alternatives 5 or 6. Again, it is important to understand that these numbers represent an index of relative risk that any species may exist in refugia or be extripated after 100 years of maximum levels of timber harvest allowed in each Alternative. This relative risk is used to compare alternatives and therefore, it is not accurate to consider these as absolute indicators of a degree of risk.

Because 2008 Alternatives 1, 2, and 3 would harvest less timber than Alternative 5 or 6, but maintain equivalent or more protective conservation measures, it can be assumed that their risk indices would be lower than the corresponding indices for Alternatives 5 and 6. The lowest risk indices would be associated with Alternative 1.

The fact that Alternative 4 had an overall probability of extirpation that was slightly higher than Alternative 7, despite proposing less harvest, is likely due to the fact that risk assessment panels convened twice, once in 1995 and once in 1997, evaluating different alternatives each time. The 1997 FEIS Alternative 2 (equivalent to the 2008 Alternative 7) was assessed both times, whereas 1997 FEIS Alternative 6 (equivalent to the 2008 Alternative 4) was only assessed in 1995. In 1997, there was a consistent shift in outcome ratings for Outcome V, or local extirpation (points shifted to higher outcomes, generally IV), across all alternatives due to a clarification of the interpretation of extirpation within the 100-year evaluation period (Iverson 1997). Also, the acreage potentially harvested under the version of Alternative 6 reviewed by the 1995 panel was higher than the level of harvest for the 1997 Alternative 6 and for the 2008 Alternative 4. Thus, it is likely that if the 1995 version of Alternative 6 had been reevaluated in 1997, its score for Outcome V would also have shifted down, lower than the 1997 version of Alternative 2 (re-ordering the results to show that Alternative 7 considered here would in fact pose the greatest risk to the ecological community). Taking this factor into account, the overall outcomes confirm the relative rankings of the alternatives based on other comparisons.

4. CONCLUSIONS REGARDING THE 2008 FOREST PLAN AMENDMENT

4.1. Introduction

The conservation strategy provides the scientific basis for an ecological approach to the Tongass Forest Plan. The strategy consists of a system of OGRs and matrix lands that are a mix of retention and active forest management. The Forest-wide reserve network provided by the non-development LUDs provides the backbone framework to ensure maintenance of habitat for species viability while the matrix provides a variety of functions and activities. Both are critical for the conservation strategy and to ensure species viability; however, they have different functions.

The reserve network protects the integrity of the old-growth forest ecosystem by protecting the largest blocks of contiguous old growth, as well medium and smaller-sized blocks. These reserves are distributed across the Forest and serve as core areas for functioning old-growth ecological communities.

The forests in the matrix provide a variety of functions, including connectivity between old growth in reserve areas and providing habitat for a variety of organisms associated with forests of a variety of successional stages, including old growth. Standards and guidelines within the matrix are designed to provide for important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next and maintenance of ecologically valuable structural components such as down logs, snags and large trees. The expected condition for the matrix over time, given all Forest Plan expectations, is a mosaic of successional stages – from early seral to second growth forests to old-growth forests. The suite of ecological functions provided by the matrix, including connectivity and old-growth representation, is achieved through the combination of old growth retention in beach fringe, riparian and floodplain buffers, karst, soil, other no-harvest areas; aging young-growth stands; uneven-aged managed stands; and patches of forest left in managed stands. Matrix functions are enhanced, both in the short term and as the stand ages, by leaving individual reserve trees, snags and clumps of reserve trees within harvested units.

4.2. Forest-wide Reserve Changes

Changes to the conservation strategy under the alternatives fall into two broad categories (as described in Sections 2.5.1 and 2.5.2): changes to the Forest-wide reserve network and changes to standards and guidelines that affect management of the matrix. The overall effects of these changes need to be examined in combination to determine the net effects of the changes relative to the 2007 Forest Plan (modeled by Alternative 5). This section summarizes these overall effects.

As noted in Section 2.5.1, the Forest-wide reserve network was modified in two ways: changes were made to the areas identified as Old-Growth Habitat LUDs and changes were made to other non-development LUDs. Under Alternatives 1, 2, 3, and 6, the boundaries of a large portion of the Old-Growth Habitat LUDs that represent the small OGRs were modified using a process that started with an interagency biological proposal and ended with a refinement of that proposal in consideration of multiple-use objectives. The net result of these modifications was an increase in OGR acres by 39,000 relative to Alternative 5 (the 2007 Forest Plan). In contrast, Alternative 4 reduces the acreage in Old-Growth Habitat LUDs by 789,000 or 67 percent and Alterative 7 totally eliminates the Old-Growth Habitat LUD.

The second way that the Forest-wide reserve network was modified was through the modification of other non-development LUDs, which also represent an important part of the network. Overall, the acreage in these other non-development LUDs was also enlarged under Alternatives 1, 2, 3, and 6 relative to Alternative 5, and reduced under Alternatives 4 and 7.

Table D-5 provides a summary of these changes in reserve area relative to Alternative 5. This table demonstrates that the land area in reserves under Alternative 6 (proposed action) has increased by 149,000 acres relative to Alternative 5. This represents an increase of approximately 1 percent of the Forest land area (i.e., reserve acreage represents 79.4 percent of the Forest under Alternative 6 and 78.5

percent under Alternative 5). An increasingly greater percentage of the Forest would be in reserves under Alternatives 3, 2, and 1 (83.3, 88.5, 95.0 percent, respectively). Under Alternatives 4 and 7, the acreage in reserves would be reduced to 71.8 and 69.9 percent of the Forest, respectively.

Table D-6 summarizes these changes relative to POG. Under Alternative 6, the acreage of POG in reserves would be 45,000 acres greater than under Alternative 5, while the acreage of POG that is protected in the matrix would be 28,000 acres less than under Alternative 5, resulting in a net increase of 17,000 acres. In addition, the percentage of high-volume and large-tree POG that is protected in reserves would increase under Alternative 6, relative to Alternative 5, primarily because of the changes made to OGRs and other LUDs; these changes resulted in a greater portion of the forest types consisting of larger trees being included within reserves. Under Alternative 6, for example, 72.6 percent of the high-volume POG and 69.9 percent of the large-tree POG would be included within reserves compared with 71.3 and 67.8 percent under Alternative 5, respectively. Overall, 90.1 percent of the existing high-volume POG and 89.0 percent of the large-tree POG would not be harvested under Alternative 6, compared with 88.9 and 88.6 percent under Alternative 5. Again, an increasingly greater percentage of total POG and the larger tree POG types would be protected in reserves and in overall under Alternatives 3, 2, and 1, in that order. In contrast, a significantly smaller percentage of total POG and the larger tree POG types would be protected in reserves and overall in Alternatives 4 and 7, in decreasing order.

4.3. Standards and Guidelines Changes

The other major factors to be considered in comparing the overall effects of changes to the conservation strategy are the changes to standards and guidelines. Most changes to the standards and guidelines under Alternatives 1, 2, 3, and 6 are minor and it was concluded in the previous subsections that they would not affect the strategy. The one change to the standards and guidelines that is more far-reaching and needs to be considered in combination with the LUD changes is the replacement of the goshawk and marten standards and guidelines with the legacy standard and guideline. The legacy standard provides an alternative, more ecological approach to conserving wildlife habitat at the project scale as compared to the more species-specific marten and goshawk standards. This approach simplifies the standard, allows equal to greater flexibility, and leaves representative components of old growth in high risk VCUs outside of the biogeographic provinces covered by the marten and goshawk standards.

For marten, ADF&G harvest reports continue to indicate stable or increasing marten populations across the Tongass and trapping continues to occur across the entire Tongass under both State regulations and federal subsistence regulations. While there is increased knowledge regarding the distribution of two marten lineages (*caurina* and *americana*), there is no indication of differential life history requirements or habitat use between lineages. Therefore, maintaining one set of marten standards is still appropriate. The legacy standard would continue to retain additional forest structure in VCUs with the highest level of harvest in high risk marten provinces and this is still valid, based on concerns about the ability of marten to travel through landscapes that have large openings due to past timber harvest.

No barriers to movement other than open salt water have been identified and marten travel through a variety of habitats including clearcuts, muskeg openings and roads. Marten will continue to move through the matrix using riparian and beach buffer routes, as well as crossing the mix of natural and human-caused openings. Since trapping access and trapping success can increase where there are roads, the standard requiring road management considerations is maintained, where marten mortality is directly attributed to road access.

Considering the combination of the OGR network, non-development LUDs and retention of old growth via various standards and guidelines, there is significantly more high value marten habitat retained than just in OGRs. Recent studies indicating that OGRs may not be of sufficient sizes to maintain marten do not adequately take into account the amount of other old growth retained in the Forest Plan and, thus, do not reflect how much actual marten habitat would remain. Slightly more than two-thirds (68 percent) of all existing old growth within the matrix would remain unharvested after 100 years of Forest Plan implementation (at the maximum allowable harvest rate) under either Alternative 5 or Alternative 6. Thus, lands outside of the reserves will provide more than just connectivity for marten. Given timber harvest trends (smaller-sized openings coupled with decreased harvest levels), the continued succession of young growth to mature forest, and the value and amount of old growth retained outside of OGRs, it appears that the assumptions of these studies were very conservative and do not reflect available marten habitat under actual Forest Plan implementation. Based upon this analysis, implementation of Alternatives 1, 2, 3, or 6 with the legacy standard would not reduce the likelihood of maintaining habitat that supports well-distributed marten populations, relative to Alternative 5. Based on the viability panel analysis (Section 3), there is at least a moderate likelihood that sufficient habitat would be maintained to support a viable and well distributed marten populations across the Tongass under these alternatives. While it is anticipated that there could be gaps in this distribution, there is a low likelihood that there would be significant isolation among marten populations resulting from implementation of the amended Forest Plan.

For goshawks, based upon these analyses, Alternatives 1, 2, 3, and 6 would provide a sufficient amount and distribution of habitat to maintain viable and well distributed populations across the Tongass after 100 years of Forest Plan implementation. The legacy standard and guideline would continue to retain additional forest structure in harvest units greater than 20 acres in all VCUs on Prince of Wales Island that were identified as concerns for goshawk, and this is still valid, based on concerns about goshawks specific to this island. In addition, the legacy standard would also retain forest structure in other VCUs forest-wide, which provides an additional measure of protection for goshawk habitat outside of Prince of Wales Island.

These analyses assumed maximum allowable timber harvest every decade for 100 years of implementation of the Forest Plan. The interagency assessment called *The Conservation Assessment for the Northern Goshawk in Southeast Alaska* (Iverson et al. 1996) defined three categories of VCU harvest and related those categories to the likelihood of the VCU continuing to support goshawks. These categories were based on the concept of a 300-year ecological rotation. The three categories were: 1) <33 percent POG harvest = high likelihood that VCU supports goshawks; 2) 33-47 percent POG harvest = slightly increased risk that VCU will not support goshawks; and 3) >47 percent = increased risk that VCU will not support goshawks.

The proportion of the Tongass acreage that falls into these categories was estimated for those VCUs that originally contained a significant amount of goshawk habitat (defined as a minimum of 2,300 acres of POG). For this appendix, the three categories were applied to Alternative 6 and the results are summarized below:

- An estimated 95 percent of the goshawk range on the Tongass currently has a high likelihood of sustaining goshawk habitat (< 33 percent of old-growth harvested).
- An estimated 95 percent of the goshawk range on the Tongass would have 47 percent or less of the POG harvested after 100 years of Forest Plan implementation, and would maintain a relatively high likelihood of sustaining goshawks.
- An estimated 12 percent of the goshawk range on the Tongass would have a slightly elevated risk of not sustaining goshawks, with between 33 and 47 percent of the old growth harvested after 100 years.
- Most elevated risk landscapes (> 47 percent harvested) would be aggregated on North and Central Prince of Wales Island. This province only represents 9 percent of the acreage comprising goshawk range on the Tongass.
- Where risks would be elevated by matrix management intensity, remaining very high quality goshawk habitats would be protected by forest-wide standards and guidelines

These results, together with the viability panel analysis described in Section 3 and the other related analyses presented in Section 2.5, lead to the conclusion that implementation of Alternatives 1, 2, 3, or 6 with the legacy standard would not reduce the likelihood of maintaining habitat that supports viable and well-distributed goshawk populations relative to Alternative 5. Based on the viability panel analysis (Section 3) there is at least a high likelihood that sufficient habitat would be maintained to support viable and well distributed goshawk populations across the Tongass under these alternatives.

In contrast, the modifications to the standards and guidelines under Alternatives 4 and 7 (e.g., no legacy or goshawk/marten standards and guidelines under either alternative and reduced beach fringe and elimination of Class III stream buffers under Alternative 7), coupled with their significantly lower acreages of protected POG, particularly in reserves, leads to the conclusion that the likelihood of maintaining habitat that supports well-distributed marten and goshawk populations could be compromised. The potential effect would be substantially greater under Alternative 7. However, based on the viability panel analysis (Section 3) there is a moderate likelihood for marten and a moderate to moderately high likelihood for goshawks, that sufficient habitat would be maintained to support viable and well distributed populations across the Tongass under these alternatives. In addition, even under Alternative 4 or 7, the potential effect would not be realized unless harvest levels occurred and were maintained at a much higher rate than has occurred in the past 10 years. Given this, and given the 10 to 15-year timeframe until the Forest Plan is revised again, it is highly unlikely that these levels of harvest would occur before the next Forest Plan revision.

4.4. Summary and Conclusions

In summary, the numbers reviewed in Section 2.5 reflect the changes in reserves as well as the changes in standards and guidelines (including the replacement of the goshawk and marten standards and guidelines with the legacy standard and guideline). Although there is some shift of POG from the matrix to POG in reserves, the net effect of all LUD and standard and guideline changes is an increase in protected POG (including the larger tree POG types) under Alternatives 1, 2, 3, and 6, relative to Alternative 5. The 1997 Forest Plan FEIS analysis of Alternative 11 (without consideration of specific additional goshawk and marten standards and guidelines) stated that the 1997 Alternative 11 was explicitly designed to address issues related to wildlife viability conservation planning. It was projected to have a moderately high likelihood of maintaining viable, well distributed populations of old-growth associated species across the Tongass National Forest (USDA Forest Service 1997c). Alternatives 1, 2, 3, and 6 of the 2008 Forest Plan Amendment FEIS do not negatively affect the conservation strategy that this conclusion was based on; in fact, the acreage in reserves and the acreage of old growth in reserves would be higher and the total protected POG would be slightly higher. These positive effects would occur under Alternatives 6, 3, 2, and 1, in increasing order. Alternatives 4 and 7, on the other hand, would negatively affect the conservation strategy and would reduce the likelihood of maintaining viable, well-distributed populations. Alternative 7 would have the greatest potential to negatively affect the strategy. Under any alternative, however, the maximum effects that these conclusions are based on depend on actual harvest levels occurring at a rate significantly higher than under the recent past.

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APPENDIX E
CATALOGUE OF PAST HARVEST

Appendix E

Catalogue of Past Harvest

CONTENTS

Appendix E
Catalogue of Past Harvest

Introduction

This appendix presents a catalogue of past harvest for Southeast Alaska. It is based on updated and extensive mapping of past harvest based on the Tongass GIS library, GIS data layers provided by Sealaska Regional Native Corporation, the State of Alaska, and Audubon Alaska/The Nature Conservancy, as well as supplemental interpretation of orthophotography and other aerial photography. It is also based on tabular information collected from the State of Alaska, Department of Natural Resources regarding state harvests and harvests under the Alaska Forest Resources and Practices Act. Appendix B provides more detailed information on the inventory methodology.

Part I of this appendix provides a tabular catalogue of harvest acreage by ownership category, landowner, and biogeographic province. An approximate harvest period is listed by decade as well. Part II presents a tabular summary of information provided by the State of Alaska Department of Natural Resources, Division of Forestry.

Part I – Acreage of Past Harvest by Ownership Category, by Landowner, by Biogeographic Province, by Approximate Decade

Ownership Category	Landowner	Est. Approx. Harvest Decade	Acres Harvested
Yakutat Forelands Biogeographic Province			
Tongass National Forest	Tongass National Forest	1950s	28
	Tongass National Forest	1970s	553
	Tongass National Forest	1980s	1,812
	Tongass National Forest	1990s	229
	Tongass National Forest	2000s	987
	Tongass National Forest	--	18
	Total NFS Lands		**3,627**
State of Alaska	State of Alaska	1970s–1990s	1,315
	Total State Lands		**1,315**
	Yak-tat Kwaan Village Corporation	1980s	12,541
	Other	--	134
Private & Other Lands	**Total Private/Other Lands**		**12,675**
	TOTAL PROVINCE HARVEST		**17,618**

Ownership Category	Landowner	Est. Approx. Harvest Decade	Acres Harvested
Yakutat Uplands Biogeographic Province			
Tongass National Forest	Tongass National Forest	1980s	665
	Tongass National Forest	1990s	173
	Tongass National Forest	2000s	552
	Tongass National Forest	--	21
	Total NFS Lands		**1,411**
State of Alaska	**Total State Lands**		0
Private & Other Lands	**Total Private/Other Lands**		0
	TOTAL PROVINCE HARVEST		**1,411**
East Chichagof Island Biogeographic Province			
Tongass National Forest	Tongass National Forest	<1950	1,016
	Tongass National Forest	1950s	1,527
	Tongass National Forest	1960s	6,053
	Tongass National Forest	1970s	13,232
	Tongass National Forest	1980s	10,501
	Tongass National Forest	1990s	11,713
	Tongass National Forest	2000s	60
	Tongass National Forest	--	105
	Total NFS Lands		**44,207**
State of Alaska	State of Alaska	1980s	200
	State of Alaska	1990s	227
	State of Alaska	2000s	70
	Total State Lands		**497**
Private & Other Lands	Hoonah	--	252
	Huna Totem Village Corporation	--	11,449
	Sealaska Regional Corporation	1970s	1,352
	Sealaska Regional Corporation	1980s	7,670
	Sealaska Regional Corporation	1990s	6,400
	Sealaska Regional Corporation	2000s	6,825
	Other Private Owners	--	81
	Total Private/Other Lands		**37,007**
	TOTAL PROVINCE HARVEST		**81,711**

Ownership Category	Landowner	Est. Approx. Harvest Decade	Acres Harvested
West Chichagof Island Biogeographic Province			
Tongass National Forest	**Total NFS Lands**		**0**
State of Alaska	**Total State Lands**		**0**
Private & Other Lands	**Total Private/Other Lands**		**0**
	TOTAL PROVINCE HARVEST		**0**
East Baranof Island Biogeographic Province			
Tongass National Forest	Tongass National Forest	<1950	197
	Tongass National Forest	1950s	223
	Tongass National Forest	1960s	8,158
	Tongass National Forest	1970s	2,725
	Tongass National Forest	1990s	2,227
	Total NFS Lands		**13,530**
State of Alaska	**Total State Lands**		**0**
Private & Other Lands	Other Private Land Owners	--	2
	Total Private/Other Lands		**2**
	TOTAL PROVINCE HARVEST		**13,532**
West Baranof Island Biogeographic Province			
Tongass National Forest	Tongass National Forest	<1950	516
	Tongass National Forest	1950s	1,085
	Tongass National Forest	1960s	9,812
	Tongass National Forest	1970s	5,556
	Tongass National Forest	1980s	10
	Total NFS Lands		**16,978**
State of Alaska	State of Alaska	1980s	696
	State of Alaska	1990s	204
	Total State Lands		**900**

Ownership Category	Landowner	Est. Approx. Harvest Decade	Acres Harvested
Private & Other Lands	Shee Atika Village Corporation	1980s	1,184
	Other Private Owners	--	271
	Total Private/Other Lands		**1,455**
	TOTAL PROVINCE HARVEST		**19,332**
Admiralty Island Biogeographic Province			
Tongass National Forest	Tongass National Forest	Prior to 1950	3,202
	Tongass National Forest	1950s	771
	Tongass National Forest	1960s	3,305
	Tongass National Forest	1970s	1,108
	Tongass National Forest	1990s	17
	Tongass National Forest	2000s	105
	Tongass National Forest	--	88
	Total NFS Lands		**8,595**
State of Alaska	**Total State Lands**		**0**
Private & Other Lands	Shee Atika Village Corporation	1980s–1990s	20,080
	Other Private Owners	--	110
	Total Private/Other Lands		**20,190**
	TOTAL PROVINCE HARVEST		**28,785**
Lynn Canal Biogeographic Province			
Tongass National Forest	Tongass National Forest	1960s	2,129
	Tongass National Forest	1970s	1,177
	Tongass National Forest	1980s	545
	Tongass National Forest	1990s	1,527
	Total NFS Lands		**5,377**
State of Alaska	State of Alaska	1980s	214
	Total State Lands		**214**
Private & Other Lands	Other Private Owners	1990s	335
	Total Private/Other Lands		**335**
	TOTAL PROVINCE HARVEST		**5,926**

Ownership Category	Landowner	Est. Approx. Harvest Decade	Acres Harvested
North Coast Range Biogeographic Province			
Tongass National Forest	Tongass National Forest	1950s	221
	Total NFS Lands		**221**
State of Alaska	State of Alaska	--	24
	Total State Lands		**24**
Private & Other Lands	Goldbelt Village Corporation	1980s	20,389
	City and Borough of Juneau	--	1
	Other Land Owners	--	147
	Total Private/Other Lands		**20,537**
	TOTAL PROVINCE HARVEST		**20,782**
Kupreanof/Mitkof Biogeographic Province			
Tongass National Forest	Tongass National Forest	<1950	1,573
	Tongass National Forest	1950s	1,096
	Tongass National Forest	1960s	6,781
	Tongass National Forest	1970s	10,183
	Tongass National Forest	1980s	8,335
	Tongass National Forest	1990s	5,539
	Tongass National Forest	2000s	2,234
	Total NFS Lands		**35,742**
State of Alaska	State of Alaska	1980s	3,648
	State of Alaska	1990s	884
	State of Alaska	2000s	54
	Total State Lands		**4,587**
Private & Other Lands	Kake	--	126
	Petersburg	--	484
	Kake Village Corporation	1970s–1990s	17,471
	Sealaska Regional Corporation	<1980	3,755
	Sealaska Regional Corporation	1980s	1,831
	Sealaska Regional Corporation	1990s	551
	Sealaska Regional Corporation	2000s	6,009
	Other Private Owners	--	823
	Total Private/Other Lands		**31,050**
	TOTAL PROVINCE HARVEST		**71,379**

Ownership Category	Landowner	Est. Approx. Harvest Decade	Acres Harvested
Kuiu Island Biogeographic Province			
Tongass National Forest	Tongass National Forest	<1950	2,570
	Tongass National Forest	1950s	344
	Tongass National Forest	1960s	3,428
	Tongass National Forest	1970s	8,989
	Tongass National Forest	1980s	7,852
	Tongass National Forest	1990s	4,644
	Tongass National Forest	2000s	667
	Total NFS Lands		**28,494**
State of Alaska	State of Alaska	--	9
	Total State Lands		**9**
Private & Other Lands	Sealaska Regional Corporation	<1980	22
	Other Private Owners	--	113
	Total Private/Other Lands		**135**
	TOTAL PROVINCE HARVEST		**28,638**
Central Coast Range Biogeographic Province			
Tongass National Forest	Tongass National Forest	<1950	159
	Tongass National Forest	1950s	910
	Tongass National Forest	1960s	3,574
	Tongass National Forest	1970s	1,087
	Tongass National Forest	1980s	164
	Tongass National Forest	1990s	586
	Total NFS Lands		**6,479**
State of Alaska	State of Alaska	1970s–1980s	1,421
	Total State Lands		**1,421**
Private & Other Lands	Other Land Owners	--	13
	Total Private/Other Lands		**13**
	TOTAL PROVINCE HARVEST		**7,913**

Ownership Category	Landowner	Est. Approx. Harvest Decade	Acres Harvested
Etolin Island and Vicinity Biogeographic Province			
Tongass National Forest	Tongass National Forest	<1950	2,565
	Tongass National Forest	1950s	1,728
	Tongass National Forest	1960s	2,593
	Tongass National Forest	1970s	12,666
	Tongass National Forest	1980s	8,964
	Tongass National Forest	1990s	6,532
	Tongass National Forest	2000s	1,016
	Tongass National Forest	--	4
	Total NFS Lands		**36,066**
State of Alaska	State of Alaska		3,764
	Total State Lands		**3,764**
Private & Other Lands	Wrangell		643
	Other Land Owners		68
	Total Private/Other Lands		**712**
	TOTAL PROVINCE HARVEST		**40,542**
North Central Prince of Wales Island Biogeographic Province			
Tongass National Forest	Tongass National Forest	<1950	1,772
	Tongass National Forest	1950s	11,460
	Tongass National Forest	1960s	50,216
	Tongass National Forest	1970s	47,190
	Tongass National Forest	1980s	35,623
	Tongass National Forest	1990s	33,507
	Tongass National Forest	2000s	4,343
	Tongass National Forest	--	15
	Total NFS Lands		**184,125**
State of Alaska	State of Alaska	--	15,384
	Total State Lands		**15,384**
Private & Other Lands	Hydaburg	--	48
	Kasaan	--	16
	Thorne Bay	--	180
	Haida Village Corporation	1980s–1990s	2,465
	Kavilco Village Corporation	1990s	11,811
	Klawock-Heenya Village Corporation	1980s–1990s	12,073
	Sealaska Regional Corporation	<1980	3,240
	Sealaska Regional Corporation	1980s	32,741
	Sealaska Regional Corporation	1990s	24,452
	Sealaska Regional Corporation	2000s	22,835
	Shaan Seet Village Corporation	1980s–1990s	6,858

Ownership Category	Landowner	Est. Approx. Harvest Decade	Acres Harvested
	Other Private Land Owners	--	3,304
	Total Private/Other Lands		**120,022**
	TOTAL PROVINCE HARVEST		**319,531**
Revilla Island/Cleveland Peninsula Biogeographic Province			
Tongass National Forest	Tongass National Forest	<1950	2,181
	Tongass National Forest	1950s	6,812
	Tongass National Forest	1960s	6,389
	Tongass National Forest	1970s	8,443
	Tongass National Forest	1980s	5,827
	Tongass National Forest	1990s	11,477
	Tongass National Forest	2000s	4,470
	Tongass National Forest	--	60
	Total NFS Lands		**45,658**
State of Alaska	State of Alaska		4,043
	Total State Lands		**4,043**
Private & Other Lands	Ketchikan	--	39
	Sealaska Regional Corporation	<1980	151
	Cape Fox Village Corporation	1980s–1990s	13,266
	Other Land Owners	1980s–1990s	7,406
	Total Private/Other Lands		**20,862**
	TOTAL PROVINCE HARVEST		**70,563**
Southern Outer Islands Biogeographic Province			
Tongass National Forest	Tongass National Forest	1950s	569
	Tongass National Forest	1960s	3,737
	Tongass National Forest	1970s	3,058
	Tongass National Forest	1980s	5,737
	Tongass National Forest	1990s	1,683
	Tongass National Forest	2000s	354
	Total NFS Lands		**15,138**
State of Alaska	State of Alaska	1990s	2,102
	Total State Lands		**2,102**
Private & Other Lands	Haida Village Corporation	--	4
	Klawock-Heenga Village Corporation	--	366
	Sealaska Regional Corporation	2000s	31
	Shaan Seat Village Corporation	1980s–1990s	3,324
	Total Private/Other Lands		**3,725**

Ownership Category	Landowner	Est. Approx. Harvest Decade	Acres Harvested
	TOTAL PROVINCE HARVEST		**20,965**
Dall Island and Vicinity Biogeographic Province			
Tongass National Forest	Tongass National Forest	<1950	77
	Tongass National Forest	1950s	79
	Tongass National Forest	1960s	213
	Total NFS Lands		**369**
State of Alaska	**Total State Lands**		**0**
Private & Other Lands	Haida Village Corporation	1980s–1990s	365
	Klukwan Villa Village Corporation	1980s–1990s	17,265
	Sealaska Regional Corporation	<1980	630
	Sealaska Regional Corporation	1980s	4,549
	Sealaska Regional Corporation	1990s	1,831
	Sealaska Regional Corporation	2000s	8,011
	Other Land Owners	--	265
	Total Private/Other Lands		**32,916**
	TOTAL PROVINCE HARVEST		**33,285**
South Prince of Wales Island Biogeographic Province			
Tongass National Forest	Tongass National Forest	<1950	410
	Tongass National Forest	1950s	60
	Tongass National Forest	1960s	467
	Tongass National Forest	1970s	368
	Tongass National Forest	1980s	276
	Tongass National Forest	1990s	994
	Tongass National Forest	2000s	716
	Tongass National Forest	--	1
	Total NFS Lands		**3,292**
State of Alaska	State of Alaska	--	351
	Total State Lands		**351**
Private & Other Lands	Sealaska Regional Corporation	<1980	79
	Sealaska Regional Corporation	2000s	79
	Haida Village Corporation	1980s–1990s	589
	Kootznoowoo Village Corporation	1980s–1990s	13,491
	Other Land Owners	--	25
	Total Private/Other Lands		**14,184**
	TOTAL PROVINCE HARVEST		**17,827**

Ownership Category	Landowner	Est. Approx. Harvest Decade	Acres Harvested
North Misty Fiords Biogeographic Province			
Tongass National Forest	Tongass National Forest	1950s	81
	Tongass National Forest	1960s	960
	Tongass National Forest	1980s	68
	Tongass National Forest	--	260
	Total NFS Lands		**1,370**
State of Alaska	State of Alaska	--	818
	Total State Lands		**818**
Private & Other Lands	Sealaska Regional Corporation	1980s	16
	Sealaska Regional Corporation	2000s	8
	Total Private/Other Lands		**23**
	TOTAL PROVINCE HARVEST		**2,211**
South Misty Fiords Biogeographic Province			
Tongass National Forest	**Total NFS Lands**		**0**
State of Alaska	**Total State Lands**		**0**
Private & Other Lands	**Total Private/Other Lands**		**0**
	TOTAL PROVINCE HARVEST		**0**
Ice Fields Biogeographic Province			
Tongass National Forest	Tongass National Forest	1960s	1,732
	Tongass National Forest	1970s	1,311
	Tongass National Forest	1980s	996
	Tongass National Forest	2000s	5
	Total NFS Lands		**4,044**
State of Alaska	**Total State Lands**		**0**
Private & Other Lands	**Total Private/Other Lands**		**0**
	TOTAL PROVINCE HARVEST		**4,044**

Ownership Category	Landowner	Est. Approx. Harvest Decade	Acres Harvested
Glacier Bay/Fairweather Range Biogeographic Province			
Tongass National Forest	**Total NFS Lands**		**0**
State of Alaska	**Total State Lands**		**0**
Private & Other Lands	Glacier Bay N.P. **Total Private/Other Lands**	--	200 **200**
	TOTAL PROVINCE HARVEST		**200**
Chilkat River Complex Biogeographic Province			
Tongass National Forest	**Total NFS Lands**		**0**
State of Alaska	State of Alaska **Total State Lands**	1980s–2000s	17,069 **17,069**
Private & Other Lands	BLM Glacier Bay N.P. Private/Other **Total Private/Other Lands**	-- -- --	136 568 2,864 **3,568**
	TOTAL PROVINCE HARVEST		**20,637**

Part II – Statistics on the Alaska Forest Resources and Practices Act Implementation and State Timber Sales in Southeast Alaska

Part II presents a tabular summary of information provided by the State of Alaska Department of Natural Resources, Division of Forestry. Statistical information is not available for harvests prior to the Alaska Forest Resources and Practices Act (AFRPA), nor for some years since the Act. Tables E-1 through E-5 provide statistics regarding the AFRPA, as it has been applied to private and other lands in Southeast Alaska. Tables E-6 through E-17 provide information on State timber sales in Southeast Alaska.

Table E-1
Forest Practices Act – Summary Statistics for Southeast Alaska, 1991-1998

	1991	1992	1993	1994	1995	1996	1997	1998
New Notifications								
SSE	103	117	145	124	131	146	123	87
NSE	2	0	8	0	3	1	0	0
TOTAL	105	117	153	124	134	147	123	87
Harvest Acreage in New Notifications Received								
SSE	21016	37971	28769	33038	22745	30509	26034	16291
NSE	110	0	824	100	227	80	0	0
TOTAL	21126	37971	29593	33138	22972	30589	26034	16291
# Inspections								
SSE	146	134	98	119	93	90	42	56
NSE	2	0	8	1	5	0	0	0
TOTAL	148	134	106	120	98	90	42	56
# Variation Trees Reviewed (=approved, denied, and other (e.g., withdrawn)								
SSE	350	1344	3581	1660	1054	1116	2571	4113
NSE	83	0	0	0	0	0	0	0
TOTAL	433	1344	3581	1660	1054	1116	2571	4113

Table E-2
Forest Practices Act – Summary Statistics for Southeast Alaska, 1999-2006

	1999	2000	2001	2002	2003	2004	2005	2006
New Notifications								
SSE	79	104	36	43	51	47	43	51
NSE	0	0	19	10	6	6	5	3
TOTAL	79	104	55	53	57	53	48	54
Harvest Acreage in New Notifications Received								
SSE	11705	20542	5599	7667	12197	30488	27733	37313
NSE	0	3779	9619	5839	1780	1969	344.3	413
TOTAL	11705.3	24321	15217.8	13505.5	13977	32457	28077.3	37726
# Inspections								
SSE	32	89	44	43	58	35	59	20
NSE	0	0	25	24	11	9	13	9
TOTAL	32	89	69	67	69	44	72	29
# Variation Trees Reviewed (=approved, denied, and other (e.g., withdrawn)								
SSE	1522	330	103	58	336	948	411	0
NSE	0	0	144	20	199	17	0	0
TOTAL	1522	330	247	78.4	535	965	411	0

Table E-3
Forest Practices Act – Road Miles Summary for State of Alaska, 1997 - 2006

Road Miles Notified	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
SSE	156	104	101	130	39	58	71	69	34.1	25
NSE	0	0	0	0	104	20	10	3	4	3
Mat-Su/SW	13	3	28	0	0	3	5	13	12	46
Kenai-Kodiak	195	50	146	44	65	146	96	57	25	11
COASTAL	364	157	275	174	208	227	182	142	75	85
Fairbanks	1	0	0	3	0	1	7	3	0	0
Delta	0	0	0	0	0	0	0	0	4	0
Tok	3	0	0	0	0	0	0	60	57.75	0
Copper R.	7	5	0	0	0	0	0	46	0	0
NORTHERN	11	5	0	3	0	1	7	109	61.75	0
TOTAL	**375**	**162**	**275**	**177**	**208**	**228**	**189**	**251**	**136**	**85**

Table E-4
Southern Southeast Alaska, Forest Practices Act – Detail Statistics

Yr Notified	Geographical Area	Acre Notified*	Road Notified	Renew Ac	Renew Rd	New PCT Ac	Rnwl PCT Ac
Private Land							
2000	Dall Island					2160.0	
2000	Kupreanof Kake Area	1381.0	14.0	430.0	4.0		629.0
2000	Long Island					1958.7	
2000	POW Big Salt					505.0	179.0
2000	POW Craig Rd Area	25.0		110.0			
2000	POW Hetta Inlet	766.0	8.1	710.0	7.6		
2000	POW Kasaan Peninsula	2091.1	10.5	487.5	1.0		
2000	POW Klawock Rd Area	831.0	3.5	179.5	0.2		
2000	POW Natzuhini Bay	89.0	0.7			113.0	58.0
2000	POW s/sw side Kasaan Bay	1140.0	18.9	354.0	2.1		
2000	POW Soda Bay	807.2	4.1				
2000	POW Trocadero Bay	2267.0	18.2	223.0	0.0	0.0	222.0
2000	Revilla Ketchikan Rd Area	522.0	10.0	54.0	1.5		
2000	Revillagigedo Island	10543.0					
2001	Dall Island	1978.0	20.6	230.3			
2001	Kupreanof Kake Area	316.0	3.0	49.0	0.2		610
2001	Long Island					808.0	
2001	POW Big Salt						216.0
2001	POW Hetta Inlet	1856.8	6.0	237.0			
2001	POW Kasaan Peninsula	27.0	0.8	449.5			
2001	POW Klawock Rd Area			55.0	0.4		
2001	POW Natzuhini Bay						208.0
2001	POW s/sw side Kasaan Bay	430.6	3.0				
2001	POW Soda Bay	991.0	8.5				
2001	POW Trocadero Bay						280.0

Table E-4
Southern Southeast Alaska, Forest Practices Act – Detail Statistics

Yr Notified	Geographical Area	Acre Notified*	Road Notified	Renew Ac	Renew Rd	New PCT Ac	Rnwl PCT Ac
2002	Dall Island	3835.0	10.4	363.0	2.1	280.0	
2002	Kupreanof Kake Area	1033.7	15.7	549.3	2.3	0.0	610.0
2002	Long Island					699.4	
2002	POW Big Salt					207.0	173
2002	POW Craig Rd Area	23.0		17.0			
2002	POW Hetta Inlet	254.0		164.0			
2002	POW Kasaan Peninsula	969.0	19.2	328.0	1.8		
2002	POW Natzuhini Bay	331.0	3.2			52.0	76.0
2002	POW s/sw side Kasaan Bay	306.0					
2002	POW Soda Bay	671.8	7.4	255.0	1.5		222.0
2002	Revilla Ketchikan Rd Area	244.0	2.3	103.0	1.9		
2003	Dall Island	2637.0	15.4	1029.0	5.0	460.0	
2003	Kupreanof Kake Area	3710.3	9.7	297.0	2.4	835.0	
2003	Long Island					360.5	
2003	POW Big Salt					695.0	
2003	POW Craig Rd Area	28.0					
2003	POW Hetta Inlet					602.0	
2003	POW Kasaan Peninsula	1252.5	11.5		0.2	38.0	
2003	POW Klawock Rd Area	2216.0	2.8				
2003	POW Natzuhini Bay	952.0	10.8	264.0	2.2	113.0	
2003	POW Soda Bay	1137.0	15.7	214.0	2.1		
2003	Revilla Ketchikan Rd Area	94.0	0.7		1.5		
2004	Dall Island	5189.3	31.7	100.0		119.0	
2004	Kosciusko Island	15.0	0.2				
2004	Kupreanof Kake Area	5056.0	9.5	72.5		1463.0	159.0
2004	Long Island					245.0	
2004	POW Big Salt					601.0	33.0
2004	POW Hetta Inlet					167.0	42.0
2004	POW Kasaan Peninsula	63.0		650.0		38.0	
2004	POW Klawock Rd Area	1082.0	0.4				
2004	POW Natzuhini Bay	3879.0	5.8	402.0	3.4	306.0	
2004	POW Nutkwa Inlet	1571.5					
2004	POW s/sw side Kasaan Bay	1326.0				1605.0	
2004	POW Soda Bay	5020.4	2.1	21.0			134.0
2004	POW Trocadero Bay	2388.0	15.8	542			
2004	Revilla Ketchikan Rd Area	4562.0	1.6	16.0			
2004	Wrangell Island Wrg Rd Area	336.0	2.3				
2005	Dall Island	751.0	9.9	658	0.9		
2005	Kupreanof Kake Area	4209.0		4710.5	5.0	216.0	110.0
2005	Long Island					366.0	
2005	POW Big Salt					271	80.0
2005	POW Hetta Inlet					95.0	
2005	POW Kasaan Peninsula	5398.0	1.5	1326			
2005	POW Klawock Rd Area	10.0					

Table E-4
Southern Southeast Alaska, Forest Practices Act – Detail Statistics

Yr Notified	Geographical Area	Acre Notified*	Road Notified	Renew Ac	Renew Rd	New PCT Ac	Rnwl PCT Ac
2005	POW Natzuhini Bay	2209.0		1807	0.6	369	
2005	POW Nutkwa Inlet	785.0		1571.5			
2005	POW s/sw side Kasaan Bay	4936.4	0.5			600.0	
2005	POW Soda Bay			1604.0			69.0
2005	POW Trocadero Bay	8473.2	7.1	638	5.1		
2005	Revilla Ketchikan Rd Area		1.3	2814			
2005	Revillagigedo Island	712.0	10.9				
2005	Wrangell Island Wrg Rd Area	250.0	2.5	332.0	2.3		
2006	Dall Island	12890.1	5	725.0	5.9		
2006	Kupreanof Kake Area	7761.2		5486	5.2	501.0	
2006	Long Island					377.5	
2006	Mitkof Petersburg Rd Area	2267.0	2.1				
2006	POW Big Salt	30.0				1563.0	
2006	POW Hetta Inlet	3473.0				1916	
2006	POW Kasaan Peninsula					178.0	
2006	POW Klawock Rd Area	16.0					
2006	POW Natzuhini Bay					694.0	
2006	POW Nutkwa Inlet	400.4	3.7				
2006	POW s/sw side Kasaan Bay					286.0	
2006	POW Trocadero Bay	2422.2		2545.4	2.1		
2006	Revilla Ketchikan Rd Area	2050.0	0.6				
2006	Revillagigedo Island	1025.0	10.1	859	4.8		
2006	Wrangell Island Wrg Rd Area			100.0	0.2		
2007	Dall Island	7988.1	7.6	2402.0	3.8		
2007	Kupreanof Kake Area					171.0	191.0
2007	Long Island	853.0	4.3			296.0	
2007	POW Big Salt	106.0				865	
2007	POW Craig Rd Area					39.0	
2007	POW Hetta Inlet					1109	320.0
2007	POW Kasaan Peninsula					362.0	174.0
2007	POW Klawock Rd Area					64.0	
2007	POW Natzuhini Bay					152.0	
2007	POW Nutkwa Inlet			400.4	3.7		
2007	POW Trocadero Bay	292.4	4.1	3039.4			
2007	Revilla Ketchikan Rd Area	14.0	0.5	1000	0.4		
2007	Revillagigedo Island	310.0	4.5	1055.0	4.4		
2007	Wrangell Island Wrg Rd Area	199.0	2.1				
Other Public Land (borough, city, university)							
2000	Revilla Ketchikan Rd Area	79.0	0.9	199.0			
2003	POW Thorne Bay Rd Area	58.0	0.8				
2003	Wrangell Island Wrg Rd Area	115.0	0.7				
2004	Wrangell Island Wrg Rd Area			110.0			

* Acres notified includes clearcut, partial cut, and salvage of previously cut cedar

Table E-5
Northern Southeast Alaska, Forest Practices Act – Detail Statistics

DPO ID	Date Received	Land Owner-Operator	Unit Number	Unit Acres	Area Name
NSE-001	1/16/2001	Mental Health	S17A	36	W. Icy Bay
NSE-001		Mental Health	S17B	58	W. Icy Bay
NSE-001	1/16/2001	Mental Health	S18	18	W. Icy Bay
NSE-002	1/12/2001	SOA/University of AK	43	24	W. Icy Bay
NSE-002	1/12/2001	SOA/University of AK	44	22	W. Icy Bay
NSE-002	1/12/2001	SOA/University of AK	45	21	W. Icy Bay
NSE-002	1/12/2001	SOA/University of AK	47	26	W. Icy Bay
NSE-002	1/12/2001	SOA/University of AK	48	21	W. Icy Bay
NSE-003	1/18/2001	SOA/University of AK	8B	9	W. Icy Bay
NSE-005	1/2/2001	Sealaska Timber	60	59	Hoonah-Eastport
NSE-005	1/2/2001	Sealaska Timber	107	13	Hoonah-Eastport
NSE-005	1/2/2001	Sealaska Timber	108	72	Hoonah-Eastport
NSE-005	1/2/2001	Sealaska Timber	110	111	Hoonah-Eastport
NSE-005	1/2/2001	Sealaska Timber	137	122	Hoonah-Eastport
NSE-005	1/2/2001	Sealaska Timber	126	22	Hoonah-Eastport
NSE-005	1/2/2001	Sealaska Timber	127	68	Hoonah-Eastport
NSE-005	1/2/2001	Sealaska Timber	128	45	Hoonah-Eastport
NSE-006	2/15/2001	Sealaska Timber	135	87	Hoonah-Eastport
NSE-007	3/23/2001	Mental Health	S15C	39	W. Icy Bay
NSE-007	3/23/2001	Mental Health	C18A	14	W. Icy Bay
NSE-007	3/23/2001	Mental Health	C18B	11	W. Icy Bay
NSE-007	3/23/2001	Mental Health	C18C	4	W. Icy Bay
NSE-007	3/23/2001	Mental Health	C18D	3	W. Icy Bay
NSE-007	3/23/2001	Mental Health	C18E	4	W. Icy Bay
NSE-007	3/23/2001	Mental Health	C18F	4	W. Icy Bay
NSE-007	3/23/2001	Mental Health	S20	28	W. Icy Bay
nse-009	4/5/2001	Mental Health	C5	66	W. Icy Bay
nse-009	4/5/2001	Mental Health		0	W. Icy Bay
NSE-010	6/8/2001	Mental Health	C11	137	W. Icy Bay
NSE-012	7/1/2001	Mental Health	C21B	16	W. Icy Bay
NSE-012	7/1/2001	Mental Health	S21A	5	W. Icy Bay
NSE-012	7/1/2001	Mental Health	S23A	27	W. Icy Bay
NSE-012	7/1/2001	Mental Health	S23B	25	W. Icy Bay
NSE-012	7/1/2001	Mental Health	S25	18	W. Icy Bay
NSE-014	8/29/2001	Mental Health	C25	8	W. Icy Bay
NSE-014	8/29/2001	Mental Health	S22A	22	W. Icy Bay
NSE-015	11/20/2001	Mental Health	C1A	4	W. Icy Bay
NSE-015	11/20/2001	Mental Health	C1B	12	W. Icy Bay
NSE-015	11/20/2001	Mental Health	C1C	50	W. Icy Bay
NSE-015	11/20/2001	Mental Health	C2	72	W. Icy Bay
NSE-015	11/20/2001	Mental Health	C25A	15	W. Icy Bay
NSE-016	10/30/2001	Mental Health	S3A	25	W. Icy Bay
NSE-016	10/30/2001	Mental Health	S3B	5	W. Icy Bay
NSE-016	10/30/2001	Mental Health	S5B	26	W. Icy Bay
NSE-016	10/30/2001	Mental Health	S12	14	W. Icy Bay

Table E-5
Northern Southeast Alaska, Forest Practices Act – Detail Statistics

DPO ID	Date Received	Land Owner-Operator	Unit Number	Unit Acres	Area Name
NSE-018	3/29/2002	Mental Health	C3	85	W. Icy Bay
NSE-018	3/29/2002	Mental Health	C20A	34	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	48A	22	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	310	86	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	311	105	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	312	145	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	314	125	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	314A	6	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	501	12	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	501A	3	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	502A	4	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	502B	6	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	502C	8	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	503	12	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	507	16	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	507	16	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	507A	12	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	509	69	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	510	51	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	601/602	260	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	603	76	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	604	66	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	605	130	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	606	14	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	607	46	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	608	67	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	609	99	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	701	19	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	702	130	W. Icy Bay
NSE-022	6/25/2001	SOA/University of AK	703	74	W. Icy Bay
NSE-13	7/22/2001	Mental Health	C23	0	W. Icy Bay
NSE-13	7/22/2001	Mental Health	C24	0	W. Icy Bay
NSE-13	7/22/2001	Mental Health	S21	0	W. Icy Bay
NSE-23	1/26/2002	SOA/University of AK	304	2	W. Icy Bay
NSE-23	1/26/2002	SOA/University of AK	305	36	W. Icy Bay
NSE-23	1/26/2002	SOA/University of AK	504	31	W. Icy Bay
NSE-23	1/26/2002	SOA/University of AK	505A	25	W. Icy Bay
NSE-23	1/26/2002	SOA/University of AK	505B	6	W. Icy Bay
NSE-23	1/26/2002	SOA/University of AK	505C	20	W. Icy Bay
NSE-23	1/26/2002	SOA/University of AK	506	6	W. Icy Bay
NSE-23	1/26/2002	SOA/University of AK	508	11	W. Icy Bay
NSE-24	4/5/2002	Sealaska Timber	8A	23	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	15	15	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	16	28	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	17A	31	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	31A	33	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	38A	17	Hoonah-Eastport

Table E-5
Northern Southeast Alaska, Forest Practices Act – Detail Statistics

DPO ID	Date Received	Land Owner-Operator	Unit Number	Unit Acres	Area Name
NSE-24	4/5/2002	Sealaska Timber	128A	33	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	113	103	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	129	26	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	134	69	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	136B	82	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	1	46	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	4	13	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	6	13	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	7B	13	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	8	76	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	10	18	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	10a	13	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	14	34	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	17B	14	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	18	11	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	19	42	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	20C	17	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	20D	13	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	26A	49	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	27	51	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	28	20	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	28A	7	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	29	22	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	31	23	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	33B	19	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	36B	83	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	37	30	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	38	8	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	50	21	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	51	26	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	52A	31	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	53	53	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	59C	32	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	85	42	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	96	11	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	97	32	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	136	48	Hoonah-Eastport
NSE-24	4/5/2002	Sealaska Timber	137	7	Hoonah-Eastport
NSE-25	7/15/2002	Sealaska Timber	8A	23	Hoonah-Eastport
NSE-25	7/15/2002	Sealaska Timber	38A	18	Hoonah-Eastport
NSE-26	9/29/2002	Sealaska Timber	108A	22	Hoonah-Eastport
NSE-26	9/29/2002	Sealaska Timber	109	23	Hoonah-Eastport
NSE-26	9/29/2002	Sealaska Timber	111	29	Hoonah-Eastport
NSE-26	9/29/2002	Sealaska Timber	112	56	Hoonah-Eastport
NSE-27	2/10/2003	Yak-Tat-Kwaan-Aloha	1	24	Yakutat
NSE-27	2/10/2003	Yak-Tat-Kwaan-Aloha	2	64	Yakutat
NSE-27	2/10/2003	Yak-Tat-Kwaan-Aloha	3	91	Yakutat

Table E-5
Northern Southeast Alaska, Forest Practices Act – Detail Statistics

DPO ID	Date Received	Land Owner-Operator	Unit Number	Unit Acres	Area Name
NSE-27	2/10/2003	Yak-Tat-Kwaan-Aloha	4	207	Yakutat
NSE-27	2/10/2003	Yak-Tat-Kwaan-Aloha	5	75	Yakutat
NSE-27	2/10/2003	Yak-Tat-Kwaan-Aloha	6	45	Yakutat
NSE-28	2/22/2003	Sealaska Timber	136B	21	Hoonah-Eastport
NSE-28	2/22/2003	Sealaska Timber	47	120	Hoonah-Eastport
NSE-28	2/22/2003	Sealaska Timber	115	82	Hoonah-Eastport
NSE-28	2/22/2003	Sealaska Timber	134	58	Hoonah-Eastport
NSE-28	2/22/2003	Sealaska Timber	114A	89	Hoonah-Eastport
NSE-28	2/22/2003	Sealaska Timber	36A	26	Hoonah-Eastport
NSE-28	2/22/2003	Sealaska Timber	33A	14	Hoonah-Eastport
NSE-28	2/22/2003	Sealaska Timber	26C	23	Hoonah-Eastport
NSE-28	2/22/2003	Sealaska Timber	114B	22	Hoonah-Eastport
NSE-29	5/8/2003	Sealaska Timber	195C	57	Hoonah-Eastport
NSE-29	5/8/2003	Sealaska Timber	162	60	Hoonah-Eastport
NSE-29	5/8/2003	Sealaska Timber	171	86	Hoonah-Eastport
NSE-29	5/8/2003	Sealaska Timber	169A	48	Hoonah-Eastport
NSE-29	5/8/2003	Sealaska Timber	168	48	Hoonah-Eastport
NSE-29	5/8/2003	Sealaska Timber	167B	89	Hoonah-Eastport
NSE-29	5/8/2003	Sealaska Timber	180	12	Hoonah-Eastport
NSE-29	5/8/2003	Sealaska Timber	180	23	Hoonah-Eastport
NSE-29	5/8/2003	Sealaska Timber	186	101	Hoonah-Eastport
nse-31	6/30/2003	Sealaska Timber	44A	19	Hoonah-Eastport
nse-31	6/30/2003	Sealaska Timber	47	119	Hoonah-Eastport
nse-31	6/30/2003	Sealaska Timber	49	45	Hoonah-Eastport
NSE-32	9/11/2003	Sealaska Timber	43B	22	Hoonah-Eastport
NSE-32	9/11/2003	Sealaska Timber	42A	39	Hoonah-Eastport
NSE-32	9/11/2003	Sealaska Timber	18	12	Hoonah-Eastport
NSE-32	9/11/2003	Sealaska Timber	17B	15	Hoonah-Eastport
NSE-33	3/11/2004	Huna Totem	EPSH 400	1752	Hoonah-Eastport
NSE-34	8/10/2004	Sealaska Timber	13	28	Hoonah-Eastport
NSE-34	8/10/2004	Sealaska Timber	131	83	Hoonah-Eastport
NSE-34	8/10/2004	Sealaska Timber	132	61	Hoonah-Eastport
NSE-35	8/10/2004	Huna Totem	172	45	Hoonah-Eastport
NSE-36	4/10/2005	Sealaska Timber	26A	30	Hoonah-Eastport
NSE-36	4/10/2005	Sealaska Timber	101A	17	Hoonah-Eastport
NSE-37	4/22/2005	Huna Totem	175	56	Hoonah-Eastport
NSE-37	4/22/2005	Huna Totem	178	77	Hoonah-Eastport
NSE-38	4/27/2005	Sealaska Timber	10	6	Hoonah-Eastport
NSE-38	4/27/2005	Sealaska Timber	16	18	Hoonah-Eastport
NSE-38	4/27/2005	Sealaska Timber	51A	28	Hoonah-Eastport
NSE-38	4/27/2005	Sealaska Timber	83A	15	Hoonah-Eastport
NSE-38	4/27/2005	Sealaska Timber	400	24	Hoonah-Eastport
NSE-39	8/5/2005	Sealaska Timber	16A	13	Hoonah-Eastport
NSE-40	5/18/2005	SOA/University of AK	704	60	W. Icy Bay
NSE-41	1/17/2007	SOA/University of AK	204	23	W. Icy Bay
NSE-41	1/17/2007	SOA/University of AK	205	17	W. Icy Bay
NSE-41	1/17/2007	SOA/University of AK	207	0	W. Icy Bay

Table E-5
Northern Southeast Alaska, Forest Practices Act – Detail Statistics

DPO ID	Date Received	Land Owner-Operator	Unit Number	Unit Acres	Area Name
NSE-43	8/15/2007	SOA/University of AK	203	33	W. Icy Bay
NSE-44	8/15/2007	Sealaska Timber	802	18	Hoonah-Eastport
NSE-44	8/15/2007	Sealaska Timber	37	5	Hoonah-Eastport
NSE-44	8/15/2007	Sealaska Timber	117A	9	Hoonah-Eastport
NSE-45	10/7/2007	Sealaska Timber	130	6	Hoonah-Eastport
NSE-45	10/7/2007	Sealaska Timber	808	5	Hoonah-Eastport

Table E-6
State timber sales sold

	Volume sold		
Year	North-Central	South-Central	Southeast
1983	5964	51985	54
1984	14735	4445	1907
1985	12182	4698	3298
1986	4450	2587	424
1987	9352	3081	7174
1988	16510	4513	6452
1989	13872.5	1990	5738
1990	14317.9	3398.8	18064.5
1991	9519	565	72.2
1992	20613	3306	186
1993	17208	1020	9065
1994	1569	5564	8903
1995	10752[1]	28332	4455
1996	18213[1]	9368	1109
FY97	15528	129	5942
FY98	13211	17754	14623
FY99	6836	2803	4797
FY00	6637	5774	8365
FY01	6064	1857	954
FY02	4207	1333	11340
FY03	4813	3779	4094
FY04	2708	957	8064
FY05	5594	4934	16003
FY06	12478	6638	10777
FY07	6420	30110	24437

[1] Converted from Mcf.
Note: data collection changed from calendar year (CY) to fiscal year (FY) with some overlap between 1996 and FY97.

Table E-7
FY 97 STATE TIMBER SALES SOLD - SOUTHEAST

AREA	SALE NAME	ACRES	SALE DATE	USE	VOL MBF
Ketchikan	Ronald Brown	6	7/22/1996	local	37
Ketchikan	Pat Richter	4	8/21/1996	local	43
Ketchikan	Ernie Eads	9	8/22/1996	local	34
Ketchikan	Last Chance Enterprises	5	1/13/1997	local	55
Ketchikan	Ernie Eads	1	2/3/1997	local	8
Ketchikan	Pat Richter	1	3/3/1997	local	4
Ketchikan	Warren Jones	2	3/7/1997	local	46
Ketchikan	Norman Canaday	5	3/18/1997	local	14
Ketchikan	Ralph Porter	1	5/26/1997	local	34
Ketchikan	Daryl Tinkness	1	6/16/1997	local	19
Ketchikan	Ernie Eads	9	6/9/1997	local	228
Ketchikan	Pete Smit	8	5/30/1997	local	54
SUBTOTAL	**12**	**52**			**576**
Haines	Pond View	22	10/14/1996	local	249
SUBTOTAL	**1**	**22**			**249**
Juneau	Shadow	45	7/26/1996	Export	1,455
Juneau	Corner	12	9/30/1996	local	141
Juneau	Blackheart	14	11/7/1996	local	425
Juneau	Nufie	79	2/11/1997	local	1,700
Juneau	Thumb Nail	45	2/11/1997	local	802
Juneau	Pt. Frederick #6	9	3/7/1997	Export	446
Juneau	Silas Triangle	6	6/30/1997	mixed	106
Juneau	Magazine Road	3	6/30/1997	Export	42
SUBTOTAL	**8**	**213**			**5,117**

Table E-8
STATE TIMBER SALES SOLD- FY 98 - SOUTHEAST

AREA	SALE NAME	ACRES	SALE DATE	USE	VOL MBF
KETCHIKAN	FLEENOR	5	7/25/1997	**local**	178
KETCHIKAN	SNEATHER	0	10/21/1997	**local**	7
KETCHIKAN	WHALE PASS ASSOC. I	0	11/3/1997	**local**	55
KETCHIKAN	WHALE PASS ASSOC. II	0	2/26/1998	**local**	67
KETCHIKAN	TINKESS	1	11/14/1997	**local**	5
KETCHIKAN	TRUMBLE	1	11/24/1997	**local**	1
KETCHIKAN	FLEENOR #2	8	3/6/1998	**local**	147
KETCHIKAN	GRAY	1	12/8/1997	**local**	2
KETCHIKAN	SMITH	3	PENDING	**local**	16
KETCHIKAN	EADS	2	5/12/1998	**local**	44
KETCHIKAN	HAMMAR	3	5/12/1998	**local**	21
KETCHIKAN	HOLLIS COMM. COUNCIL	0	5/12/1998	**local**	74
KETCHIKAN	KITKUN	160	6/29/1998	**local**	4,300
SUBTOTAL	**13**	**184**			**4,917**
NSE	THUNDER CREEK	565	7/15/1997	export	4,331
NSE	BUSTER BENSON	7	8/18/1997	**local**	80

Table E-8
STATE TIMBER SALES SOLD- FY 98 - SOUTHEAST

AREA	SALE NAME	ACRES	SALE DATE	USE	VOL MBF
NSE	HIGHLINE	8	9/2/1997	**local**	244
NSE	ALASKA POWER & TELE.	0	9/18/1997	**local**	6
NSE	FRED STRONG	4	10/9/1997	**local**	32
NSE	SCOTT ROSSMAN	5	5/8/1998	**local**	23
NSE	SCOTT ROSSMAN #2	2	5/28/1998	**local**	12
NSE	SCOTT ROSSMAN #3	2	6/15/1998	**local**	58
NSE	BANANA PT. SALVAGE	2	7/9/1997	**local**	40
NSE	ROY'S BREAKDOWN	41	7/23/1997	**local**	1,339
NSE	SILAS	14	7/23/1997	**local**	466
NSE	ROY SOKOL SALVAGE	1	7/29/1997	**local**	9
NSE	THUMBNAIL UNIT 3	2	9/12/1997	**local**	229
NSE	THUMBNAIL II	29	9/15/1997	**local**	607
NSE	MITKOF HWY ROW	1	11/21/1997	**local**	16
NSE	HEMLOCK SALVAGE	0	11/21/1997	**local**	9
NSE	SHADOW SALVAGE	0	11/24/1997	export	120
NSE	HERMIT CREEK	4	12/22/1997	**local**	102
NSE	PT. FREDERICK #6	0	*6/5/1998*	**local**	58
NSE	EASTERN PASSAGE I	83	2/23/1998	**local**	1,681
NSE	NUFIE II	19	6/9/1998	**local**	244
SUBTOTAL	**21**	**788**			**9,706**

Table E-9
STATE TIMBER SALES SOLD -- FY 99 COASTAL REGION

AREA	SALE NAME	ACRES	SALE DATE	MBF	USE
		SALES SOLD			
KETCHIKAN	Fleenor No. 3	6	07/27/98	125	Local
KETCHIKAN	Small #2	4	08/17/98	123	Local
KETCHIKAN	Small #3	3	09/28/98	68	Local
KETCHIKAN	Small #4	6	11/30/98	382	Local
KETCHIKAN	Small #5	4	11/30/98	308	Local
KETCHIKAN	Small #6	1	11/24/98	18	Local
KETCHIKAN	Small #7	3	12/11/98	80	Local
KETCHIKAN	Small #8	3	12/24/98	67.7	Local
KETCHIKAN	Small #9	0.1	03/26/99	10	Local
KETCHIKAN	Small #10	9.9	05/19/99	357	Local
KETCHIKAN	Small #11	4.7	06/01/99	150	Local
Subtotal	**11**	**44.7**		**1,688.7**	
NSE	Thumbnail III	74	09/21/98	1,613	Local
NSE	Eastern Passage I	52	06/01/99	1,429	Local
NSE	McCormack Creek Rd. Project ROW	0	08/03/98	37.25	Local
NSE	Del Mikkelsen	5	12/03/98	29	Local
Subtotal	**5**	**131**		**3,108**	

Table E-10
STATE TIMBER SALES SOLD -- FY 00 -- SOUTHEAST

AREA	SALE NAME	ACRES	SALE DATE	MBF	MCF	USE
KETCHIKAN	SE-959K	1	07/13/99	3		Local
KETCHIKAN	Coffman Cove	214	07/27/99	5,515		Local
KETCHIKAN	SE-960K	1	09/21/99	14		Local
KETCHIKAN	SE-962K	5	09/21/99	117		Local
KETCHIKAN	SE-1019K	1	03/13/00	12		Local
KETCHIKAN	SE-1021K	5	04/07/00	491		Local
KETCHIKAN	SE-970K	2	05/22/00	27		Local
KETCHIKAN	SE-971K	1	06/08/00	8		Local
KETCHIKAN	SE-1020K	1		34		Local
KETCHIKAN	SE-972K	5		468		Local
KETCHIKAN	SE-973K	8		257		Local
Subtotal	**11**	**244**		**6,945.9**		
NSE	Small #1, SE-474J	3	07/19/99	139		Local
NSE	Eastern Passage I, Unit 4	24	12/30/99	656		Local
NSE	Devils Elbow	2	07/19/99	24		Local
NSE	Porcupine Snow		12/22/99	41		Local
NSE	High Extension	8	02/01/00	49		Local
NSE	Porcupine Wings	24	03/28/00	419		Any
NSE	Porcupine Heights	5	04/05/00	38		Local
NSE	Roy's Favorite	3	06/02/00	53		Local
Subtotal	**8**	**69**		**1,419**		

Table E-II
STATE TIMBER SALES SOLD -- FY 01 SOUTHEAST

AREA	SALE NAME	ACRES	SALE DATE	MBF	PURCHASER	USE
SSE	SE-979-K	1	01/12/01	20	Jack Dupertuis	local
SSE	SE-983-K	2	03/14/01	28	Sealaska	export
SSE	SE-1020-K	2	10/16/00	34	Naukati Adventures	local
SSE	SE-976-K	7	10/03/00	391	Pat Richter	local
SSE	SE-980-K	0	12/08/00	10	Evergreen Timber	export
SSE	SE-981-K	2	12/08/00	30	Hummer Enterprises	local
SSE	SE-982-K	4	05/16/01	80	B&W Lumber	local
SSE	SE-984-K	0	05/17/01	10	Hummer Enterprises	local
Subtotal	**8**	**17**		**603**	**0**	**0**
NSE	Ski Hill	5	07/29/00	34	The Stump Co.	local
NSE	37Mile	6	04/10/01	104	The Stump Co.	local
NSE	Chilkat Lake	2	04/10/01	19	Bob Jensen	local
NSE	Knob 4	2	04/10/01	28	Tophat Logging	local
NSE	Birch Hill	1	04/30/01	9	Eager Beaver	local
NSE	Knob Extension	1	06/18/01	1	Sage Thomas	local
NSE	Knobs Backside	5	06/25/01	24	Carl Smith	local
NSE	Half Load	1	01/18/01	11	Hidden Valley	local
NSE	Knob 3 Extension	2	02/05/01	16	Green Diamond	local
NSE	Daisy	3	02/23/01	65	Hidden Valley	local
NSE	SE-741	1	02/26/01	11	Don Peterson	local
NSE	Three Peaks	2	03/12/01	20	Green Diamond	local
NSE	Knob ABC	2	03/21/01	9	Green Diamond	local
Subtotal	**13**	**33**		**351**	**0**	**0**

Table E-12
STATE TIMBER SALES -- FY 02 -- SOUTHEAST

AREA	SALE NAME	ACRES	SALE DATE	MBF	USE
SSE	Naukati West	70	04/29/02	2,685	V-A
SSE	East Pass #5	50	04/01/02	1,110	V-A
SSE	Tuxecan	134	04/15/02	4,018	V-A
SSE	Richter #2	4	07/09/01	187	V-A
SSE	Richter #3	3	02/08/02	90	V-A
SSE	Jones 1	0	09/18/01	13	V-A
SSE	Sunde 1	0	05/30/02	7	V-A
SSE	Clark Bay Group	3	11/02/01	26	V-A
SSE	Gildersleeve1	1	09/17/01	24	V-A
SSE	Thorne Bay #1	80	09/14/01	2,539	V-A
Subtotal	**10**	**345**		**10,699**	**0**
NSE	37.5 Mile Fall	4	10/25/01	51	V-A
NSE	37-Mile Addition	4	07/24/01	28	V-A
NSE	Daisy Salvage	1	10/16/01	31	V-A
NSE	Birch Road A	2	07/13/01	17	V-A
NSE	Birch Pole	1	01/08/02	3	V-A
NSE	Backside 2	3	07/10/01	19	V-A
NSE	Daisy 2	7	05/24/02	117	V-A
NSE	Birch road	2	07/06/01	10	V-A
NSE	Daisy Dead	2	06/06/02	9	V-A
NSE	LS Mountain	10	07/09/01	357	V-A
Subtotal	**10**	**36**		**641**	

Table E-13
STATE TIMBER SALES SOLD -- FY 03 -- SOUTHEAST

AREA	SALE NAME	ACRES	SALE DATE	MBF	USE
SSE	Yatuk Creek #1	4	10/15/02	179	VA
SSE	Yatuk Creek #2	5	10/15/02	228	VA
SSE	Yatuk Creek #3	2	10/15/02	80	VA
SSE	Yatuk Creek #4	4	10/15/02	41	VA
SSE	Yatuk Creek #5	6	10/15/02	205	VA
SSE	Yatuk Creek #6	4	10/15/02	112	VA
SSE	Yatuk Creek #7	4	10/15/02	308	VA
SSE	Yatuk Creek #8	3	10/15/02	151	VA
SSE	Yatuk Creek #9	64	01/06/03	2,064	VA
SSE	Frederick Rd. #1	4	10/14/02	125	VA
SSE	Thorne Bay Burn #4	2	11/01/02	53	VA
SSE	Thorne Bay Burn #5	2	11/01/02	40	VA
SSE	Sandy Road #1	6	11/01/02	87	VA
SSE	Sunde #2	<1	05/06/03	10	VA
Subtotal	**14**	**110**		**3,683**	
NSE	Starigavin ROW NSE-1026	1	09/27/02	6	VA
NSE	Tidy Stump SE-759	1	08/23/02	25	VA
NSE	Farm Wood	3	01/17/03	50	VA
NSE	Jensen Skid Road	3	02/18/03	19	VA
NSE	Hemlock Switch	5	02/10/03	67	VA
NSE	Spruce Addition	1	02/04/03	10	VA
NSE	20 Mile Xing	2	02/26/03	13	VA
NSE	Half Dozen	1	02/28/03	4	VA

Table E-13
STATE TIMBER SALES SOLD -- FY 03 -- SOUTHEAST

NSE	Wolf Pack	1	03/10/03	13	VA
NSE	Chilkat Lake Road	2	03/27/03	5	VA
NSE	Spruce Log	2	01/03/03	10	VA
NSE	Hemlock Home	1	01/13/00	13	VA
NSE	Porcupine Clean	1	11/04/02	11	VA
NSE	Farm Birch	2	12/17/02	6	VA
NSE	Wolf Skid	2	04/04/03	4	VA
NSE	Spruce Tap	2	05/05/03	7	VA
NSE	Hemlock Corner	2	05/05/03	41	VA
NSE	37 Mile Patch	1	05/19/03	10	VA
NSE	38 Mile Draw	9	05/21/03	84	VA
NSE	Daisy Cleanup	3	06/13/03	64	VA
Subtotal	**20**	**45**		**462**	

Table E-14
STATE TIMBER SALES SOLD -- FY 04 -- SOUTHEAST

AREA	SALE NAME	ACRES	SALE DATE	MBF	USE
SSE	Boy Scout	19	08/21/03	990.18	local
SSE	Intertie ROW	n/a	07/21/03	172.00	local
SSE	Coffman Cove R	1	08/18/03	40.40	local
SSE	Kasaan 1	149	10/21/03	3,238.00	local
SSE	East Naukati	135	05/06/04	3,164.00	local
SSE	Thorne Bay ROW	1	12/12/03	42.43	export
Subtotal	**6**	**305**		**7,647.01**	
NSE	Deats 1-N. Douglas	1	03/14/04	1.00	local
NSE	Little Salmon Mt.	8	10/03/03	357.00	local
NSE	38-mile Draw 5	1	10/02/03	10.00	local
NSE	Spruce Rose	1	07/08/04	11.00	local
NSE	Big Hemlock	2	07/23/03	34.00	local
NSE	Boulder Spruce	3	08/10/03	52.00	local
NSE	Boulder Spruce 2	10	10/30/03	24.00	local
NSE	38 Mile Pocket	1	11/25/03	33.00	local
NSE	Stretch Time	2	12/10/03	29.00	local
NSE	Ice Road	2	02/06/04	28.00	local
NSE	Boulder 6 x 6	1	05/03/04	21.00	local
NSE	Stretch Melt	2	06/10/04	31.00	local
NSE	Nataga Skid	3	06/10/04	5.24	local
NSE	Stretch	6	11/28/03	53.00	local
NSE	38 Mile Extension	1	12/09/03	22.00	local
Subtotal	**15**	**44**		**711.24**	

Table E-15
STATE TIMBER SALES SOLD -- FY 05 -- SOUTHEAST

AREA	SALE NAME	ACRES	SALE DATE	MBF	USE
SSE	2058 Road 1/Jones #2	3	07/09/04	36	local
SSE	2058 Road 2/Jones #3	2	07/09/04	28	local
SSE	2058 Road 4/Jones #1	2	07/09/04	19	local
SSE	2058 Road 5/Thorne Bay WP	6	07/27/04	107	local
SSE	2058 Road 6/Thorne Bay WP	3	07/21/04	65	local
SSE	Sandy Road 2	20	08/20/04	419	local
SSE	Coffman Cove ROW #2	1	08/23/04	8	local
SSE	Thorne Bay 2	130	10/30/04	4130	local
SSE	Control Lake 1-mid	112	11/15/04	3627	local
SSE	Shady Tie-in	40	11/29/2004	987	local
SSE	Kasaan 6	6	11/17/04	179	local
SSE	Control Lake 2	5	12/03/04	121	local
SSE	Control L. 3	8	12/03/04	189	local
SSE	Control L. 4	17	12/09/04	491	local
SSE	Kasaan 2	108	12/17/04	4028	local
SSE	Mt. Point #1	3	05/12/05	149	export
SSE	Choker Setter Cir.	1	06/28/05	23	local
Subtotal	**17**	**466**		**14,606**	
NSE	Boulder Load	1	7/6/2004	8	local
NSE	Boulder Six X Six 2	1	7/12/2004	8	local
NSE	Alder Rerun	2	7/23/2004	27	local
NSE	Alder Rerun 2	2	9/1/2004	41	local
NSE	Nataga Skid 2	1	8/12/2004	17	local
NSE	Alder III	2	9/17/2004	59	local
NSE	Porcupine Mining	1	9/10/2004	20	local
NSE	Porcupine Mining II	1	9/10/2004	23	local
NSE	Klehini U14 Corner	2	12/11/2004	32	local
NSE	Porcupine Mining III	1	10/15/2004	13	local
NSE	Takshanuk Trail	3	11/7/2004	14	local
NSE	37 Mile Ridge	2	11/11/2004	15	local
NSE	Porcupine Low Road	1	11/12/2004	10	local
NSE	Battleship Island	1	12/12/04	2	local
NSE	West Herman 2	9	1/3/2005	185	local
NSE	37 Mile Bowl	2	1/4/2005	27	local
NSE	37 Mile Bowl 2	1	1/24/2005	38	local
NSE	Purlin	1	02/16/05	1	local
NSE	Pondside	2	02/28/05	31	local
NSE	West Draw	2	03/14/05	21	local
NSE	West Herman 1	23	03/01/05	594	local
NSE	West Draw #2	1	04/01/05	21	local
NSE	Knobs Rerun	2	05/21/05	49	local
NSE	Fabrizio Mining	6	05/27/05	82	local
NSE	Birch Reload	1	05/18/05	6	local
NSE	Nataga Sky	1	06/10/05	22	local
NSE	Dunit Bench	2	06/20/05	31	local
Subtotal	**27**	**74**		**1,397**	

Table E-16
STATE TIMBER SALES SOLD -- FY 06 -- SOUTHEAST

AREA	SALE NAME	ACRES	SALE DATE	MBF	USE
SSE	2058 Rd 8 small/Gutchi Creek #2	5	08/02/05	108	local
SSE	SSE 1230/2058 Rd 8 mid	18	10/01/05	588	local
SSE	Eastern Passage units 6-12	395	11/01/05	9110	local
SSE	Steep Drive	1	10/19/05	20	local
SSE	South Thorne Arm #1	0	10/01/05	2	local
SSE	Leask Lake Sort Yard	5	09/22/05	60	export
SSE	Kasaan 6	6	3/28/2006	179	local
Subtotal	**7**	**430**		**10,067**	
NSE	Tatshunak Trail	1	8/2/2005	5	local
NSE	Knobs B-C Timber	1	7/25/2005	16	local
NSE	Nataga Stretch	18	7/25/2005	173	local
NSE	Glacier Salvage	10	10/1/2005	100	local
NSE	Spruce Corner	1	10/3/2005	27	local
NSE	KB West Spur 1	10	10/10/2005	144	local
NSE	1424 Hemlock Ridge	1	12/29/2005	46	local
NSE	1425 Porcupine Salvage	3	1/6/2006	25	local
NSE	1426 Billy Goat	3	1/6/2006	24	local
NSE	1427 Farm Special	5	2/1/2006	38	local
NSE	1428 Farm Spur 2	3	03/15/06	37	local
NSE	1429 Billy Goat 2	3	04/11/06	55	local
NSE	Boulder Firewood	1	04/11/06	10	local
NSE	Porcupine Firewood	2	06/26/06	10	local
Subtotal	**14**	**62**		**710**	

Table E-17
STATE TIMBER SALES SOLD -- FY 07 -- SOUTHEAST

AREA	SALE NAME	ACRES	SALE DATE	MBF	USE
SSE	Bostwick #1	362	11/29/06	12687	local
SSE	2058 Road Small	6	07/10/06	182	local
SSE	2058 Road Small	4	07/10/06	98	local
SSE	Control Lake Fir	1	08/25/06	0	local
SSE	Leask Lake Aide	1	08/25/06	19	research
SSE	South Thorne Bay	128	07/02/06	3330	local
SSE	D-1 #1	1	04/02/07	7	export
SSE	20 Road	26	05/29/07	5145	local
SSE	Whipple Creek	26	04/02/07	2334	export
SSE	Bostwick Trail Lo	0	6/20/2007	13	local
Subtotal	**10**	**555**		**23,815**	
NSE	KB2	1	7/28/2006	17	local
NSE	Cabin Log	4	8/10/2006	41	local
NSE	Spur Road	1	8/10/2006	12	local
NSE	West Herman 3	4	8/25/2006	105	local
NSE	Porcupine Spruce	3	9/12/2006	132	local
NSE	Hemlock Spruce	3	9/12/2006	55	local
NSE	KB3	6	10/26/2006	42	local
NSE	Winds	2	11/2/2006	119	local
NSE	Porucpine Road	1	11/7/2006	5	local
NSE	Warm Springs	5	10/01/06	1	local
NSE	Hidden	2	01/03/07	16	local
NSE	35 Mile Snow Co	10	04/09/07	9	local
NSE	Sunlight Salvage	2	05/11/07	45	local
NSE	Ski Hill	3	06/05/07	23	local
Subtotal	**14**	**47**		**621.9**	

APPENDIX F
BIOLOGICAL ASSESSMENT

Appendix F

Biological Assessment

CONTENTS

LIST OF TABLES

Appendix F
Biological Assessment

Introduction

Under Section 7 of the Endangered Species Act (ESA), federal agencies are required to ensure that actions are not likely to jeopardize the continued existence of a listed species. This is done in a report called a "Biological Assessment." The effects analysis for threatened and endangered (T&E) species is required to address the direct and indirect effects of the action(s) on T&E species and their critical habitat (50 Code of Federal Regulations [CFR] 402.02). This documentation complies with Section 7 of the ESA which requires all federal agencies, in consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), to ensure that their actions are not likely to jeopardize the continued existence of T&E species or adversely modify their habitat. It updates previous Biological Assessments for the Tongass Plan Revision dated October 1996 (previous versions were also completed in August 1990 and April 1992).

This biological assessment complies with the Forest Service Manual (FSM) 2672.4 and documents the potential direct and indirect effects of the proposed alternatives (including the Proposed Action) and the cumulative effects of past, present, and reasonably foreseeable actions within the project area or adjacent lands on the critical habitats and viability of any federally listed or USDA Forest Service sensitive listed species. Species considered in this assessment include any species listed as threatened, endangered, proposed, or candidate by USFWS or NMFS.

Six wildlife species and one plant species under the jurisdiction of USFWS are found (or were once found) in Alaska: Kittlitz's murrelet (*Brachyramphus brevirostris*), the recently listed northern sea otter (*Enhydra lutris kenyoni*), short-tailed albatross (*Phoebastria albatrus*), Eskimo curlew (*Numenius borealis*), spectacled eider (*Somateria fischeri*), Alaska breeding population of Steller's eider (*Polysticta stelleri*), and Aleutian shield fern (*Polystichum aleuticum*). Except for the Kittlitz's murrelet, which is a candidate for listing under ESA, none of these species is found in Southeast Alaska, and will not be discussed further in this biological assessment.

Additionally, a number of marine threatened and endangered species fall under the jurisdiction of NMFS. These species are at least occasionally, or historically have been, found in Southeast Alaska. They include the leatherback sea turtle (*Dermochelys coriacea*), eastern population of Steller sea lion (*Eumetopias jubatus*), small numbers of the western population of Steller sea lion (*E. jubatus*), fin whale (*Balaenoptera physalus*), northern right whale (*Eubalaena japonica*), blue whale (*B. musculus*), and humpback whale (*Megaptera novaeangliae*). In addition to the above listed species, the Cook Inlet beluga whale Distinct Population Segment (DPS) has been proposed for listing as endangered. Furthermore, one sockeye salmon (*Onchorynchus nerka*), six chinook salmon (*O. tshawytscha*), one chum salmon (*O. keta*), and six steelhead trout (*O. mykiss*) evolutionarily significant units (ESUs)/DPSs are currently listed under ESA and are known to seasonally inhabit the marine waters of Southeast Alaska (Table F-1). However, of all these species, the Steller sea lion and humpback whale are known to occur in Southeast Alaska, while 14 of the 28 listed salmon and steelhead trout stocks shown in Table F-1 occur in Southeast Alaska's marine waters.

This combined assessment addresses 12 threatened species, 5 endangered species, and 1 candidate (Table F-1)[1]. These are the only T&E listed species addressed further in this assessment. The listed species covered are divided into two sections: those under the jurisdiction of USFWS (Kittlitz's murrelet), and those under the jurisdiction of NMFS (the remaining 17 species).

[1] Note that the eastern stock of the Steller sea lion is listed as threatened, and the western stock is listed as endangered. As a result, Steller sea lion is included in this count as a threatened species and an endangered species.

Table F-1
Threatened and Endangered Species Listed as occurring on or adjacent to the Tongass National Forest from USFWS and NMFS.

Species/Stock	ESU/DPS Designation [1/]	ESA Status	Likely Ranging into Alaskan Waters? [2/]
Under Jurisdiction of FWS			
Birds			
Kittlitz's murrelet *Brachyramphus brevirostris*	N/A	***Candidate***	Yes
Under Jurisdiction of NMFS			
Marine Mammals			
Humpback whale (*Megaptera novaeangliae)*	N/A	***Endangered***	Yes
Steller sea lion (*Eumetopias jubatus)*	N/A	***Threatened/ Endangered*** [3/]	Yes
Fish			
Sockeye Salmon (*Oncorhynchus nerka*)	Snake River	***Endangered***	Yes
	Ozette Lake	***Threatened***	No
Chinook Salmon (*O. tshawytscha*)	Sacramento River Winter-run	***Endangered***	No
	Upper Columbia River Spring-run	***Endangered***	Yes
	Snake River Spring/Summer-run	***Threatened***	Yes
	Snake River Fall-run	***Threatened***	Yes
	Puget Sound	***Threatened***	Yes
	Lower Columbia River	***Threatened***	Yes
	Upper Willamette River	***Threatened***	Yes
	Central Valley Spring-run	***Threatened***	No
	California Coastal	***Threatened***	No
Coho Salmon (*O. kisutch*)	Central California Coast	***Endangered***	No
	Southern Oregon/Northern California	***Threatened***	No
	Lower Columbia River	***Threatened***	No
Chum Salmon (*O. keta*)	Hood Canal Summer-run	***Threatened***	No
	Columbia River	***Threatened***	Yes
Steelhead (*O. mykiss*	Southern California	***Endangered***	No
	Central California Coast	***Endangered***	No
	South Central California Coast	***Threatened***	No
	Snake River Basin	***Threatened***	Yes
	Lower Columbia River	***Threatened***	Yes
	Upper Columbia River	***Endangered***	Yes
	California Central Valley	***Threatened***	No
	Upper Willamette River	***Threatened***	Yes
	Middle Columbia River	***Threatened***	Yes
	Northern California	***Threatened***	No[4/]
	Oregon Coast	***Threatened***	No[4/]
	Puget Sound	***Threatened***	Yes[4/]

1/ NMFS defines "species" under the ESA to include evolutionarily significant units (ESUs) for salmon and distinct population segments (DPSs) for steelhead.
2/ Distribution from NMFS 2003.
3/ The eastern stock of the Steller sea lion is listed as threatened, and the western stock is listed as endangered.
4/ DPS that were listed since 2004. Alaska distribution assumed.

Section 1. Biological Assessment for Kittlitz's murrelet for the Tongass Forest Plan Adjustment

November 2007

This section addresses the potential direct and indirect effects of the proposed alternatives on threatened, endangered, proposed, or candidate species managed by the USFWS pursuant to Section 7 consultation requirements of the ESA. This Biological Assessment updates a previous Biological Assessment for the Tongass Plan Revision (dated October 1996). This update includes these changes to the previous Biological Assessment:

- The USFWS published a final rule in the Federal Register (USFWS, 1999) delisting the Peregrine Falcon from the Threatened species list. This species is listed as Forest Service Sensitive.
- The Kittlitz's murrelet was officially designated a candidate species (warranted, but precluded) on May 4, 2004.

I. Identification of Endangered, Threatened and Candidate Species and/or Critical Habitats for Such Species within the Project Area.

On May 9, 2001, the Secretary of the Interior was petitioned to list the Kittlitz's murrelet (*Brachyramphus brevirostris*) as endangered with concurrent designation of critical habitat under the ESA. Petitioners cited dramatic reductions in population size over the past decade and declining habitat quality as reasons for the requested listing. On May 4, 2004, the Kittlitz's murrelet was designated a candidate species.

Common Name	Scientific Name	ESA Status
Kittlitz's murrelet	*Brachyramphus brevirostris*	Candidate

II. Overview of Species Distributions, Populations and Habitats.

The Kittlitz's murrelet is closely associated with glacial habitats along the Alaska mainland coast. Breeding sites are usually chosen in the vicinity of glaciers and cirques in high elevation alpine areas, with little or no vegetative cover (Van Vliet 1993). When present, vegetation is primarily composed of lichens and mosses (Day et al. 1983). The species nests a short distance below the peak or ridge on coastal cliffs, barren ground, rock ledges, and talus above timberline in coastal mountains, generally near glaciers 0.2 to 47 miles inland (Day et al. 1983). The remote and solitary nesting habits lead to extreme difficulty in finding nests. Non-breeding or off-duty breeders spend the summer in inshore areas, especially along glaciated coasts.

The Kittlitz's murrelet is one of the rarest seabirds in North America. The only American population occurs in Alaskan waters from Point Lay south to northern Southeast Alaska (Endicott and Tracey Arm). The largest breeding populations are believed to be in Glacier Bay National Park and Preserve, Prince William Sound, Kenai Fjords, and Icy Bay (Kendall and Agler 1998). According to the petition, the southern boundary of the breeding range is LeConte Bay on the Tongass National Forest. Latest worldwide population estimates range from 9,500 to 26,500 birds. The best information available from the USFWS indicates that Prince William Sound populations have declined by 84 percent since 1984, Kenai Fjords area by 83 percent since 1976, Malaspina Forelands by 38 percent and perhaps as much as 75 percent between 1992 and 2002, and Glacier Bay by 60 percent between 1990 and 1999. Speculated causes for decline include oil pollution, glacial recession, gill-net mortality, and availability of preferred forage fish (Kuletz et al. 2003, Piatt and Anderson 1996, van Vliet and McAllister 1994). Effects of these factors include increased adult and juvenile mortality and low recruitment. Human-caused mortality includes gillnet fisheries and oil spills like that from the Exxon Valdez or smaller tourism and fishing boats. Increased disturbance from helicopter tours and cruise ships may also be a factor.

III. Assessment of Effects on the Populations or Habitats of the Species In Relation to Proposed Actions of the Tongass Forest Plan Adjustment.

Due to the Kittlitz's murrelet's association with glacial habitat, this species occupies areas outside of where timber harvest and associated activities have occurred or are likely to occur. Major threats to this species are global warming, which is correlated with a loss of suitable habitat (glacial melt) and reduction in prey availability due to warming sea temperatures. Human activity in the marine environment, particularly vessel traffic and fishing operations, are additional threats to this species. There is no indication that any Forest Service management activity is affecting the Kittlitz's murrelet (USDA Forest Service 2004). Consequently, implementing any of the alternatives will not directly or indirectly affect the Kittlitz's murrelet.

Forest-wide standards and guidelines have been developed for protecting seabird rookeries and waterfowl concentration areas (Attachment 1). Adverse effects on Kittlitz's murrelet populations or their habitats are not anticipated with any Forest management activities.

Relationship with other Agencies and Plans

The USFWS has responsibility for the Kittlitz's murrelet. Recovery Plans have not been developed for this species. No critical habitat has been designated in Southeast Alaska to date.

Determination for Kittlitz's Murrelet

Based upon this analysis, the Adjustment of the Tongass National Forest Land Management Plan *will not likely jeopardize the continued existence of Kittlitz's murrelet, or adversely modify proposed critical habitat (if it were to be proposed).*

In addition, formal and informal consultation procedures (as directed by the ESA, as amended, and 50 CFR 17.7, and FSM 2670) are used with the USFWS on all projects within areas that may be used by Kittlitz's murrelet. Forest-wide standards and guidelines for threatened and endangered species (Chapter 4 - Wildlife) direct all projects to follow requirements of the ESA and Forest Service Policy (FSM 2670).

Documentation of Correspondence with other Agencies

Consultation with USFWS occurred throughout the 1997 Forest Plan Revision process and was initiated by the Forest Service in September 1987 with written letters requesting a list of threatened, endangered, proposed, and candidate wildlife species for the Tongass National Forest. At that time, the determination was that the American peregrine falcon was the only listed species that could occur on the Tongass and the evaluation of effects in the Biological Assessment indicated that populations of peregrine falcons would not likely be adversely affected as a result of implementation of the decision. The USFWS concurred with this determination in October 1996. The peregrine falcon was delisted in 1999 and, therefore, not assessed further in this updated Biological Assessment.

For the preparation of this update to the Biological Assessment, current species lists were obtained on the USFWS website accessed most recently in November 2007. The Kittlitz's murrelet was officially designated a candidate species (warranted, but precluded) on May 4, 2004 and therefore is automatically listed as Forest Service Sensitive. In April 2006, the Forest Service hosted an interagency Conservation Strategy Review workshop in Ketchikan, Alaska, which brought together scientists, technical experts, and land managers with expertise in conservation biology and natural resource management from the USFWS, the Alaska Department of Fish and Game (ADF&G), and the Pacific Northwest and Pacific Southwest Research Stations. The workshop provided a forum for the presentation and discussion of relevant scientific information gained since 1997 to be used to inform forest planning decisions. This information has been incorporated into the Forest Plan Amendment EIS and this biological assessment.

Informal consultation was initiated by the Forest Service with the USFWS through a phone conversation on November 21, 2007 (log number 71440-2008-SL-0010) regarding Kittlitz's murrelet. The USFWS concurred that formal consultation was not required.

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Section 2. Biological Assessment for the Endangered Humpback Whale, Endangered Western and Threatened Eastern Steller Sea Lion Populations, and Listed Pacific Salmon and Steelhead for the Tongass National Forest Plan Adjustment

November 2007

This section addresses the potential direct and indirect effects of the proposed alternatives on federally-listed species managed by NMFS. This Biological Assessment updates a previous Biological Assessment (dated October 1996,) that was prepared for endangered whales and the threatened Steller sea lion for the Tongass Forest Plan Revision process. NMFS concurred with the Forest Service finding in that Biological Assessment that the proposed revised Tongass Land Management Plan was not likely to adversely affect listed species under the jurisdiction of NMFS. This update includes the following changes:

- Consideration of the endangered western population of Steller sea lion as likely to occur within the coastal waters possibly affected by the proposed action;
- Consideration of 11 additional species of Pacific salmon that were listed since the previous update and may occur within the project area.

I. Identification of Endangered and Threatened Species and/or Critical Habitats for Such Species Within the Project Area.

The following marine mammals and salmon or steelhead stocks under the jurisdiction of NMFS have been identified as possibly occurring within the affected project area and are considered in this assessment.

<u>Marine Mammals</u>
Humpback whale—Endangered
Steller Sea Lion—Threatened: eastern population, Endangered: western population

<u>Fish</u>
Snake River Sockeye salmon—Endangered
Snake River Spring/Summer-run Chinook salmon—Threatened
Snake River Fall-run Chinook salmon—Threatened
Upper Columbia River Spring-run Chinook salmon—Endangered
Lower Columbia River Chinook salmon—Threatened
Upper Willamette River Chinook salmon—Threatened
Puget Sound-run Chinook salmon—Threatened
Columbia River Chum salmon—Threatened
Snake River Basin Steelhead—Threatened
Lower Columbia River Steelhead—Threatened
Middle Columbia River Steelhead—Threatened
Upper Columbia River Steelhead—Endangered
Upper Willamette River Steelhead—Threatened
Puget Sound Steelhead—Threatened

NMFS completed a final recovery plan for the humpback whale in 1991 and for the Steller sea lion in 1992.

There has been no critical habitat officially designated for the whales at this time in Southeast Alaska.

Critical habitat was designated for the Steller sea lion by NMFS in 1993 and represents areas considered essential for the continued survival and recovery of this species (NMFS 1993). The eastern population of Steller sea lion was listed as threatened on November 26, 1990 (55 CFR 40204) and the western population was listed as Endangered on May 5, 1997 (62 CFR 30772). Adult Steller sea lions congregate at rookeries for breeding and pupping. Rookeries are generally located on relatively remote islands, often in exposed areas that are not easily accessed by humans or mammalian predators. These rookeries, as well as haul-outs, have been officially designated as critical habitat in Southeast Alaska (NMFS 2001). NMFS' definition of critical habitat for Southeast Alaska includes a "terrestrial zone, aquatic zone, and an air zone, that extend 3,000 feet landward, seaward, and above, respectively, for each major rookery and major haul-out in Southeast Alaska." Critical habitat provides notice to federal agencies that a listed species is dependent on these areas for its continued existence and that any federal action that may affect these areas is subject to the consultation requirements of Section 7 of the ESA. To date, 3 major rookeries and 11 major haul-outs have been identified in Southeast Alaska (Table F-2).

Table F-2
Major Steller Sea Lion Rookery and Haul-out Habitats in Southeast Alaska

Name	Rookery	Haul-out
Forester Island	X	
Hazy Island	X	
White Sisters	X	
Benjamin Island		X
Biali Rock	X	X
Biorka Rock		X
Cape Addington		X
Cape Cross		X
Cape Ommaney		X
Coronation Island		X
Gran Point		X
Lull Point		X
Sunset Island		X
Timbered Island		X

Source: 50 CFR 226.202, pages 183, 200-203

No ESA-listed stocks of salmon or steelhead originate in Alaskan streams. However many species and stocks are listed that originated from freshwater habitats in Washington, Idaho, Oregon and California (Table F-1). Some of these listed species migrate into marine waters off the coast of Alaska. While distribution of these stocks is primarily in outer coastal waters some are occasionally present in the inner waters of Southeast Alaska and they may feed on prey resources originating within marine and estuarine waters of the Tongass National Forest.

II. Overview of Species Distributions and Populations.

The following summaries for humpback whale, Steller sea lion, and salmonids were abstracted and compiled from information found in the Alaska Marine Mammal Stock Assessments, 2006 (Angliss and Lodge 2007), Glacier Bay Biological Opinion (NMFS 2003a), published scientific literature, and unpublished reports.

Humpback whales were listed as endangered under the ESA in 1973 due to reduced population size that resulted from significant commercial whaling harvest. Currently, no critical habitat has been designated for the humpback whale.

Due to dramatic declines in total population numbers over approximately a 30 year period, the Steller sea lion was listed as threatened under the ESA (55 CFR 40204). In 1997, the Steller sea lion population was split into two separate populations (western and eastern populations) based on demographic and genetic differences (Bickham et al. 1996, 62 CFR 307772).

A total of 28 listed ESU/DPSs of salmon and steelhead occur in the Northeast Pacific (Table F-1). Alhough none of the listed stocks originate from Alaskan streams, 14 could potentially be present in Alaskan waters during some period of their marine life stage.

Humpback Whale

Humpback whales (*Megaptera novaeangliae*) are currently listed as endangered under the ESA, and have been protected since 1965. From the late 1800s through the early 1900s, they were extensively commercially hunted, and their current worldwide population is estimated to be only 8 percent of their historical numbers. Recent population estimates, however, show signs of recovery (Calambokidis et al. 1997, NMFS 2002a).

Humpback whales generally migrate between temperate and tropical waters in the winter and spring where they mate and calve, and cooler northern coastal waters where they feed. Feeding occurs near the highly productive fjords of the Southeastern Alaskan panhandle and Prince William Sound, from approximately May through December, although some individuals can be seen every month of the year (Calkins 1986). Peak numbers of whales are usually found in nearshore waters during late August and September, but substantial numbers usually remain until early winter. Humpbacks summering in Southeast Alaska have been linked to three wintering areas: the coastal waters along Baja California and mainland Mexico, the main islands of Hawaii, and the islands south of Japan (NMFS 1991). Those whales that feed in Southeast Alaska and migrate to Hawaii are referred to as the Central North Pacific stock (NMFS 2002a).

The local distribution of humpbacks in Southeastern Alaska appears to be correlated with the density and seasonal availability of prey, particularly herring (*Clupea harengus*) and euphausiids, and adults consume up to 3,000 pounds a day outside the breeding season. Important feeding areas include Glacier Bay and adjacent portions of Icy Strait, Stephens Passage/Frederick Sound, Seymour Canal and Sitka Sound. Glacier Bay and Icy Strait appear to be an important feeding area early in the season, when whales prey heavily on herring and other small, schooling fishes. Frederick Sound is important later in summer, when whales feed on swarming euphausiids. During autumn and early winter, humpbacks move out of the Sound to areas where herring are abundant, particularly Seymour Canal. Other areas of Southeastern Alaska may also be important for humpbacks and need to be evaluated. These include Cape Fairweather, Lynn Canal, Sumner Strait, Dixon Entrance, the west coast of Prince of Wales Island, and offshore banks such as the Fairweather Grounds.

The Central North Pacific stock of humpback whales was estimated to number 4,005 in 1993 (+/- 746, 95 percent confidence interval) (Calambokidis et al. 1997). A 1997 Forest Service estimate of the Southeast Alaska humpback whale feeding aggregation was 300 to 500 animals (USDA Forest Service 1997) during summer and fall, although a more recent estimate is 961 animals (+/- 226, 95 percent confidence interval) (Straley et al. 2002). The population rate of increase was estimated at 7 percent for Pacific humpback whales during 1993–2000 (Mobley et al. 2001), which may be near the species maximum. They are regularly sighted in the Inside Passage and coastal waters of the Southeastern Alaska panhandle from Yakutat Bay south to Queen Charlotte Sound (USDA Forest Service 1997).

Because the humpback inhabits shallow coastal areas, it is increasingly exposed to human activity. Consequently, these whales may be more susceptible to confrontational disturbance, displacement, and loss of habitat from environmental degradation than some other whale species. Specifically, the greatest threats to humpback whales today are entanglements in fishing gear, ship strikes, and coastal habitat pollution.

Steller Sea Lion

The Steller (northern) sea lion (*Eumetopias jubata*) ranges from Hokkaido, Japan, through the Kuril Islands and Okhotsk Sea, Aleutian Islands and central Bering Sea, Gulf of Alaska, Southeast Alaska, and south to central California (Calkins 1986, National Marine Mammal Laboratory [NMML] 2003). The centers of abundance and distribution are the Gulf of Alaska and Aleutian Islands, respectively.

The Steller sea lion was originally listed under the ESA in 1990 as threatened. At that time, Steller sea lion numbers were declining sharply throughout their range and particularly in Alaska. Populations are estimated to have declined between the 1950s and 1990 by 78 percent (NMFS 1992). In certain parts of Alaska, declines of greater than 80 percent have occurred since 1985. The number of sea lions observed on certain rookeries from Kenai Peninsula to Kiska Island declined by 63 percent since 1985 and by 82 percent since 1960. Critical habitat for Steller sea lions was designated in 1993 (NMFS 1993). Specific causes of the population decline are unknown, although population modeling has suggested that decreased juvenile survival is a likely driver. The declines are spreading to previously stable areas and are accelerating. Significant declines have also occurred on the Kuril Islands.

In 1997, NMFS classified the Steller sea lion as two distinct population segments, the eastern stock (ES) and western stock (WS), and re-evaluated their status. The stock differentiation is based primarily on differences in mitochondrial DNA, but also on population trends in the two regions. Steller sea lions occurring west of 144°W longitude were reclassified as endangered. The eastern Pacific population, still listed as threatened, includes Southeast Alaska and the Tongass National Forest. ES populations are increasing in the northern part of the range (Southeast Alaska and British Columbia) and declining in the southern end of its range (Oregon, Washington, and California). In this region, habitat concerns include reduced prey availability, contaminants, and disease (Sydeman and Allen 1997). Both WS and ES stocks are designated as “depleted” and “strategic” under the Marine Mammal Protection Act (MMPA). Although ES stock size has increased in recent years, its status relative to its optimum sustainable population size is still unknown.

There is some limited interchange between the WS and ES populations. Raum-Suryan et al. (2002, 2004) branded 8,596 sea lion pups from 1975 to 2001, and found that a few juveniles from the WS moved to the ES region. Resightings of branded Steller sea lions showed wide dispersal from natal rookeries, particularly among juveniles, which occasionally traveled over 1,500 km to other rookeries and haul-outs and crossing stock boundaries. However, individuals consistently returned to breed, and no adult Steller sea lions were observed breeding with the opposite stock (Raum-Suryan et al. 2002). A more recent study used satellite transmitters to track distribution and movement patterns of pup and juvenile Steller sea lions from both stocks. Overall, movement of individuals between the WS and ES populations were documented only in very low numbers, and only among males (Raum-Suryan et al. 2004). Although some WS individuals have been observed foraging in Southeast Alaska, the WS Steller sea lion population will not be discussed in greater detail in this assessment because of the extremely low number of sightings and because the existing Standard and Guidelines are not specific to the ES Steller sea lion stock and would therefore protect both populations.

The total estimated population of the ES Steller sea lions is 48,519 or 54,989 in 2002–2005, depending on which assumptions are used to calculate the pup multiplier (see Calkins and Pitcher 1982, Trites and Larkin 1996). The number of ES pups produced has nearly doubled since 1978, with an annual rate of increase of 5.9 percent from 1979 to 1998, although the rate of increase between 1989 and 1997 was only 1.7 percent (Calkins et al. 1999). Sease and Gudmundson (2002) estimated a 1.8 percent annual increase in non-pup sea lions between 1991 and 2002. In the Southeast Alaska portion of the ES, non-pup counts on trend sites have increased 29.3 percent since 1990 (Sease et al. 2001). The estimated abundance of the ES population of Steller sea lions throughout its range is 31,028 animals (NMFS 2002b). Calkins et al. (1999) suggested that there are probably more sea lions at present than at any time in recorded history. The minimum population estimate for Steller sea lions in Southeast Alaska in 2005 was 20,793 (15,283 non-pups, 5,510 pups). Current population trends in Southeast Alaska are moving up, with non-pups at trend sites increasing 56 percent from 1979 to 2002, and pups increasing 148 percent (Merrick et al. 1992, Sease et al. 2001, NMFS 2006).

Steller sea lions are opportunistic predators, feeding primarily on a wide variety of fishes and cephalopods. Prey varies geographically and seasonally. Some of the more important prey species in Alaska are walleye pollock (*Theragra chalcogramma*), Atka mackerel (*Pleurogrammus monopteryguis*), Pacific herring (*Clupea harengus*), capelin (*Mallotus villosus*), Pacific sand lance (*Ammodytes hexapterus*), Pacific cod (*Gadus macrocephalus*), salmon (*Oncorhynchus* spp.), and, locally, eulachon (*Thaleichthys pacificus*).

Listed Salmon and Steelhead

Although none of the listed stocks originate from Alaskan streams, 14 of the 28 listed ESU/DPSs of salmon and steelhead could potentially be present in Alaskan waters during some period of their marine life stage (Table F-1). All of these originate from the Columbia River system or Puget Sound. Juveniles from these ESUs/DPSs move varying distances north from Washington after leaving their natal streams to rear in the rich north Pacific waters before returning to their home streams as adults (Groot and Margolis 1991, McNeil and Himsworth 1980). They may feed on prey resources originating from marine and estuarine waters of the Tongass National Forest, and could occasionally be present in inner waters of Southeast Alaska. Overall, listed stocks make up a small portion of total salmon and steelhead in waters off the coast of Alaska (NMFS 2003b). Snake River sockeye do not occur within the marine waters bounded by the Tongass National Forest in the Inside Passage, but may occur in adjacent waters near the western boundaries of the Forest. British Columbia and Washington sockeye stocks normally occur south of the Southeast Alaska sockeye stocks below the latitude of 46°N (Burgner 1991).

Any of the six listed chinook ESUs could potentially be present in marine Alaskan waters, off the outside coast to the west of the Tongass National Forest, and some may rarely be present in the marine waters of the Tongass National Forest. Columbia River chum and all ESUs of steelhead are likely present in Southeast Alaska waters only rarely (Salo 1991, NMFS 2003b). Southerly stocks of chum tend to move offshore early in their northern migration (Salo 1991). Chinook and steelhead may use nearshore marine and estuarine resources, such as prey fish, which are dependent on the Tongass National Forest.

III. Assessment of Effects on the Populations or Habitats of the Species in Relation to Proposed Actions of the Tongass Forest Plan Adjustment.

Humpback Whale

The NMFS recovery plan for the humpback whale identified six known or potential categories of human impacts to these species: hunting, entrapment and entanglement in fishing gear, collisions with ships, acoustic disturbance, habitat degradation, and competition for resources with humans. The majority (74 percent) of human-related mortalities and injuries to humpback whales investigated involved commercial fishing gear, and 38 percent of these were serious injuries or mortalities. These data were gathered from reports submitted to NMFS, Alaska Region, 2001–2005 (NMFS 2007). The estimated minimum mortality and serious injury rate incidental to U.S. commercial fisheries in Southeast Alaska is 1.4 humpback whales per year (NMFS 2007). Mortality and serious injury caused by ship strikes in Southeast Alaska occurred 1.4 times/year between 2001 and 2005.

National Forest management activities which may have an effect on whale habitats or populations generally fall into the categories of acoustic disturbance and habitat degradation. These management activities include: the development and use of log transfer facilities (LTF's) and their associated camps, the movement of log rafts from log transfer facilities to mills, and the potential development of other docks and associated facilities for mining, recreation, and other forest uses and activities. Generally, with the development and use of LTF's and other docking facilities for projects, there is an associated increase in recreational boating in the immediate vicinity during the construction and use of the facilities. Risks from hunting, entrapment and entanglement in fishing gear, ship strikes, and competition for resources with humans associated with LTF's are generally negligible. This is due to the slow speed of watercraft associated with the log transfer activity, and the lack of association between LTF's and the other risks.

Construction and operation of LTF's and other docking facilities are restricted to small, very localized areas of the marine environment. There are 116 LTF's currently on the Tongass National Forest and there is an estimated 232 acres of marine benthic disturbance associated with these existing LTF's (2 acres per LTF). However, not all LTF's are active at the same time and, in recent years, the number that are active is a small minority of the total existing. Based on the 2007 logging system and transportation analysis and modeling conducted for the 2008 Final EIS, it is estimated that a maximum of 115 new LTFs would be needed under the highest harvest alternative (Alternative 7), resulting in an estimated maximum of 230 additional acres of benthic habitat disturbance. The 2 acres of disturbance per LTF figure, assumes that logs would be placed into the water and rafted, rather than loaded onto barges as is currently required on many sales. Therefore, it is likely that future effects at each LTF would be even less than in the past.

Generally there is no reasonable potential to directly affect whales with these facilities. During the summer of 1989, there was a report of a humpback whale entangled in some cables from an inactive LTF site on the Stikine Area. To our knowledge, this is the only direct effect incident related to LTF's.

Two potential indirect effects of LTF's and other docking facilities and associated activities have been identified: 1) effects on whale prey species, and 2) disturbances of whales by boat traffic associated with LTF's.

Effects on Prey. Nemoto (1970) noted that euphausiids and gregarious fish are the primary prey of humpbacks. Thirteen species of fish and 57 species of invertebrates were identified as humpback whale prey in Southeast Alaska. Humpbacks studied in Glacier Bay and Stephens Passage-Frederick Sound were found most frequently in areas of high prey density (Wing and Krieger 1983).

Construction and operation of all LTF's and similar facilities require U.S. Army Corps of Engineers and U.S. Environmental Protection Agency permits, and State of Alaska Tidelands permits. The permitting process provides that construction and operation maintain water quality in the specific facility locations, and that marine circulation and flushing are maintained. All facilities must be in conformance with permit standards. No impacts to the marine environment which would affect whale prey species are anticipated.

Effects from Disturbance. Humpback whale response to nearby boating activity varies from no apparent response to pod dispersal, sounding, breaching, evasive underwater maneuvers, and maintaining distance (Baker and Herman 1983, Baker et. al. 1982). Disturbance by boat activity has been suggested as one of the possible causes of observed changes in whale distribution in Southeast Alaska. Direct pursuit of whales by boats, and frequent changes in boat speed and direction appear to elicit avoidance behaviors more frequently than other types of boat traffic. However, whales may readily habituate to constant and familiar noise (Norris and Reeves 1978). Whales can be commonly found in some areas of Southeast Alaska which have considerable boat traffic; however, whether they are habituated to boat traffic has not been documented, as far as we know. Adverse effects from current levels of boat traffic have not been documented, as far as we know.

Two basic types of boat activity would be associated with LTF's: log raft towing and recreational boating by workers. Log raft towing frequency would vary between camps, seasons, and years; a general average may be about once a week during the working season (U.S. Forest Service, 1989-94 Operating Period for the Ketchikan Pulp Company Long-term Sale Area). Tugs would maintain relatively constant speeds and directions during raft towing. Constant speed and direction elicit less avoidance behavior from whales than other types of boating activity. Log raft towing routes are generally well established, and adverse effects from log raft towing have not been documented.

Recreational boating activity would vary between seasons, years, and camps of different sizes. This activity would be concentrated near LTF sites, other docking facilities and camps. It is estimated that most recreational boating would occur within a few miles of the site, few trips would be made over 10 miles, and activity greater than 30 miles from a site would be negligible. This boating would involve frequent changes in speed and direction and may include some small amount of whale pursuit, if the whales are within sight of the camp or an occupied boat. The effect of such recreational activity on whales would depend on many factors such as size of the bay, depth of the waters in the bay, number of boats, individual behavior responses of the whales, etc. At the present time, there is not a quantifiable way to estimate these possible effects.

Attachment 2 outlines forest-wide standards and guidelines that have been developed for application on all Forest Service permitted or approved activities to minimize or eliminate any adverse impacts on humpback whales.

The amount of human activity in the marine environment associated with Forest management activities is only a fraction of the total amount of human activity occurring in the marine environment. Some of the other activities include: commercial fishing, sport fishing, hunting, subsistence, tourism, and mariculture.

Many of these activities are not regulated by the Forest Service. NMFS is currently proposing regulations for how close humans can approach whales. The purpose of these regulations is to reduce disturbance to whales from activities such as whale pursuing. Such regulations would reduce the indirect disturbance effects discussed above.

Steller Sea Lion

NMFS provides a summary of factors affecting the Steller sea lion populations, including:.reductions in the availability of food resources - especially pollock which is the most important prey species for sea lions; commercial harvests of sea lion pups; subsistence harvests of sea lions; harvests for public display and scientific research purposes; predation by sharks, killer whales and brown bear; disease; the inadequacy of existing regulatory mechanisms re quotas on the incidental harvesting of sea lions during commercial fishing operations; and other natural or manmade factors such as incidences of fishermen shooting adult sea lions at rookeries, haul out sites, and in the water near boats (NMFS 1990, 1993). None of these factors are regulated or fall within the jurisdiction of the Forest Service.

A primary human-caused injury and mortality factor is incidental take during commercial fisheries, though mortality by this cause is low (0.8 mortality rate for 2001–2003, or about 1/year for Pacific whiting component groundfish trawl) (NMFS 2007). Subsistence harvest is likewise low (mean annual take 2001–2005: 9), though it is aimed at both the ES and WS stocks of Steller sea lions (NMFS 2007). Illegal shooting, entanglement in non-fishery-related manmade material, and research activities also account for an additional small amount of annual mortality. The sum of these manmade mortality factors does not exceed annual potential biological removal as defined by NMFS for the ES Steller sea lions, and these can therefore be considered insignificant.

Southeast Alaska populations have not declined to the extent that other populations have. Harassment or displacement of sea lions from preferred habitats by human activities such as boating, recreation, aircraft, LTF's, log raft towing, etc., is a concern with regard to long term conservation of the sea lion in Southeast Alaska. Forest-wide standards and guidelines direct the Forest Service to prevent and/or reduce potential harassment of sea lions and other marine mammals due to activities carried out by or under the jurisdiction of the Forest Service. These Forest-wide standards and guidelines are listed in Attachment 2.

Salmon

The USDA Forest Service has no authority over the direct taking of salmon. This responsibility rests with the State of Alaska, Board of Fisheries, and ADF&G. As a land management agency, the Forest Service may indirectly influence the take of fish, both on and adjacent to the National Forest. Indirect take may occur as a result of modification of habitat or improving the opportunity to harvest salmon. Examples of the latter include the development of roads, boat launches, saltwater anchorages, or cabins; and special use permits for lodges, guides and outfitters. The following analysis considers the potential opportunity for indirect taking of the listed Snake River Sockeye, six Chinook salmon ESUs, Columbia River Chum salmon, and five steelhead DPSs believed to potentially occur in Alaskan waters (Table F-1).

Snake River Sockeye. Due to both the lack of suitable sockeye habitat in the Tongass National Forest, little or no use of prey resources potentially affected in the nearshore environment, and the lack of availability to sport and subsistence fisheries accessed through the Forest, amendment of the Tongass National Forest Land Management will not likely adversely affect the Snake River sockeye salmon.

The management of the Tongass National Forest has no direct or indirect effect on the take of the Snake River sockeye salmon. There is only a very limited relationship between the life history of these salmon and management of terrestrial habitats of the Tongass.

Snake River Chinook (All Stocks). Among the listed fish species evaluated, the six Chinook salmon ESUs are generally most likely to be found in inner waters of Southeast Alaska. Because chinook salmon are piscivores they may feed on fish which are dependent on the waters of Tongass National Forest during some stage of their lives, or these prey species may be affected by management actions. Additionally, chinook salmon are harvested in the sport and subsistence fisheries which may utilize the Tongass for saltwater access. Aquatic habitat protection measures have been designed to provide a natural range of habitat conditions in the waters of the Tongass National Forest (Riparian Forest-wide Standards and Guidelines) and have been developed to reduce or eliminate the likelihood of contribution to the degradation of freshwater habitats. Chinook prey species, such as members of the Pacific smelt family, Pacific herring, and other Pacific salmon, are not anticipated to be negatively impacted by the Tongass Forest Plan Adjustment.

The Tongass Forest Plan does not schedule any developments which measurably increase the access or opportunity to harvest Snake River chinook salmon by sport or subsistence fisheries. Additionally, it is likely that such projects that could be developed in the future, such as roads; boat launches; saltwater anchorages, cabins, special use permits for lodges, guides and outfitters,and logging camp development for the purpose of timber harvest, would have no measurable effect on the listed chinook salmon.

Columbia River Chum Salmon. Like sockeye, the effects of Tongass National Forest actions on land or in nearshore environments are not likely to affect this stock because of their rare presence in the inner marine waters of this region and small magnitude of any affects to the marine environment from any future actions.

Steelhead (All five DPSs). The nearshore resources utilized by steelhead could be affected in small regions. Again because of low probability of any of these fish being present in the inner waters, and the low chance of any adverse effects to prey resources, changes to the Tongass Forest Plan are unlikely to cause adverse effects to any of the listed steelhead DPSs. Additionally, as noted above, none of the considered actions result in any ground or nearshore marine water disturbance so the considered action will have no direct effect on these steelhead DPSs. Specific ground disturbing actions, considered in this respect, would be addressed in through agency consultation, as needed, during project specific actions.

Determination for Marine Mammals and Listed Pacific Salmon/Steelhead

Based on the analysis above, which takes into account current protection measures required by the Marine Mammal Protection Act (MMPA), ESA, and implementation of the Forest-Wide Standards and Guidelines (Attachments 2 and 3), the National Forest management activities will not likely adversely affect the humpback whale, Steller sea lion, or of the any of the ESUs or DPSs of salmonids or their habitats addressed above and listed in Table F-1.

Since the currently evaluated actions do not permit any ground disturbing activity none of the considered actions will have any direct adverse effects to any of the listed species addressed in this section. Any proposed actions indirectly resulting from the considered alternatives will be evaluated on case specific bases as to their affect to listed species and may include formal or informal consultation with NMFS at the time of project evaluation.

In addition, formal and informal consultation procedures (as directed by the ESA, as amended in 50 CFR 17.7, and FSM 2670) are used with the NMFS on all site specific projects that implement the Forest Plan. Forest-wide standards and guidelines for threatened and endangered species (Attachments 2 and 3) also direct that all projects will comply with requirements of the ESA and Forest Service Policy (FSM 2670).

Documentation of Correspondence with Other Agencies

Consultation with NMFS occurred throughout the 1997 Forest Plan Revision process and was initiated by the Forest Service in September 1987 with written letters requesting a list of threatened and endangered marine mammal and anadromous fish species for the Tongass National Forest. The evaluation of effects in the Biological Assessment indicated that populations of species under the jurisdiction of NFMS would not likely be adversely affected as a result of implementation of the decision. NMFS concurred with this determination in November 1996. They concluded Section 7 consultation by stating that consultation should be reinitiated if project plans change or new information becomes available that would change the basis of this determination,

Concurrence findings from the 1997 Forest Plan Revision are still valid for this amendment. Extensive consultation occurred throughout past revision processes of the Forest Plan; the proposed new Forest Plan is an amendment; and the above analysis and determination is consistent with the approach and findings of the 1996 Biological Assessment. The Forest Service will continue to adhere to the Forest-wide Standards and Guidelines for Threatened, Endangered, and Sensitive species, which was the basis for concurrence in the November 21, 1996 letter. Consultation will occur when site specific activities are proposed that may affect a listed species.

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Attachment 1

Forest-wide standards and guidelines in the Tongass Land Management Plan for the conservation of threatened, endangered, and proposed species (portions excerpted relevant to the Kittlitz's murrelet).

Wildlife Habitat Planning: WILD1

I. *Coordination/cooperation with other Agencies, Institutions and Partners*

A. Coordinate with the Alaska Department of Fish and Game, other state agencies, NMFS, the U.S. Fish and Wildlife Service, tribal governments, and other cooperators and partners during the planning of activities that may affect wildlife.

1. The Forest should meet at least annually with state and Federal wildlife agencies to review resource activities, present progress reports on implementation of past cooperative work or agreements, and schedule cooperative work.
2. Seek to maintain memoranda of understanding with appropriate state, Federal, and local agencies and associations.

B. Emphasize management for indigenous wildlife species and natural habitat except in cases where the Forest Service, in cooperation with the Alaska Department of Fish and Game and U.S. Fish and Wildlife Service, find desirable alternatives. Special consideration should be given to the possible adverse impacts on habitat of sensitive, threatened, and endangered species.

C. Coordinate wildlife habitat surveys, studies, plans and improvement projects with the Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, NMFS, and other appropriate state, Federal, tribal, local and private agencies. Use the Sikes Act authorities for cooperative work with the state. Use agreements and other partnerships to cooperate with other partners.

D. Coordinate with the Alaska Department of Fish and Game in development of state strategic plans and population goals and objectives for wildlife species and attempt to incorporate wildlife goals and objectives into forest management.

E. Provide habitat information to the Alaska Department of Fish and Game to assist in correlating hunting seasons, permits, and bag limits to on-the-ground habitat conditions so that population and habitat objectives can be achieved.

II. *General Habitat Planning/Coordination*

A. Recognize as wildlife habitat, areas of land and water which can contribute to achieving wildlife objectives for consumptive and non-consumptive uses.

B. Provide the abundance and distribution of habitat necessary to maintain viable populations of existing native and desirable introduced species well-distributed in the planning area, i.e., the Tongass National Forest. (Consult 36 CFR 219.19 and 36 CFR 219.27.)

C. Cooperate with the State and, as appropriate, the U.S. Fish and Wildlife Service in managing vehicle, boat, and other human use (e.g. hunting and fishing seasons and bag limits) as necessary to achieve wildlife objectives, recognizing the access provisions of ANILCA. Emphasize management to reduce human disturbance in high value habitat areas and during critical periods of wildlife use.

D. Maintain a Forest program schedule which includes anticipated wildlife habitat and population inventory needs, monitoring requirements and proposed habitat improvement and maintenance projects.

E. Use forest plan management indicator species to evaluate the potential effects of proposed management activities affecting wildlife habitat (Consult Forest Service Manual 2620).

F. Develop interagency habitat capability models for any or all of the management indicators to systematically assess the impacts of proposed projects during project level analysis. Periodically review and update models to reflect the most current habitat relationships and habitat modeling technology.

G. Cooperate with the Alaska Department of Fish and Game to seek to prevent existing populations of invasive species from dispersing into Wilderness areas. Address issues regarding management, introduction, and re-introduction of wildlife species consistent with National and Regional Policy.

H. When population or habitat declines for a plant or animal species or subspecies indicates that long-term persistence is at risk, evaluate the particular species for designation as a Regional

Sensitive Species by the Regional Forester. (Consult FSM 2670 and R10 supplemental directions for Threatened, Endangered, and Sensitive Species.)

III. *Seabird Rookeries*

A. Provide for the protection and maintenance of seabird (marine bird) rookeries.

1. Locate facilities and concentrated human activities requiring Forest Service approval as far from known seabird colonies as feasible consistent with the Migratory Bird Treaty Act. The following distances are provided as general guidelines for maintaining habitats and reducing human disturbance:
    a) For aircraft flights on Forest Service permitted or approved activities, when weather ceilings permit, maintain a constant flight direction and airspeed and a minimum flight elevation of 1,500 feet (458 meters) for helicopters and fixed-winged aircraft. If at all possible, avoid flying over seabird colonies.
    b) Regulate human use to maintain a 250 meter no-disturbance distance from seabird colonies on upland habitats.
2. The availability of garbage to gulls should be eliminated by requiring Special Use Permittees to collect and dispose of garbage from their Special Use Authorizations.
3. Cooperate with state and other Federal agencies to develop sites and opportunities for the safe public viewing of these species. Maintain a public education program explaining forest management activities related to these species in cooperation with state and other Federal agencies.

IV. *Waterfowl and Shorebird Habitats*

A. Maintain or enhance wetland habitats which receive significant use by waterfowl and shorebirds. (The Tongass National Forest is a “Priority Forest’ in the national TAKING WING Strategic Plan.) “Significant” is relative, but generally relates to use of a specific area by tens or hundreds of individuals of one or more species.

1. Support the international significance of wetland habitats on the Tongass National Forest by participating in partnerships such as the North American Waterfowl Management Plan and the Western Hemisphere Shorebird Reserve Network.
2. Identify during project analysis, in cooperation with the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service, wetlands which receive significant waterfowl or shorebird use during fall/winter/spring concentrations or nesting, brood rearing or molting habitats.
3. Locate facilities and concentrated human activities requiring Forest Service approval as far from known waterfowl or shorebird concentration and nesting areas as feasible. Minimize disturbance of waterfowl by restricting, when feasible, development activities to periods when waterfowl are absent from the area.
4. During project analysis, consider the need to rehabilitate waterfowl habitat following development activities if there is no feasible alternative to the habitat disturbance. (Also see the Wetlands Forest-wide Standards & Guidelines.)
5. Maintain habitat capability in coastal wetlands and intertidal areas that are important migratory staging areas and fall/winter/spring concentration areas, and wetlands that are important nesting and brood-rearing habitats, by avoiding, where feasible, all development activities which could fill wetlands, drain wetlands, or alter water levels resulting in loss of desirable vegetation, or direct loss of habitat. (Consult the Migratory Bird Treaty Act.)
6. Minimize human disturbance of habitats during important periods of the year (nesting and brood-rearing, molting, and winter) by managing human use (such as trails, Off-Highway Vehicle use) in significant wetland areas. The following distances are provided as guidelines for reducing human disturbance:
    a) Provide a minimum distance of 330 feet (100 meters) between human activities on the ground and significant areas being used by other waterfowl.
7. Develop waterfowl habitat improvement projects in cooperation with appropriate state, Federal and local agencies, partner organizations, and individuals.
8. For Special Use Administration (non-recreational), issue only authorizations which meet the objectives of Executive Order 11990 (Protection of Wetlands). Issue permits which

serve to preserve, enhance, or aid in the management of the natural and beneficial values of wetlands.

9. Perform integrated logging system and transportation analysis to determine if other feasible routes avoiding areas where significant waterfowl use exists.
10. If the need to restrict road access is identified during project interdisciplinary review, roads will be closed either seasonally or yearlong to minimize adverse effects on waterfowl.
11. Cooperate with state and other Federal agencies to develop sites for safe-public viewing opportunities that do not adversely disturb wildlife. Maintain a public education program explaining forest management activities related to these species in cooperation with state and other Federal agencies.

B. Conduct activities to avoid or minimize disturbance to habitats within the forest, riparian, and estuarine areas which are important nesting, brooding, rearing, and molting areas, for Vancouver Canada geese, sandhill cranes, or trumpeter swans.

Threatened, Endangered, and Sensitive Wildlife Species: WILD4

Consult FSM 2670 and R10 supplemental directions for Threatened, Endangered, and Sensitive Species.

I. Threatened or Endangered Species

A. Kittlitz's Murrelet

1. Provide for the protection and maintenance of known Kittlitz's Murrelet nesting habitats.

Attachment 2

Wildlife Forest-wide Standards and Guidelines in the Tongass National Forest (portions excerpted pertaining to the conservation of marine mammals and their habitats).

WILDLIFE
Forest-wide Standards & Guidelines

Wildlife Habitat Planning: WILD1

I. *Coordination/Cooperation with Other Agencies, Institutions, and Partners*

C. Coordinate with the Alaska Department of Fish and Game, other state agencies, NMFS, the U.S. Fish and Wildlife Service, tribal governments, and other cooperators and partners during the planning of activities that may affect wildlife.
   1. The Forest should meet at least annually with state and federal wildlife agencies to review resource activities, present progress reports on implementation of past cooperative work or agreements, and schedule cooperative work.
   2. Seek to maintain memoranda of understanding with appropriate state, Federal, and local agencies and associations.

D. Emphasize management for indigenous wildlife species and natural habitat except in cases where the Forest Service, in cooperation with the Alaska Department of Fish and Game and U.S. Fish and Wildlife Service, find desirable alternatives. Special consideration should be given to the possible adverse impacts on habitat of sensitive, threatened, and endangered species.

E. Coordinate wildlife habitat surveys, studies, plans and improvement projects with the Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, NMFS, and other appropriate state, federal, tribal, local and private agencies. Use the Sikes Act authorities for cooperative work with the state. Use agreements and other partnerships to cooperate with other partners.

F. Coordinate with the Alaska Department of Fish and Game in development of state strategic plans and population goals and objectives for wildlife species and attempt to incorporate wildlife goals and objectives into forest management.

G. Provide habitat information to the Alaska Department of Fish and Game to assist in correlating hunting seasons, permits, and bag limits to on-the-ground habitat conditions so that population and habitat objectives can be achieved.

II. *General Habitat Planning/Coordination*

A. Recognize as wildlife habitat, areas of land and water that can contribute to achieving wildlife objectives for consumptive and non-consumptive uses.

B. Provide the abundance and distribution of habitat necessary to maintain viable populations of existing native and desirable introduced species well-distributed in the planning area, i.e., the Tongass National Forest. (Consult 36 CFR 219.19 and 36 CFR 219.27.)

C. Cooperate with the State and, as appropriate, the U.S. Fish and Wildlife Service in managing vehicle, boat, and other human use (e.g. hunting and fishing seasons and bag limits) as necessary to achieve wildlife objectives, recognizing the access provisions of ANILCA. Emphasize management to reduce human disturbance in high value habitat areas and during critical periods of wildlife use.

D. Maintain a Forest program schedule that includes anticipated wildlife habitat and population inventory needs, monitoring requirements and proposed habitat improvement and maintenance projects.

E. Use forest plan management indicator species to evaluate the potential effects of proposed management activities affecting wildlife habitat. (Consult Forest Service Manual 2620.)

F. Develop interagency habitat capability models for any or all of the management indicators to systematically assess the impacts of proposed projects during project level analysis. Periodically review and update models to reflect the most current habitat relationships and habitat modeling technology.

G. Cooperate with the Alaska Department of Fish and Game to seek to prevent existing populations of invasive species from dispersing into Wilderness areas. Address issues regarding management, introduction, and re-introduction of wildlife species consistent with National and Regional Policy.

H. When population or habitat declines for a plant or animal species or subspecies indicates that long-term persistence is at risk, evaluate the particular species for designation as a Regional Sensitive Species by the Regional Forester. (Consult FSM 2670 and R10 supplemental directions for Threatened, Endangered, and Sensitive Species.)

III. Marine Mammal Habitats

H. Provide for the protection and maintenance of harbor seal, Steller sea lion and sea otter habitats.

1. Ensure that Forest Service permitted or approved activities are conducted in a manner consistent with the MMPA, the ESA, and NMFS guidelines for approaching seals and sea lions. Consult with the appropriate agency for identification of critical timing events, such as molting, parturition, etc., and recommended distances to avoid disturbances. "Taking" of marine mammals is prohibited; "taking" includes harassment (adverse disturbance), pursuit, or attempting any such activity.
2. Locate Forest Service authorized and approved facilities and concentrated human activities as far from known marine mammal haul outs, rookeries and known concentration areas as feasible to meet the Alaska Coastal Management Program (ACMP) consistency requirements and MMPA. The following distances are provided as general guidelines for maintaining habitats and reducing human disturbance:
   a) Locate camps, Log Transfer Facilities, campgrounds and other developments (where allowed by the Land Use Designation) 1 mile from known haul outs, and farther if the development is large.
   b) Forest Service permitted or approved activities will not intentionally approach within 100 yards, or otherwise intentionally disturb or displace any hauled-out marine mammal.
   c) Dispose of waste oil and fuels off-site as regulated by the Alaska Department of Environmental Conservation.
3. Cooperate with the state and other federal agencies to develop sites and opportunities for the safe viewing and observation of marine mammals by the public. Maintain a public education program explaining forest management activities related to marine mammals in cooperation with state and other Federal agencies.

Threatened, Endangered, and Sensitive Wildlife Species: WILD4

Consult FSM 2670 and R10 supplemental directions for Threatened, Endangered, and Sensitive Species.

I. Threatened or Endangered Species

A. Steller Sea Lion

1. Protect Steller sea lion habitats.
2. Ensure that Forest Service funded, permitted or authorized activities are conducted in a manner consistent with the requirements, consultations, or advice received from the appropriate regulatory agencies for the MMPA, the ESA, and NMFS guidelines for approaching seals and sea lions. "Taking" of sea lions is prohibited; "taking" includes harassing or pursuing or attempting any such activity.
3. Locate facilities, camps, Log Transfer Facilities, campgrounds and other developments 1 mile from known haulouts, and, farther away, if the development is large.
4. Cooperate with state and other federal agencies to develop sites and opportunities for the safe viewing and observation of sea lions by the public. Maintain a public education program explaining forest management activities related to sea lions in cooperation with state and other federal agencies.

B. Humpback Whale

1. Provide for the protection and maintenance of whale habitats.
2. Ensure that Forest Service permitted or approved activities are conducted in a manner consistent with the MMPA, the ESA, and NMFS regulations for approaching whales, dolphins, and porpoise. "Taking" of whales is prohibited; "taking" includes harassing or pursuing or attempting any such activity.

Attachment 3

Forest-wide standards and guidelines in the Tongass Forest Plan for the conservation of threatened, endangered, and proposed fish species. These conservation measures serve to protect important habitat that may be used for listed Pacific salmon and steelhead.

FISH
Forest-wide Standards & Guidelines

Fish Habitat Inventory and Monitoring: FISH1

I. *Fish Habitat Inventory*
   - A. Maintain the channel type and stream class (see Glossary) based inventory of all Forest streams.
     - 1. Maintain and update the stream inventory (and GIS mapping) during site-specific project planning and analysis.
       - a) Consult publication *R10-TP-26, A Channel type Users Guide for the Tongass National Forest, Southeast Alaska* (as revised), for descriptions of the channel types.
       - b) Consult the Aquatic Habitat Management Handbook FSH 2090.21 for descriptions of Region 10, stream survey methodologies.
   - B. Maintain the inventory of Forest streams and watersheds for fish enhancement opportunities.
   - C. Maintain, and further develop as necessary, the fish-habitat-objectives database used to measure changes in the natural range and frequency of aquatic habitat conditions. (See FISH 112,IV(B) and Appendix B.)

Fish Habitat Planning: FISH2

I. *Fish Habitat and Channel Processes*
   - A. Recognize watershed function and channel processes when planning for the protection, restoration or enhancement of fish habitat. (Consult Riparian Forest-wide Standards and Guidelines RIP2 and Soil and Water Forest-wide Standards and Guidelines S&W112.)
     - 1. Consider the effects of upstream and upslope activities during site-specific planning.
     - 2. Consider the condition of upstream and upslope areas during site-specific planning.
     - 3. Consider topics such as erosion processes, watershed hydrology, vegetation, stream channel morphology, water quality, wilderness designation, recommendations for inclusion into the Wild and Scenic River System, species and habitats, and human uses, during analyses.

II. *Channel Classification and Process Groups*
   - A. Use channel type inventories to categorize stream reaches into channel process groups. Use channel types and process groups to plan management activities affecting fish and fish habitat along all lakes and streams. Process groups and the channel types included in each process group are shown in Appendix D, and in publication R10-TP-26, A Channel type Users Guide for the Tongass National Forest, Southeast Alaska. These groups may be redefined as more information about channel types becomes available.
     - 1. Map and field-verify streams, lakes and estuaries by channel type and stream class for project planning and implementation.

III. *Fish Stream Classification* ***(reference FSH 2090.21 (2001) Chapter 10, Section 12)***
   - A. Determine fish/water quality value class of all streams in the affected area prior to or during site-specific project planning (also see Riparian Standards and Guidelines).
   - B. Use the following classification system across the Forest.
     - 1. **Class I:** Streams and lakes with anadromous or adfluvial fish or fish habitat; or high quality resident fish waters or habitat above fish migration barriers known to provide reasonable enhancement opportunities for anadromous fish.
     - 2. **Class II:** Streams and lakes with resident fish or fish habitat—generally steep channels 6 to 25 percent or higher gradient—where no anadromous fish occur, and otherwise do not meet Class I criteria.
     - 3. **Class III**: Perennial and intermittent streams with no fish populations but which have sufficient flow, or transport sufficient sediment and debris, to have an immediate influence

on downstream water quality or fish habitat capability. For streams less than 30 percent gradient special care is needed to determine if resident fish are present.

A stream segment is designated Class III if the following conditions are met **for the majority of its length:** Bankfull stream width greater than 1.5 meters (5 feet) **and** channel incision (or entrenchment) greater than 5 meters (15 feet).

Streams that do not meet both the width and incision criteria may be classified as class III streams based on a professional interpretation of stream characteristics for the stream segment being assessed. The following characteristics **could** indicate a class III stream:

a. Steep side-slopes containing mobile fine sediments, sand deposits, or deep soils that can provide an abundant source area for sedimentation.

b. Very steep gradient channels (greater than 35 percent slope).

c. Recently transported bedload or woody debris wedges (especially if deposited outside high water mark).

d. High water indicators (scour lines, drift lines etc) that greatly exceed observed wetted stream width.

e. Large sediment deposits stored amongst debris that could be readily transported if debris shifts.

4. **Class IV**: Other intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capacity to directly influence downstream water quality or fish habitat capability. Class IV streams **do not** meet the criteria used to define Class I, II or III streams. Class IV streams must have bankfull width of at least 0.3 meters (1 foot) over the majority of the stream segment. For perennial streams, with average channel gradients less than 30 percent, special care is needed to determine if resident fish are present (resident fish presence dictates a Class II designation).

5. **Non-streams**: Rills and other watercourses, generally intermittent and less than 1 foot in width, little or no incision into the surrounding hillslope, and with little or no evidence of channel scour (Note: these micro-drainage features are not mapped in GIS hydrography layers).

IV. Objectives/Guidelines for Management Affecting Fish Habitat

A. Maintain or restore the natural range and frequency of aquatic habitat conditions on the Tongass National Forest to sustain the diversity and production of fish and other freshwater organisms.

B. Use (and update) baseline fish habitat objectives as a reference to evaluate the relative health or condition of riparian and aquatic habitat. Use baseline fish habitat objectives, listed below (and others as developed), (AFHA, 1995, Bryant et. al. 2004, Woodsmith et. al. 2005) to characterize the natural range of habitat conditions by channel types and process groups. Specific measurement protocols are described in the Alaska Region Aquatic Management Handbook (FSH 2090.21 – 2001-1)

1. Width-to-depth ratio. Relationship between bankfull width and average bankfull depth, expressed as average bankfull width / average bankfull depth.
2. Large woody debris. Frequency of qualifying large wood pieces per kilometer of stream.
3. Total key pieces of large woody debris. The frequency of large, structurally integral pieces of wood scaled to channel size per kilometer of stream.
4. Pools per Kilometer. Frequency of qualifying pools per kilometer of stream.
5. Pool spacing. Frequency of qualifying pools per unit area of channel, length of channel surveyed / average channel bed width / number of pools.

6. Residual pool depth per channel bed width. Residual pool depth scaled to channel size, residual pool depth / average channel bed-width.
7. Median particle size.
8. Pool length per meter. Total qualifying pool length divided by length of survey.
9. Pool size (relative depth). Average residual pool depth / average bankfull depth.
10. Relative submergence. Expressed as average bankfull depth.

C. Maintain or restore stream banks and stream channel processes.
   1. Stream Class I, and Class II streams that flow directly into Class I streams. Maintain, restore or improve anadromous, adfluvial, and high value resident fish habitat capability by providing natural or improved cover/pool ratio, pool-riffle sequences, and habitat features, such as stable large woody debris. Design management activities to maintain stream bank, channel and flood plain integrity.
   2. Other Stream Class II: Maintain or restore habitat capability for resident fish populations by providing natural or improved cover/pool ratio, pool-riffle sequences, and habitat features, such as stable Large Woody Debris. Design management activities to maintain stream bank, channel, and flood plain integrity. Avoid impacts to downstream Class I streams.
   3. Stream Class III: Design management activities to maintain or restore stream bank, channel, and flood plain integrity. Avoid impacts to downstream Class I and Class II streams.

D. Maintain or restore natural and beneficial quantities of Large Woody Debris (LWD) over the short and long-term.
   1. Stream Class I, and Class II streams that flow directly into Class I streams. Maintain or restore anadromous, adfluvial, and high value resident fish habitat capability by providing for natural and beneficial volumes of LWD for rearing, stream energy dissipation, and sources of organic matter to the stream ecosystem. Use biological and physical characteristics of the stream to determine size classes and distribution of LWD. Limit navigational clearing of large wood to the minimum necessary for safety.
   2. Other Stream Class II: Maintain or restore habitat capability for resident fish populations by providing LWD, and by designing for future sources of LWD at volumes determined by channel type biological and physical characteristics.
   3. Stream Class III: Maintain or restore LWD in channels and banks to prevent changes in natural stream bank and stream channel processes.

E. Maintain or restore water quality to provide for fish production.
   1. *Stream Classes I, II, and III*: Prevent adverse effects to rearing and spawning habitat. Maintain or restore anadromous, adfluvial, and high value resident fish habitat capability. Maintain or restore capability for other resident fish populations to the extent feasible. Assure no chronic sediment input following soil-disturbing activities. Prevent adverse impacts to fish habitat downstream by minimizing siltation.
   2. Implement applicable Best Management Practices. (FHS 2509.22).

F. Maintain or restore optimum water temperatures for salmonids, considering both winter and summer habitat requirements, climate, and natural watershed characteristics.
   1. Stream Class I, and Class II streams that flow directly into Class I streams. Maintain or restore optimum salmonid summer stream temperatures at between 50 and 68°F or at natural levels.
   2. Other Stream Class II: Maintain water temperatures below 68°F, or at natural levels, to maintain or restore habitat capability for resident fish populations. Manage watersheds and riparian streamsides to maintain water temperature standards and guidelines for downstream Class I streams.
   3. Stream Class III: Manage watersheds and riparian streamsides to maintain water temperature standards and guidelines for downstream Class I and II streams.

G. Maintain, restore or improve, where feasible (see glossary), stream conditions that support the migration or other movement of aquatic organisms inhabiting a waterbody.
   1. If a stream crossing cannot be avoided then the best solution for aquatic organism passage is generally to maintain the natural stream form and processes from the inlet, through the crossing, and into the downstream channel. Bridges, open bottom culverts and stream simulated culverts designed and installed to applicable BMPs (Soil and Water

Conservation Handbook , FSH 2509.22) and design standards (Aquatic Habitat Management Handbook, FSH 2090.21) to best meet this objective.

2. Some stream conditions, engineering constraints or cost may make it desirable to install culverts that use a variety of weir/baffles or roughened channel to provide for passage. These hydraulically designed culverts rely on matching culvert hydraulic conditions at a specified design flow to the swimming performance of a specified design fish (Aquatic Habitat Management Handbook, FSH 2090.21).
3. Stream crossing structures requiring aquatic organism passage will be designed to current standards by qualified professionals.
4. Consult applicable Best Management Practices (see FSH 2509.22).
5. Consult and improve the inventory of identified fish stream crossings.
6. As per Memoranda of Understanding between the Forest Service and the Alaska Department of Natural Resources (ADNR, 2004), and the Alaska Department of Environmental Conservation (ADEC, 1992), culvert installation, stream alignment or diversions; dams; low-water crossings; and construction, placement, deposition, or removal of any material or structure below ordinary high water all require State concurrence.
7. Overall, the intent is to not disrupt the migration or movement of aquatic organisms, but occasionally it is not feasible to protect some sections of habitat and movement will be restricted. In determining feasibility consider the following:
   a) Presence of known sensitive, isolated or unique fish populations.
   b) Extent and quality of available habitat and how it is affected by the location of the stream crossing.
   c) The cumulative impacts of restricting fish passage at multiple sites in the same watershed.
   d) The upstream and downstream linkages between the anadromous and resident life strategies of the same species.
   e) Advice from the Alaska Department of Fish and Game and the Alaska Department of Natural Resources.
   f) The length of time that a stream structure will restrict movement.
   g) The cost of providing ideal passage conditions compared to less than ideal conditions.
   h) Availability of suitable, cost effective compensatory mitigation projects.
8. The discharge of dredge or fill material from normal silviculture activities such as timber harvest is exempt from Clean Water Act Section 404 permitting requirements in waters of the United States (404(f)(1)(A). Forest roads qualify for this exemption only if they are constructed and maintained in accordance with BMP's specified in 33CFR 323.4(a). These BMPs have been incorporated into BMP 12.5 in the Alaska Region's BMP Handbook (FSH 2509.22)

V. Management Indicators

A. Use forest plan management indicators to evaluate the potential effects of proposed project management activities affecting fish habitat.

VI. Management Activities

A. Maintain a fish program schedule which includes anticipated inventory needs, proposed habitat improvement and maintenance projects, and monitoring requirements.

VII. Coordination

A. Coordinate activities that affect fish resources with other Forest disciplines through the Interdisciplinary Team process, and with state, other Federal, and local agencies and groups.
   1. Develop and maintain Memoranda of Understanding/Agreements with appropriate state, Federal, and local agencies and aquaculture associations.
   2. Coordinate with the state and federal agencies, and the Pacific Northwest Research Station, to maintain a continuous program for research, monitoring, and assessment of impacts of land-use activities on fish habitat.

B. Consider the influence of proposed management activities on fishing use patterns.

C. Consider effects of Off-Highway Vehicle (OHV) travel and road closures on fish habitat and populations.

VIII. Projects

A. Use the following priority for fish habitat project work: mitigation for unplanned impacts, rehabilitation/restoration, enhancement. For both mitigation and rehabilitation, consider alternatives for cost efficiency of performing off-site enhancement (enhancement of a different area than where the impact actually occurs).
   1. Location of off-site enhancement shall be governed by the following priorities:
      a) First priority: same stream reach (same species)
      b) Second priority: same stream (same species)
      c) Third priority: same watershed (same species)
      d) Fourth priority: same anadromous fish harvest area (same species)
      e) Fifth priority: differing species, using above priority order

B. Enhance fish habitat to meet the objectives identified in this plan. Opportunities may include, but are not limited to: instream enhancement, lake fertilization, cooperative bio-enhancement (e.g., stocking), incubation boxes, and fishway construction.
   1. Use the Cooperative Fisheries Planning process (Consult ANILCA Section 507) and/or other cooperative agreements for developing priorities for the enhancement of fish resources.
   2. Determine habitat capability on streams and lakes identified for enhancement in the Cooperative Fisheries Planning process prior to construction of fish projects.
   3. Update the fish habitat enhancement list (Cooperative Fisheries Planning process) periodically.

C. Recognize bio-enhancement (e.g., stocking of juveniles, use of egg incubation boxes, transferring of adult fish to seed stream systems) as part of the fish improvement project costs when appropriate. Cooperate/coordinate with fish agencies and aquaculture associations to facilitate bio-enhancement.

D. Fishpass projects abide by the standards and best practices for colonization projects included in the Comprehensive Salmon Enhancement Plan for Southeast Alaska, Phase III.

E. Coordinate new projects to enhance the use of National Forest System lands with the recreation program managers.

Fish Habitat Improvement: FISH3

I. Planning

A. Improve or restore fish habitat to work toward the habitat objectives of the Forest Plan.

B. Construct projects using the most cost-efficient methods, while achieving desired results consistent with the Land Use Designation.

C. During project planning consider the need to monitor the accomplishment of project objectives. Need shall be governed by the type of project, with high interest/high investment projects being monitored more intensively.
   1. Where needed, develop cooperative agreements with fish/aquaculture agencies and other groups to assess the effectiveness of Forest Service habitat improvement.

II. Construction Coordination

A. Coordinate all fish habitat improvement using an interdisciplinary process.

B. Coordinate habitat improvement projects with the Alaska Department of Fish and Game and other appropriate agencies and groups.

III. Monitoring

A. Conduct monitoring of fish improvement projects to insure their continued function at the design level of operation.

B. Monitor fish production on a representative sample of improvement projects to evaluate effectiveness of individual projects, categories of similar projects, and the effectiveness of the overall improvement program.

Fish Habitat Maintenance: FISH4

I. Maintenance

A. Provide for the maintenance of fish habitat enhancements.
   1. Fund maintenance of existing projects prior to the construction of new ones.
   2. Include funding for maintenance in the planning and budgeting for all projects.

3. Maintain improvements to assure that investment objectives are met.
4. When maintenance and operation of an improvement become inefficient , reconstruct or remove the improvement.
5. If an improvement becomes inoperable, reconstruct or remove the improvement.

B. Develop a written maintenance responsibilities agreement with project cooperators prior to project construction.

Threatened, Endangered, and Sensitive Fish Species: FISH5

Consult FSM 2670 and R10 supplemental directions for Threatened, Endangered, and Sensitive Species.

I. Threatened or Endangered Species

A. There are currently no Threatened or Endangered fish species on the Tongass National Forest.

II. Sensitive Fish Species

A. Island King Salmon
1. Provide for the protection and maintenance of runs of king salmon that naturally occur on islands including the runs in King Salmon and Wheeler creeks on Admiralty Island.
2. Coordinate with the Alaska Department of Fish and Game and NMFS on commercial, sport and subsistence fish use, hatchery egg take programs, and other activities affecting the viability of king salmon runs in order to conserve these unique populations.
3. Avoid the placement of facilities or issuing permits for activities near these streams that would increase harvest pressure on these king salmon runs.

B. Northern Pike
1. Provide for the protection and maintenance of northern pike found in the Pike Lakes on the Yakutat Forelands. This population of northern pike is unique to Southeast Alaska.
2. Avoid the placement of facilities near the Pike Lakes which would increase harvest pressure to the point where the viability of these species is affected.
3. Coordinate with the Alaska Department of Fish and Game on any activities that would affect the viability of the northern pike.

C. Fish Creek Chum Salmon
1. Provide for the protection and maintenance of chum salmon in Fish Creek near Hyder. This population of chum salmon is characterized by their extraordinary large size.
2. Coordinate with the Alaska Department of Fish and Game and NMFS on commercial, sport and subsistence fish use, hatchery egg take programs, and other activities affecting the viability of the chum salmon runs in Fish Creek in order to preserve these populations.
3. Provide for habitat improvement and maintenance to maintain the viability of this run of salmon, as necessary.

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APPENDIX G
TIMBER DEMAND AND SUPPLY

Appendix G

Timber Demand and Supply

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Appendix G

Timber Demand and Supply on the Tongass National Forest

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December 7, 2007

Summary

Since 1990, when the Tongass Timber Reform Act (P.L. 101-626) required the Tongass National Forest to take economics into account in planning timber sale programs, a number of demand studies have been published by the US Forest Service Pacific Northwest Research Station, assessing derived demand for Alaska wood products. Information from these demand assessments is incorporated into short-term timber sale planning through a supply model, and into long-term planning through the Forest Plan process. This appendix supports text in the Forest Plan amendment EIS, provides additional information about the Brackley et al. (2006a) demand estimates, and outlines how the Brackley et al. demand projections are incorporated into annual timber sale offer target calculations on the Tongass National Forest.

Introduction

Section 101 of the 1990 Tongass Timber Reform Act (TTRA) states that:

> Subject to appropriations, other applicable law, and the requirements of the National Forest Management Act (P.L. 94-588); except as provided in subsection 9d) of this section, the Secretary shall, to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle.

The 1997 Record of Decision for the Tongass Land and Resources Management Plan Revision committed the US Forest Service to develop procedures to insure that annual timber sale offerings would be consistent with implementing the "seek to meet market demand" language of the TTRA. Those procedures were completed in 2000, and have become known as the "Morse methodology" after their author. These procedures are based on the premise that:

- Forest products markets are volatile, especially in the short run.
- Timber purchasers in Southeast Alaska have few alternative suppliers of timber if they cannot obtain it from the Tongass National Forest. Oversupplying this market has relatively few adverse economic effects; undersupplying it can have much greater negative economic consequences.
- It takes years to prepare national forest timber for sale, including completion of environmental impact statements.
- It is difficult to estimate demand for timber from the Tongass, even a year or two in advance.
- Industry must be able to respond to rapidly changing market conditions in order to remain competitive.

Accordingly, the Morse methodology establishes a system that seeks to build and maintain sufficient volume of timber under contract (timber purchased but not yet harvested, the primary indicator of timber inventory available to the industry) to allow the industry to react promptly to market fluctuations. Industry actions such as annual harvest levels are monitored and timber program targets are developed by estimating the amount of timber needed to replace volume harvested from year to year. The Morse methodology is self-correcting, because if harvest levels drop below expectations, future timber sale offerings will also be reduced to levels needed to maintain the target level of volume under contract. Conversely, if harvest levels rise unexpectedly, future timber sale targets will also increase sufficiently to ensure that the inventory of volume under contract is not exhausted. By dealing with uncertainty in a flexible, science-based fashion, the Morse methodology is an example of adaptive management. The Forest Service intended the Morse methodology to be the means by which the agency complies year-by-year with the annual demand portion of the TTRA “seek to meet” requirement. Similarly, the agency intended to comply with the requirement to seek to meet demand “for each planning cycle” through a series of annual applications of the Morse methodology.

The US Forest Service Pacific Northwest Research Station has published several studies conducted in support of Tongass Land Management planning that estimate derived demand for timber in Southeast Alaska, including Brooks and Haynes (1997) and Brackley et al. (2006a). The procedures developed by Morse (2000) to estimate the timber offer target (supply) incorporate the demand numbers from the PNW studies as an input into a spreadsheet. The PNW derived demand projections are trend projections and should be interpreted as five-year averages. The Morse methodology relates these derived demand projections into an annual calculation of timber sale offer levels.

The procedures developed by Morse (2000) to estimate the annual sale offering targets from the Tongass National Forest address the uncertainty associated with forecasting market conditions, considering the continuing transformation of the timber industry and the inability of the Forest Service to respond quickly to market fluctuations due to the time it takes to prepare timber for sale. The basic approach developed is to allow the industry to accumulate an adequate volume under contract (a measure of inventory), then monitor industry behavior and adjust timber program levels to keep pace with the harvest activity. Key economic indicators and stumpage market conditions are monitored. The method underwent rigorous technical and public review before it was implemented. Since the method was initially developed by Morse (2000), inputs to the model have been adjusted to reflect new understandings and information, such as share of raw material provided by the Tongass National Forest to local processors, the amount of time between purchase and harvest of a timber sale, and mill capacity. In this way, the approach has allowed for adaptations to current situations.

Morse (2000) outlined monitoring goals, with some specific criteria for action. An update of the timber demand assessment by Brooks and Haynes (1997) was requested from the US Forest Service Pacific Northwest Research Station, because sales to domestic markets now account for more than 35 percent of lumber products in Southeast Alaska. The PNW Research Station published new demand projections (Brackley et al. 2006a) with some changes in how alternative scenarios were presented and how timber volume was characterized. The new projections contain four scenarios, as opposed to the three in Brooks and Haynes (1997), and the timber volume in the Brackley et al. (2006a) demand projections is demand for decked logs (stacked logs at processing facilities) plus a portion of cedar log shipments out of Alaska.in scenarios 1 and 2. The authors acknowledge that pulpwood grade material may be left in the woods, but they do not include that volume in these two projections. In the case of scenario 3 and 4, the derived demand estimates include pulpwood quality material that is assumed to be left in the woods under scenarios 1 and 2, decked logs at processing facilities, and cedar log shipments out of Alaska. The new projections do not require a change in the basic methodology for timber offer calculations in the procedure outlined in Morse (2000).

During the 1990s, competition with production in other regions and market conditions led to the closure of Southeast Alaska’s two pulp mills and numerous closures of sawmill facilities. The twelve remaining active mills operated at about 13 percent of their estimated capacity in 2005. The Tongass National Forest contributed about 65 percent of wood sawn by local mills from 2002 to 2006 (Kilborn et al. 2004; Brackley et al. 2006b; data from mill surveys conducted by Dan Parrent of Juneau Economic Development and on file with the Regional Economist, US Forest Service Alaska Region). Although about one-third of sawn wood has come from State of Alaska lands, State lands comprise a relatively small percentage of Southeast Alaska forest lands, and State lands cannot indefinitely supply such a high proportion of the needs of remaining Southeast Alaska sawmills. A very small proportion (less than one percent) has come from private lands in the past five years. The primary destination for material sawn in Southeast Alaska is currently other states within the U.S. Brackley and Haynes (in press) conclude that many of the lumber and wood products markets Alaska mils compete in are higher-end markets in which foreign and domestic prices have become fairly similar, through market arbitrage. Haynes at al. (2007) found that since 1994, the value of U.S. forest product exports has been in gradual decline while the value of imports has steadily increased. Hansen (2006) states that U.S. companies have historically jumped into the export market when the domestic market is down, and shifted back to the U.S. market when the domestic market improves. In recent years, the U.S. domestic market has been very attractive with high housing starts and strong prices in many forest product categories. Haynes et al. (2007) state that U.S. demand for forest products is varied and large, averaging 71.4 cubic feet per person per year. This per capita consumption of wood products in the U.S. has been relatively constant for 50 years. Total U.S. forest products consumption is projected to continue to rise. U.S. imports of wood products are projected to rise at a somewhat faster rate than domestic wood supply. U.S. import dependence is projected to reach more than one-quarter of the total of all wood products consumed and exported in the US by 2010. Economic globalization throughout wood products manufacturing is contributing to a global realignment of growth in raw material demands. In addition to this realignment of where manufacturing takes place, sheer population growth will drive increases in wood products demand both in the US and world-wide. Ince et al. (in press) state that countries such as China are emerging in the 21st century as growth leaders in wood raw material and industrial wood product demand.

Brackley and Haynes (in press) examined trade information and literature on Chinese wood products markets, and concluded that one of the most significant events of the 21st century has been the emergence of China and other Asian nations into world markets. Although China and other undeveloped Asian nations will probably have a minor impact on demand for softwood products produced in southeast Alaska in the next 5 years, in the longer term there will be direct and indirect impacts “that will provide markets for any level of production the forest products industry in southeast Alaska may attain” (Brackley and Haynes, in press; 26).

In 2007, the US Forest Service in Alaska approved a new policy under which timber purchasers may ship to the lower 48 states unprocessed certain small-diameter and low-quality logs harvested from the Tongass, up to 50 percent of the volume harvested on each sale. This interstate shipments policy places purchasers of Tongass National Forest timber in a similar position as their counterparts in the Lower 48, where there is no restriction on interstate shipments of timber harvested from National Forest System lands. While it is still early in the implementation of the new policy, full implementation of it over the next year or two could make Alaska forest products producers more competitive with their counterparts in the Lower 48 States. That may allow Alaska producers to increase their share of domestic forest products markets, which would stimulate demand for timber from the Tongass without the construction of new processing facilities in Southeast Alaska. In addition, a new veneer mill has opened in Ketchikan that uses low-grade sawtimber.

On the supply side, the cost of preparing stumpage for sale and delivering it to mills has increased, due to decreased size of sales, increased fuel costs, legal and procedural challenges to federal timber sales, and more constraints on harvest activity in the interest of resource protection. The uncertainty surrounding Tongass National Forest sale quantities has increased the risk faced by potential purchasers and investors in local processing capacity.

Demand Estimation

The method to project timber harvests and output in Alaska followed by Brackley et al. (2006a) is essentially the same as that employed in previous estimates of Alaska timber demand by Haynes and Brooks (1990), Brooks and Haynes (1990), Brooks and Haynes (1994), and Brooks and Haynes (1997). Derived demand is determined by converting demand in all markets, foreign and domestic, to the timber volume that is required to produce the defined products utilized by the market. In the model, ratios are used to assign a portion of the total global demand to producing regions. Brackley et al. (2006a) then estimate the Alaska forest products output, by product, required to meet projected demand, and calculate the raw material requirements necessary to support this production, using explicit product recovery and conversion factors. The total raw material requirement (the total derived demand for timber) is a combined projection of timber harvest from private ownership, from National Forests, and from non-National Forest public owners. The projected National Forest timber demand is the quantity of timber required to satisfy projected derived demand given harvest by other owners, and given explicit assumptions about markets and implicit assumptions about prices (described below). The study analyzes trends over a historical period of about 40 years (1965 to 2004) as a basis for a projection of 20 years (2005 to 2025) in three key parameters:

1. The level of forest products imports in Pacific Rim nations. According to Brackley and Haynes (in press), the PNW demand studies define the Pacific Rim as the major producing areas of the three contiguous Pacific coast states (California, Oregon, and Washington), British Columbia, Alaska, the Russian Far East, and major consuming regions of Japan, Korea, Taiwan, and China (Haynes and Brooks 1990). Based on other research regarding these markets, the Brackley et al. demand study projects that Pacific Rim imports of sawn wood products will increase over the next 20 years.
2. The share of those markets that will be supplied by North American forest products producers, which the study projects will remain constant.
3. The share of North American exports to the Pacific Rim that will come from Alaska. The analysis examines four alternative assumptions regarding future trends of the Alaskan share of North American exports to the Pacific Rim.

Brackley et al. (2006a) assembled historic data that describe relevant components of the Alaska forest sector and calculated possible future wood needs by using an analysis of trends in factors that influence harvests. They also used assessments of current markets from other analysts. Data from the historic period of 1965 to 2004 were used as a basis for the projection of the future (2005 to 2025), to avoid emphasis on short-term cycles. Trends in consumption (for example, of sawn wood in Japan), and trends in production, represented by shipments (for example, of lumber to all destinations) make up the basic structure of the model. The authors recognized that the US is a net importer of timber. A mill in Alaska has the option to ship products to traditional export markets, emerging new markets, or the lower 48 states. Demand for wood products is global in nature and increasing amounts of wood products are being imported into the United States. The primary determinate of where products will be shipped is price. There are many high-value products (such as large timbers for architectural designed buildings, and shop grades of lumber) that are now being shipped to the lower 48 from Alaska.

The demand model calculates the quantity of National Forest timber needed by mills as a residual necessary to balance the model. In other words, Brackley et al. (2006a) estimated the roundwood equivalent of all material used to produce products from Alaska, and subtracted estimated future volume harvested from other landowners to derive National Forest roundwood needs (the “residual”). The results in Brackley et al. (2006a) reflect decked roundwood volume (stacks of unprocessed logs) at processing facilities.

Stumpage price projections in the PNW demand studies are linked to price series used and projected in the Resource Panning Act assessments (such as Haynes et al. 2007). Stumpage prices in Alaska are estimated as a function of prices in western Washington and Oregon. Alaska markets directly interact with producers and consumers in other US regions through this price relationship. Brackley and Haynes (in press) explain that “market arbitrage is used to understand parity among prices in spatially distinct markets where there is the opportunity for open exchange (trade). Market arbitrage is a powerful force that keeps prices of different species, grades, and locations within some fixed proportion to each other. Abstracting from transportation and transactions costs, for example, prices of one species and grade will not exceed prices for other species of a similar grade in the long run because of possibilities of substitution.” Tying price in Alaska to price in the Pacific Northwest is how market arbitrage is included implicitly in the demand assessment. The mix of products that go into end markets from Alaska are, on average, higher quality and more valuable than the average lumber markets in Washington, Oregon, and British Columbia (Brackley and Haynes in press). The type of lumber products in the demand projections reflects this higher value by the type of markets they compete in. Although price is not explicit in the PNW demand studies, it is reflected through this mix of generally higher value products that go into various end markets, and by the assumption that Alaska price is a function of US price.

Alaska is one of the last places in western North America that produces products from slow-grown large old trees. Old-growth trees and some younger trees in Alaska have special high-quality strength and appearance characteristics. Wood products manufactured in Alaska generally go into high-end markets, such as window casings and door moldings. These markets are arbitraged throughout the Pacific Rim, meaning that prices for these products are similar regardless of what market it goes into—domestic or foreign. Brackley and Haynes (in press) illustrate how Alaska producers have shifted in and out of domestic markets. Brackley et al. (2006a) accounted for this market arbitrage by assuming export products would be synonymous with high-value products that could be sold in domestic or foreign markets based on price.

Brackley et al. (2006a) used information about US exports to Japan, and Japanese import data, as a benchmark for the historic data, as such exports represented, until very recently, the vast majority of sawn wood production from Southeast Alaska. Data about domestic end markets for sawn wood production from Southeast Alaska have been available since about 2000. The information on domestic end markets can be difficult to verify. One major question is how much of the product shipped to the Pacific Northwest is trans-shipped Trans-shipments are products that are shipped to foreign markets from a different customs district than the one in which they were manufactured. In the case of Southeast Alaska, lumber manufactured in Alaska is apparently being shipped to foreign markets from the Seattle customs district, making it difficult to track many of the very recent end markets and subsequent demand for manufactured products from Alaska. Other data used in the Brackley et al. (2006a) analysis includes log sources from all ownerships in Southeast Alaska, log and chip shipments out of Alaska to various destinations from all owners, harvest by owner, the Alaska market share for manufactured products in North America, and the North American market share in Japan.

The assumptions used by Brackley et al. (2006a) in their four scenarios are outlined in Table G-1. The Limited Lumber Production and the Expanded Lumber Production scenarios assume the wood processing industry in Southeast Alaska is focused only on processing of sawlogs. The primary difference between these two scenarios is the assumption that Alaska will increase its market share in the North American export market from 0.39 percent to 1.14 percent in the Expanded Lumber scenario, while the Limited Lumber scenario maintains the same market share for Alaska products (0.39 percent) in the North American market as a whole. The North American market share of the entire Pacific Rim market remains at about 50 percent in all scenarios; what changes is the assumption of how much of that larger market will be comprised of wood products from southeast Alaska. In addition, although the market share of North American in the larger Pacific Rim market remains at about 50 percent, the total amount of wood products consumed in that global market is expected to rise by more than 20 percent by 2025, due to increasing populations throughout the Pacific Rim. This projected total increase in consumption is consistent with expected rates of increase in consumption reported in the RPA (Haynes et al. 2007) projections and considerably lower than the rates reported by the United Nations World Trade Organization and Trends Inc, summarized in Brackley et al. (in press).

Basically, the Limited Lumber scenario assumes the market for sawlogs from Alaska will be relatively low and remain so, as the intent of this scenario was to depict the situation the industry has faced over the last several years. The Expanded Lumber scenario assumes there will be some kind of demand stimulus for sawlog material. Such a demand stimulus could come from an industry marketing program, capital investment to make existing sawmills in Alaska more efficient, a change in policy, or some other event that enhances the competitive position of Alaskan producers relative to their competitors in the continental United States, or a combination of such developments. The recent implementation of a limited shipment policy by the US Forest Service in Alaska, in addition to the start-up of a veneer mill in Ketchikan, makes the Expanded Lumber Scenario the most likely scenario representing southeast Alaska's near future (Brackley and Haynes in press).

The Medium Integrated Industry and High Integrated Industry scenarios build on the Expanded Lumber scenario, and in addition, both assume there will be a demand stimulus for low grade and utility logs, which could come about by the construction of one or more chip and utility log processing facilities in Southeast Alaska. These two scenarios assume an increase in markets for Alaska lumber products, but not to the extent assumed in the first two scenarios. These two integrated industry scenarios also assume varying increases in the Alaska share of the North American export market. The Medium integrated scenario assumes an increase in demand for chippable material equivalent to the construction of one chip/utility processing facility in 2008, while the High integrated scenario assumes there will be two increases in demand for chippable material, equivalent to the construction of two chip/utility processing facilities, one in 2008 and another in 2012. Development of a market for low-quality material is referred to as an integrated industry, because all of the material resulting from timber harvest would be processed into marketable products. This is displayed as the construction of medium-density fiberboard (MDF) plants, but the authors make it clear that an MDF plant is only one way a use for low-quality material could develop. Shipments of low-grade material to markets outside southeast Alaska could also be the demand stimulus modeled in these two scenarios.

Table G-1
Characteristics of scenarios defining demand for Alaska roundwood (adapted from Brackley et al. 2006a)

	Scenario			
Characteristic	**Limited lumber production**	**Expanded lumber production**	**Medium integrated industry**	**High Integrated industry**
	Million cubic meters			
Pacific Rim lumber imports:				
Starting	8,077	8,077	8,077	8,077
Ending	11,042	11,042	9,099	10,098
	Million board feet lumber tally			
NA share of Pacific Rim market[a]				
Starting	2,146.7	2,146.7	2,146.7	2,146.7
Ending	2,760.5	2,760.5	2,760.5	2,760.5
	Percent			
AK share NA market				
Starting	0.39	0.39	0.39	0.39
Ending	0.39	1.14	1.60	2.34
NA share of Pacific Rim softwood lumber market	49.29	49.29	49.29	49.29
Estimated low-grade material in sawmill log mix[b]	33	33	10	10
Demand stimulation	no	yes	yes	yes
Market for low-grade logs	no	no	yes	yes

a. NA is North America, and AK is Alaska.
b. Estimating amounts of low grade and utility grade logs delivered to sawmills for use as saw logs meeting the definition of a number 2 saw log at least 12 feet long.

The assumptions and structure used in the Brackley et al. (2006a) model affect the results. An example of a structural aspect is the way total demand is allocated among ownerships. Since the trend analysis model used by Brackley et al. (2006a) calculates National Forest wood demand as a residual (i.e., the share of total demand for Alaska wood products not already accounted for by other ownerships), the model will be sensitive to assumptions about production from other ownerships. They assumed state lands in the region will produce 6.8 mmbf annually. Production from state lands will have an inverse relationship to production from Federal lands, all else assumed constant. If nothing else changes in the model, less production from State lands will mean more demand from Federal lands, and vice versa.

The assumptions in the model also affect the results in various ways. The model assumes that low grade and utility material in the two lumber production scenarios may be unused, sent to chippers, or exported. Changes in their assumptions regarding low grade material utilization may affect the volumes of timber actually removed from timber sales. The model also assumes that in the long run, the volume of sawn material shipped to the total Pacific Rim market (both domestic and foreign) from North American will steadily increase. The proportion stays the same, but the total amounts increase, as the model assumes the entire market is increasing. In the short run this assumption won't affect the results. Over a decade or more, if this assumption proves incorrect, there will be an effect on projected demand. Given population trends in all Pacific Rim market areas, this assumption of increasing demand is very likely. The model also assumes that demand for Alaska manufactured products is directly linked to demand for North American manufactured products through the share calculation. As the North American share of total Pacific Rim markets increases, so will demand for Alaska products, all else constant. In addition, if the proportion of Alaska products in the entire North American market increases, demand for Alaska products will increase, all else constant. These assumptions change from current levels to the levels outlined in Table G-1 gradually throughout the projection period.

Brackley et al. (2006a) list the following issues that will need further research to assist in better predictions in the future. They mention the issue of transshipments. Local sales of lumber within Southeast Alaska are not documented; information is needed as to types of products, prices, and so on. The price differential between foreign and domestic markets for Alaska wood products needs more investigation. Transportation costs are not documented in publicly available databases. The mix of dimension versus shop products is only beginning to be assessed, and conversion factors for these products in Alaska manufacturing are not well developed.

Using Derived Demand Estimates to Estimate Supply

Determining what the demand estimates mean for timber sale offered from National Forest lands in Southeast Alaska involves taking the results from Brackley et al. (2006a) and using them as input to a supply calculation that seeks to meet annual market demand from the forest. The derived demand projections in Brackley et al. (2006a) are one of the inputs to the timber offer calculation developed by Morse (2000). In the original model development (Morse 2000), the derived demand input was total projected harvest volume from the PNW projections developed by Brooks and Haynes (1997). Timber volume in the Brackley et al. (2006a) demand projections in Scenarios 1 (limited lumber) and 2 (expanded lumber) include decked saw logs, cedar log shipments out of Alaska, chip volumes available from sawmill production, and a very small portion of utility or low-grade material that they assumed goes directly to mill chippers. The authors acknowledge that pulpwood grade material may be left in the woods, but they did not include that volume in these two projections. Scenarios 3 (medium integrated) and 4 (high integrated) include decked saw logs, cedar log shipments out of Alaska, chip volumes available from sawmill production., utility, and low-grade material. This is different than previous projections, which projected demand for Tongass timber as volume of timber in timber sales in the forest, and did not disaggregate by species or log grade. The volume reported in Brackley et al (2006a) needs to be adjusted to represent total sale volume needed to meet derived demand estimates for the Limited Lumber and Expanded Lumber scenarios. Table G-2 illustrates the estimated sale volume represented by Brackley et al. (2006a) in their projections.

Table G-2
Tongass National Forest sale volume necessary to supply derived demand for decked log volume and chips reported in Brackley et al. (2006a) (Million Board Feet).

	Projected National Forest Timber Harvest—Alaska (MMBF; includes sawlog, utility, and shipments from Alaska)[a]			
Year	1. Limited lumber	2. Expanded lumber	3. Medium integrated	4. High integrated
2007	49.8	61.9	67	67
2008	49.8	66.4	139	139
2009	51.3	72.4	151	151
2010	52.8	78.5	166	166
2011	52.8	84.5	184	184
2012	54.3	90.5	204	286
2013	55.8	98.1	204	291
2014	57.3	105.6	204	295
2015	58.9	113.2	204	299
2016	58.9	122.2	204	303
2017	60.4	131.3	204	308
2018	61.9	140.3	204	312
2019	63.4	150.1	204	317
2020	64.9	163.0	204	325
2021	66.4	175.0	204	333
2022	67.9	187.1	204	342
2023	69.4	200.7	204	351
2024	70.9	215.8	204	360
2025	72.4	230.9	204	370

a. Annualized calculation to fulfill derived demand scenarios from Brackley et al. (2006a). This table was created using annualized values provide by Dr. Allen Brackley (personal communication, Nov 29 2006) from the model used to develop derived demand estimates in Brackley et al. (2006a). The values reported in this table have been adjusted to include low quality material not included in the demand projections. The Limited and Expanded Lumber scenarios are adjusted from values provided by Dr. Brackley by 33.73 percent to include utility volume (14.56 percent) and grade 3 volume (19.17 percent). The Limited and Expanded Lumber scenarios include saw logs, cedar export, and chip volumes available from sawmill production. Footnote b in Table 2, page 17, Brackley et al. (2006a) states that material delivered to sawmills meets the definition of a number 2 saw log at least 12 feet long , so these calculations are adjusted to account for utility and grade 3 volume. The Medium and High Integrated Scenarios developed by Brackley et al. (2006a) and presented here include saw logs, cedar exports, chip volumes, low-grade material, and utility. These scenarios are not adjusted.

The volume adjustment of wood delivered to sawmills, as in the Limited Lumber and Expanded Lumber scenarios in Brackley et al (2006a), to volume of wood necessary to be offered in a timber sale requires several steps. First is an assessment of the distribution by species in the Tongass National Forest. The net volume, by percent, of growing stock on timberland in Southeast Alaska of commercial softwood species is as follows:

Alaska yellow cedar = 10.02%
Sitka spruce = 26.71%
Western redcedar = 6.18%
Western and Mountain hemlock = 57.09%

The above percentages were calculated from Table 13 in van Hess (2003).

The next step is to assess what percentage of timber is in each grade by species on the ground. The following distribution is calculated using cruise data from thirteen timber sales distributed across the forest. Grades 2 and 6 are combined because some cruises were done before grade 6 (special mill) was implemented.

Western hemlock grade 3:	33.8%
Western hemlock grade 2/6:	55.8%
Western hemlock grade 1:	6.2%
Western hemlock grade 0:	3.2%
Sitka spruce grade 3:	15.5%
Sitka spruce grade 2/6:	64.7%
Sitka spruce grade 1:	13.2%
Sitka spruce grade 0:	6.4%

Utility grade is not part of cruise data. Recent information indicates that 10 percent of all Sitka spruce is utility, and 20 percent of all hemlock is utility. By combining the information about percent of grade by species, the percent of standing timber by species in an average Southeast Alaska stand, and the fact that 10 percent of all Sitka spruce is utility and 20 percent of all hemlock is utility, the following percent of net volume by grade and species for standing timber on the Tongass National Forest was derived.

The following calculation is an example of how percentages of Sitka spruce and hemlock by grade were calculated. The percentage of Sitka spruce in grade 3 (15.5) multiplied by the percentage of Sitka spruce in an average stand (26.71) yields the percentage of Sitka spruce grade 3 in an average stand (4.14 percent). We know that ten percent of this grade 3 Sitka spruce is utility. So, 0.41 percent of Sitka spruce grade 3 is utility and 3.73 percent of Sitka spruce grade 3 remains (see Table G-3). The utility wood from all the grades for Sitka spruce add up to 2.96 percent (Table 3, any errors are due to rounding).

Table G-3
Percent of volume in an average Tongass National Forest stand, by grade and species.

Species and Grade	Percent of Total Volume
Alaska yellow-cedar	10.02
Western red-cedar	6.18
Sitka spruce grade 3	3.73
Sitka spruce grade 2/6	15.55
Sitka spruce grade 1	3.18
Sitka spruce grade 0	1.54
Sitka spruce utility	2.96
Hemlock grade 3	15.44
Hemlock grade 2/6	25.49
Hemlock grade 1	2.84
Hemlock grade 0	1.47
Hemlock utility	11.60

The amount of utility in an average Southeast Alaska timber stand is 14.56 percent. The amount of grade 3 is 19.17 percent. The total amount of low-grade material is 33.73 percent.

The demand numbers reported by Brackley et al. (2006a) are projections of how much wood will be used to meet derived demand projections. Timber sales take years to process, and can be held for several years by the purchaser in anticipation of future needs. Timber sales must be planned and made available in advance of projected needs. The derived demand projections do not include increased timber sale volume in anticipation of increases in wood processing (such as increasing use of existing infrastructure, or construction of new mills). Such timber would need to be sold in preceding years to provide sufficient wood supply.

Demand is an estimate, and translating that demand to on-the-ground sale numbers is also an estimate. The derived demand projections developed by Brackley et al. (2006a) are used to estimate the market demand for the Forest planning cycle. They are also, as noted above, an important input to the model (Morse 2000) that the Forest Service uses to compute the offer target or supply of timber from the Tongass National Forest in a given year. That procedure will be outlined in the next section.

Development of Timber Sale Requirements to Meet Market Demand

The new demand projections in Brackley et al. (2006a) required that the spreadsheet model outlined in Morse (2000) for estimating timber sale goals be modified slightly to reflect the four alternatives in Brackley et al.(2006a). Modification of the spreadsheet model allows continued implementation of Forest Service Sale Preparation Handbook direction (FSH 2409.18, R-10 Supplement 2409.18-2006-5; Ch. 11.4), which basically states that the procedure outlined in Morse (2000) will be followed in developing short-term offer targets.

The general approach of the timber sale offer model (Morse 2000) is to consider the timber requirements of the region's sawmills at different levels of operation and under different assumptions about market conditions and technical processing capacity. These assumptions provide a basis for estimating the volume of timber likely to be processed by the industry as a whole in any given year. The specific steps in the process are outlined below.

Volume of Timber Processed Locally. The first stage in the calculations adjusts mill capacity estimates by the utilization rate assumed for each of the four scenarios, and by the percent of volume expected to come from the Tongass National Forest. This provides an estimate of the volume of logs from the Tongass National Forest likely to be processed into lumber by sawmills in Southeast Alaska under the different scenarios. These figures are then adjusted upward to account for species and grades of timber that are not processed into lumber locally. Given this set of assumptions, the timber supply expected to be consumed in a given fiscal year is then computed.

Inventory requirements. The second stage provides an estimate of the volume of uncut timber inventory to carry under different demand scenarios. As described on pages 19-20 of Morse (2000), target inventory levels depend on the volume expected to be processed each year and the amount of time needed to replenish inventory. The relationship is summarized in Morse (2000; equation 2, page 20) and by the timber inventory requirements in the model itself. Because the volume of timber expected to be processed varies by scenario, timber inventory requirements also vary from one scenario to another.

Harvest Projections. The next step in the process is to incorporate the derived demand estimates developed by Brackley et al. (2006a), adjusted as shown in Table G-2.

Range of Expected Timber Purchases. By subtracting the volume under contract at the beginning of the year from the required inventory , the projected inventory shortfall is calculated. The low range of expected timber purchases is replacement for the volume harvested; the high range is the volume harvested plus the inventory shortfall so that the inventory requirement is met at the end of the year.

The Fiscal Year (FY) 1999 to 2006 Department of the Interior and Related Agencies Appropriations Acts have included appropriations for preparing additional timber for sale to establish a three-year timber supply. In FY 2006, the Act states that:

> That of the funds provided under this heading for Forest Products, $5,000,000 shall be allocated to the Alaska Region, in addition to its normal allocation for the purposes of preparing additional timber for sale, to establish a 3-year timber supply and such funds may be transferred to other appropriations accounts as necessary to maximize this accomplishment.

While the funding level has been different for each fiscal year, the appropriation for preparation of timber sales in order to establish a three year timber supply has remained constant. The reason for establishing a three-year supply is to give timber manufacturers in Southeast Alaska enough volume to maintain a viable inventory for financial integrity and to respond to market changes at their discretion.

Three-year timber supply. The annual timber supply needs from the Tongass National Forest is considered synonymous with the annual timber consumption (i.e., the amount that is expected to be harvested in a given year). To estimate the three-year timber supply, the annual consumption is multiplied by three years.

Timber Pipeline. The Tongass timber pipeline was established as a process to "ramp-up" to the three-year supply over a period of years. It takes about four years to get a project through the analysis and preparation process, to be ready to offer for sale. The additional average annual volume needed to meet the three-year timber supply in a given fiscal year is the three-year timber supply of timber inventory minus timber inventory requirement , spread evenly over a four-year period.

Total Timber Sale Requirement. By taking the median between the low and high range of the volume expected to be purchased, and combining it with the average annual pipeline volume, the total volume anticipated for purchase is estimated.

The measure of meeting the TTRA "seek to meet" and the appropriations bill "three year timber supply" is volume sold from the Tongass National Forest. To meet these objectives, a sufficient amount of volume must be offered to account for any fall-down between the volume offered and the volume sold. The final step in projecting the amount of volume to be purchased is to evaluate the anticipated volume that needs to be offered.

Timber Sale Fall-down. Historically, there has been a difference between the volume offered and the volume sold from National Forest timber sales. The reluctance of purchasers to buy timber sales tends to increase as markets decrease and/or logging costs increase. Mason et al. (2004) examined why some offerings in Southeast Alaska go unsold, and concluded that the probability of a timber sale being successfully sold is tied to downstream markets that are inherently difficult to predict, rather than factors directly controlled by the Forest Service.

Projected Offer Objectives. In an effort to project the amount of volume that needs to be offered for each of the scenarios, the total timber sale projection is increased to account for fall-down and litigation to provide a rough estimate of the volume to be offered for each scenario to meet timber sale objectives.

Conclusion

There have been many changes in the wood manufacturing industry in southeast Alaska in the past decade. Southeast Alaska's two pulp mills and numerous sawmill facilities have closed. Remaining active mills operate at about 13 percent of their estimated capacity, on average. In 2006, the ratio of species sawn in Southeast Alaska mills was about the same as the past six years, with western hemlock in the lead (60 percent of total volume sawn), followed by Sitka spruce (27 percent), western red-cedar (11 percent), and Alaska yellow-cedar (3 percent). Between 2002 and 2006, sources of logs for local mills have been about two-thirds National Forest and one-third State of Alaska, with a very small proportion (less than one percent) from private lands. The destination for material sawn in Southeast Alaska is now primarily other states within the U.S. (Kilborn et al. 2004; Brackley et al. 2006b). Demand for Southeast Alaska wood products in historic export markets, particularly Asia, continues to be low. Hansen (2006) states that U.S. companies have historically jumped into the export market when the domestic market is down, and shifted back to the U.S. market when the domestic market improves. In recent years, the U.S. domestic market has been very attractive with high housing starts and strong prices in many forest product categories. Haynes et al. (2007) state that U.S. demand for forest products is varied and large.

On the supply side, the cost of preparing stumpage for sale and delivering it to mills is generally higher than in Oregon and Washington, due to transportation and labor costs, decreased size of sales, increased fuel costs, legal and procedural challenges to federal timber sales, and more constraints on harvest activity on Federal lands in the interest of resource protection. The uncertainty surrounding Tongass National Forest sale quantities has increased the risk faced by potential purchasers and investors in local processing capacity.

In choosing the offer level, it is important to anticipate the consequences of a "wrong" decision. In terms of short-term economic consequences, over-supplying the market is less damaging than under-supplying it. If more timber is offered than purchased in a given year, the unsold volume is still available for purchasing off-the-shelf or re-offered at a minimal investment. However, a significant shortfall in the supply of timber available for harvest in a given year can be financially devastating to the industry.

Planning the timber program requires more than just pure economic factors. To account for delays in timber sale preparation, administrative appeals, and/or litigation, sufficient contingent volume must be included in the annual timber sale program to account for realistic fall-downs. Budget and organizational constraints limit the extent to which the Forest Service can respond to economic cycles and the associated fluctuations in timber demand. All of these factors must be considered in evaluating the market demand for timber and setting timber offerings. In the final analysis, planning the timber sale program is an exercise in professional judgment. The purpose of this paper is to identify the extent to which economic analysis contributes to this decision-making process.

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APPENDIX H
COMMENTS AND RESPONSES

Appendix H

Comments and Responses

CONTENTS

CONTENTS continued

Appendix H
Comments and Responses

A. Introduction

The Tongass Land and Resource Management Plan Amendment Draft Environmental Impact Statement (EIS) and the Draft Proposed Land and Resource Management Plan were completed and mailed out (beginning January 4, 2007) to the 2,300 organizations and individuals on the Tongass National Forest's mailing list. The document and supporting documents were also posted on the project web site (http://www.tongass-fpadjust.net).

The Notice of Availability for the Draft EIS was announced in the Federal Register on January 12, 2007, initiating the 90-day formal public comment period. The 90-day comment period was subsequently extended from April 12 to April 30, 2007 because severe weather in Southeast Alaska caused some of the public meetings/hearings to be rescheduled and delayed some of the Forest's Tribal consultation activities.

This appendix presents a summary of the comments received during the public comment period and provides the Forest Service's responses to these comments. In addition, Attachment A provides copies of the letters received from government agencies, elected officials, and tribal governments.

Public Meetings

Twenty-five public meetings were held to elicit public comment over this period. These meetings included 23 meetings in communities located throughout Southeast Alaska, a meeting in Anchorage, and an electronic public meeting held on the internet (Table H-1). These meetings included both open houses and hearings. The open houses were informal meetings where participants could review maps and other information, and ask questions or discuss the Draft EIS or Forest Plan with Forest Service representatives. The hearings were formal opportunities for participants to provide oral testimony on the Draft EIS. A total of 204 people provided oral testimony at these hearings, with several people testifying at more than one hearing.

Public Input

The Forest Service received 84,509 separate pieces of input during the public comment period. These pieces of input, referred to here as "comment documents," were provided in a number of different forms, including email, letter, fax, public testimony, and online comment form (http://www.tongass-fpadjust.net). As part of the initial comment evaluation process, comment documents were initially divided into unique comment documents and form comment documents.

A comment document is considered a form document when copies of the same document (letter, email, comment form, etc.) are submitted by five or more people. Form comment documents are typically generated by special interest organizations that encourage their members to write, and provide a written template for them to use. In some cases members are encouraged to add their own personal message to the template.

Table H-1.
Locations and Dates of the Public Meetings

Community	Location	Date
Anchorage	Loussac Library Assembly Chamber	3/30/2007
Angoon	Community Center	4/13/2007
Coffman Cove	City Hall	2/20/2007
Craig	Craig Community Hall	3/1/2007
Edna Bay	Community Building	3/21/2007
Gustavus	School	3/14/2007
Haines	Borough Chambers	3/6/2007
Hoonah	Ranger District	3/7/2007
Hydaburg	City Hall	2/27/2007
Internet Meeting	http://www.tongass-fpadjust.net/	3/22/2007
Juneau	Centennial Hall	2/27/2007
Kake	Community Hall	3/21/2007
Ketchikan	Discovery Center	3/1/2007
Naukati	School Commons	2/21/2007
Petersburg	City Council Chamber Hall	2/22/2007
Point Baker	Community Building	3/12/2007
Port Protection	Community Building	3/22/2007
Saxman	Saxman Community Center	3/13/2007
Sitka	Sheet'ka Kwaan Naa Kahidi (Community House)	2/22/2007
Skagway	City Chambers	3/5/2007
Tenakee Springs	Community Hall	3/14/2007
Thorne Bay	City Hall	2/22/2007
Whale Pass	Library	2/23/2007
Wrangell	Nolan Center	3/20/2007
Yakutat	High School Auditorium	2/28/2007

Unique Comment Documents

Approximately 2.5 percent (2,102) of the comment documents received were classified as unique comment documents. The vast majority of these unique documents (1,898) were received from addresses in the U.S. Eight unique comment documents were received from Canada, with one apiece from Great Britain, France, Switzerland, and Japan. The remaining 192 unique comment documents were received with no address information.

Alaska residents submitted 620 unique comment documents, including 200 comments submitted as testimony at public hearings. These comment documents accounted for approximately 29 percent of the total unique comment documents received. The next three most frequently represented states were Washington (180 comment documents, 8 percent), Florida (130 comment documents, 5 percent), and Oregon and Pennsylvania (105 comment documents each, 5 percent each).

The total number of unique comment documents received in response to this Draft EIS (2,102) is approximately 70 percent of the number (2,983) submitted during the public comment period for the 2002 Draft Supplemental EIS (SEIS) for Wilderness Recommendations on the Tongass (USDA Forest Service 2003).

Form Comment Documents

The vast majority (approximately 97.5 percent) of the comment documents were form responses. Thirteen different form comment documents were identified, with the number of copies ranging from 5 to 43,216.

Approximately 95 percent of the form comment documents received were from addresses in the U.S. Form comment documents were received from all 50 states. Residents of California accounted for

15,600 (19 percent) of the form comment documents sent from within the U.S. The next three most frequently represented states were New York (6,220 comment documents, 8 percent of U.S. form comment documents), Florida (4,330 comment documents, 5 percent), and Illinois (3,430 comment documents, 4 percent). Alaska residents submitted 350 form comment documents, less than 0.5 percent of the total received from U.S. residents.

Form comment documents were also received from 89 other countries. Approximately 15 percent of the form comment documents from other countries were from Canada (600 comment documents). The next three most frequently represented countries were Great Britain (540 comment documents, 13 percent of non-U.S. form comment documents), Australia (280 comment documents, 7 percent), and France (120, 3 percent). In addition, 1,130 form comment documents were submitted without any address information.

The large number of documents and locations involved reflects the importance of the Tongass National Forest at a national and international level. It also reflects the membership and geographic reach of the organizations that prepared the original written templates, as suggested by the concentration of form comment documents from addresses in California and New York.

The total number of form comment documents received in response to this Draft EIS (82,407) is less than half the number of form comment documents (174,000) submitted during the public comment period for the 2002 Draft SEIS (USDA Forest Service 2003).

Comment Document Evaluation

Public comments were submitted to the Forest Service via online comment form, email, U.S. Mail, as testimony at a public hearing (in-person or online), and via hard copy comment form. Approximately 97.5 percent of the total comment documents (82,400) were sent via email. This percentage was higher for the form comment documents with 99.3 percent sent via email. Email accounted for 29 percent (about 600 messages) of the unique comment documents. More than half (59 percent, 1,220 letters) of the unique comment documents were sent via U.S. Mail.

Each comment document was assigned a unique identifier (number) upon receipt and entered into a database. Documents were numbered in the order received by the comment management team. Summary demographic information for each response was entered into a database, including the name and address of the comment author (when provided), the type of comment author (individual, government agency, environmental organization, etc.), and the method of transmittal (online comment form, email, U.S. Mail, public hearing testimony, hard copy comment form).

Members of the comment management team read each comment document and identified the comments within each document. Comments were identified for one copy of each form comment document. Comments were defined for the purposes of this initial identification phase as a coherent segment of text that stood alone as a suggestion, idea, request, or critique. Comments were delineated on a hard copy of the comment document and each comment was assigned a number. The comment number was entered into a database and assigned to a coding category. Up to three key words or terms that further characterized the comment, along with additional notes, were entered in separate fields in the database, as appropriate. The initial coding categories corresponded for the most part with the resource areas addressed in the Draft EIS. A copy of each coded comment document was scanned and saved as a unique PDF file.

Comment Summaries and Responses

The database allowed the comments to be sorted by coding category and key words. Resource specialists and Forest Service managers reviewed all the comments and consolidated the individual comments into logical comment summaries, developed responses to the comment summary, and revised the analysis or text in the Final EIS, as appropriate. The comment summaries and responses are presented in Section B of this appendix. Some comment summaries represent a concern raised once; others represent a concern, opinion, or preference that was repeated in a number of different comments. This is generally indicated at the beginning of each comment summary.

The comment identification process erred on the side of inclusion and more than 5,500 individual comments were identified and coded. Many of the identified comments consisted of statements of opinion or preference, and did not require a factual response. Comment summaries and responses are, however, presented in Section B for a number of these types of comments, primarily to provide information to the public or clarify popular misconceptions.

In accordance with 40 Code of Federal Regulations (CFR) 1503.4, the Forest Service generally considered responding in five basic ways to the substantive public comments identified in the following sections.

1. Modifying alternatives.
2. Developing and analyzing alternatives not given serious consideration in the Draft EIS.
3. Supplementing, improving, or modifying the analysis that the Draft EIS documented.
4. Making factual corrections.
5. Explaining why the comments do not need further Forest Service response.

Review of the public comments resulted in Alternative 1 being modified between the Draft and Final EIS with all Inventoried Roadless Areas being removed from the suitable land base under this alternative. After substantial consideration, it was decided that the range of alternatives was sufficient and captured the effects of all possible new alternatives. The results of the public involvement and comment process did, however, lead to a number of improvements, clarifications, and updates between the Draft and Final EIS. These changes are identified where applicable in the following section (Section B).

The following section presents the comments and responses developed by the resource specialists and Forest Service managers that comprise the Interdisciplinary Team for this project. Copies of the comment documents received during the public comment period from government agencies, elected officials, and tribal governments are presented in Attachment A. All of the responses received are available for review in the project planning record.

B. Comment Summaries and Responses

This section of the Appendix presents a summary of all of the substantive comments, written or oral, received during the public comment period for the Draft EIS and provides Forest Service responses to these comments. The comments and responses are organized and presented in the following categories:

General Comments

- Alternatives
- Cumulative Effects
- Energy
- Forest Plan – General
- Forest Plan Monitoring and Adaptive Management
- General
- Key Issues
- Multiple Use
- Public Involvement
- Restoration
- Schedule
- Standards and Guidelines
- Tribal Consultation

Resource and Issue Comments

- Climate and Air
- Economic and Social Environment
- Fish and Watersheds
- Geology, Soils, Karst and Caves
- Heritage and Sacred Sites
- Lands
- Minerals
- Recreation, Tourism and Scenery
- Roadless Areas and Wilderness
- Subsistence
- Timber
- Transportation and Utilities
- Wetlands
- Wildlife, Biodiversity and Plants

Specific Geographic Area Comments

- Specific Geographic Area Comments and Responses
- Specific Places Identified for Protection

General Comments

The General Comments section is divided into the following subsections:

- Alternatives
- Cumulative Effects
- Energy
- Forest Plan – General
- Forest Plan Monitoring and Adaptive Management
- General
- Key Issues
- Multiple Use
- Public Involvement
- Restoration
- Schedule
- Standards and Guidelines
- Tribal Consultation

Alternatives

Comment: Many comments expressed support or opposition for one or more of the seven alternatives. Support for Alternative 1 which would provide the lowest level of timber harvest and the highest level of roadless area protection was most prevalent. At the other end of the spectrum many respondents expressed support for Alternative 7, which provided the highest level of timber output and would support a fully integrated timber industry.

Response: The seven alternatives evaluated in the Final EIS present a range of reasonable alternatives developed in response to the three significant issues identified for this project. Clearly, people disagree on what the appropriate mix of timber harvest and roadless area protection should be on the Tongass. They also disagree about the risk the different alternatives pose to wildlife viability and other potentially affected resources.

Comment: Some respondents felt that the range of alternatives was inadequate. Some believed that Alternative 1 had too much old growth logging and road building, or that no old-growth should be cut. Others felt that Alternative 7 might not provide an adequate amount of timber to sustain an integrated timber industry in Southeast Alaska and should be modified to eliminate old-growth reserves (OGRs), roadless area protections, beach buffers, and Class III stream riparian buffers. Some respondents were opposed to any timber harvest, while others commented that too much land is being left undeveloped and at least 1.5 million acres were needed for timber production and pointed out that this would still leave over three-quarters of the old-growth forest undeveloped.

Response: Alternative 1 was modified between the Draft and Final EIS to reduce the amount of logging and road building. All Inventoried Roadless Areas were removed from the suitable land base, as were a number of areas of concern, such as Kuiu Island. The Forest has an obligation under the Tongass Timber Reform Act (TTRA) to seek to meet the demand for timber. Alternative 7 has an adequate land base to exceed the highest levels of potential future timber demand as identified by McDowell Group 2004 and Brackley et al. 2006. Alternative 7 does not include OGRs or 1,000-foot beach buffers. Alternative 7 (as modified in the Final EIS) does not include OGRs, 1,000-foot beach buffers, or buffers on Class III streams.

Comment: A number of comments stated that the analysis was too narrowly focused on timber demand resulting in an inadequate range of alternatives. These respondents felt that the Draft EIS should have examined alternate desired conditions for the Forest and a new array of goals and objectives. Other items such as designation of new wilderness areas, road management options, the growth in recreation demand, and other OGR options were cited as examples of topics that should have been considered in more detail. Some felt that a full revision of the Forest Plan was necessary.

Response: This analysis effort is being conducted in response to the August 2005 Ninth Circuit Court of Appeals Court Decision which directed the Forest to take a second look at timber demand, the alternatives considered in response to timber demand, and cumulative effects. To respond to the Court in a timely manner, the decision was made to limit the scope of the analysis and amend the Forest Plan. The suggested topics were covered in the 1997 Plan Revision that this Amendment brings to completion. Chapter 1 of the Final EIS explains the Purpose and Need for the analysis and describes the history of forest planning on the Tongass. Forest planning is a dynamic process with periodic reviews occurring to assess the need for additional changes.

Comment - Concern was expressed that an alternative that maximized timber harvest within the roaded land base was not developed.

Response: Alternative 1 was modified for the Final EIS to remove all Inventoried Roadless Areas from the suitable land base. The timber output level associated with Alternative 1 is intended to represent the level of timber harvest that has occurred over the last several years. While it is true that more timber might be harvested from this land base, it is unclear if it would truly be sustainable. As the land base decreases, standards and guidelines that coincide and other spatial issues become more problematic. While some feel that more intensive management on a smaller land base is appropriate, others have concerns about issues such as wildlife habitat connectivity and water quality. Some analysis has been done regarding the maximum amount of timber that could be harvested from the roaded land base, but a separate alternative was not analyzed in detail.

Comment: Concern was expressed that a preferred alternative was not identified in the Draft EIS.

Response: As noted in the cover letter that accompanied the Draft EIS, the Forest Supervisor for the Tongass National Forest, chose not to identify a preferred alternative for the Draft EIS because he hoped that public input in response to the Draft EIS would help the forest make a more informed decision. The Forest Service wanted to get comments regarding the merits of all the alternatives and ideas about possible combinations of alternatives that would be acceptable. The Forest Supervisor and other members of the planning team felt that identifying one of the alternatives as the preferred in the Draft EIS could be counterproductive and might lead to polarization rather than a collaborative discussion.

Comment: Some felt they could only support an alternative that gave great emphasis to conserving the forest for future generations rather than highly weighting immediate extractive use of the forest.

Response: All the alternatives in the Final EIS are judged to be sustainable and conserve the forest for future generations.

Cumulative Effects

Comment: Several comments urged that the cumulative effects of past logging, particularly on private lands, be taken into account when considering future timber harvest.

Response: Cumulative effects were one of the deficiencies of the 1997 Final EIS identified in the August 2005 decision issued by the U.S. Court of Appeals for the Ninth Circuit. As noted in the cover letter that accompanied the Draft EIS, considerable work was completed for this analysis to acquire information on past timber activities conducted on lands managed by the State of Alaska and Alaska Native Corporations. This information is included in the cumulative effects discussions presented by potentially affected resource in the EIS and supplements the extensive cumulative effects analysis that was completed for the 1997 planning effort.

Energy

Comment: One comment noted that as fuel and other energy costs continue to increase there will be increased interest in wood products and hydroelectric projects on the Tongass. These things, the comment noted, will help reduce the region's dependence on fossil fuels. Another comment expressed support for using wood waste and low value material as fuel and cited the current project in Craig as an example that should be identified in the Final EIS.

Response: Biofuel and hydroelectric projects do have the potential to reduce fossil fuel consumption, as noted in the Final EIS. The wood burning boiler installed by the community of Craig to heat school buildings and a recreation facility is identified in the *Economic and Social Environment* section of the EIS as an example of one of several developments that hold future promise for the timber industry in Southeast Alaska. As noted in the EIS, several other communities have also shown interest in this type of system

Comment: Several comments stated that the site for the airport identified in the Kootznoowoo Wilderness should be on the EIS maps. These maps should also show prospective hydroelectric, wind, tidal, and geothermal energy sites, as well as native allotments.

Response: This Plan Amendment responds to a narrow set of issues defined by the Ninth Circuit Court and to some additional issues identified in the 5-year Plan Review. These maps are not intended to illustrate all aspects of Forest resources. However, the Angoon Hydroelectric Project will be included in the Transportation and Utility Systems LUD on the Forest Plan map.

Forest Plan - General

Comment: Some comments stated that the Tongass National Forest should be divided into sections or different units for various reasons and each area should be managed separately, taking into consideration the uniqueness of each area or applicable laws.

Response: The Land Use Designations (LUDs) identified in the current and proposed Forest Plans consider the uniqueness of areas and allow for the tailoring of management direction to match the characteristics of each area. The LUDs take into account all applicable laws and regulations, including TTRA, the Alaska National Interest Land Conservation Act (ANILCA), and Wilderness designations by Congress.

Comment: One respondent felt the Forest Plan should be specific to each separate island or appropriate island-groupings, with unique management plans and separate standards and guidelines applied to each island or island-grouping.

Response: Forest planning takes place at two levels: 1) programmatic planning, as found at the Forest Plan level, and 2) project-specific planning that addresses particular site-specific projects, such as proposed timber sales or recreation developments. Intermediate planning as proposed in this comment is beyond the scope of this analysis. The Forest Service normally evaluates specific projects at the landscape assessment or site-specific level during Forest Plan implementation. Nothing precludes the Forest Service from applying adaptive management techniques based on appropriate analysis whether at the smaller landscape or project level, or at the level represented by the Forest Plan.

Comment: Concern was expressed that the Experimental Forest LUD should not be classified as a Development LUD but instead should be in the Natural Setting LUD group because of the restrictions to development.

Response: Development and Natural Setting are broad categories that are useful for comparing LUD designations in alternatives. The Experimental Forest LUD may be a good example of one that is somewhere in between these two categories.

Comment: Some respondents felt that a separate LUD was needed for customary and traditional uses. Others asked for an economic zone around certain native communities so that their needs would be recognized and have highest priority in those areas.

Response: Traditional and subsistence uses are widespread and often compatible with other uses and, as a result, the current and proposed Forest Plans emphasize the importance of these uses across the Forest on most lands rather than identify certain zones. Maps of community use areas were considered in alternative development and determination of effects (see the *Subregional Overview and Communities* section of the EIS).

Forest Plan Monitoring and Adaptive Management

Comment: Numerous comments were received regarding the use of adaptive management. Most generally accepted or supported adaptive management but advised caution with respect to the potential for misuse. Others expressed concern over the use of adaptive management and assumed that the application of adaptive management techniques would mean less protective measures for a particular resource. Concern was also expressed that there needed to be a monitoring program in place with adequate funding.

Response: Site-specific projects or activities that implement adaptive management are typically applied and reviewed at the project level, though some may be applied Forest-wide. The Forest Plan monitoring program considers adaptive management.

Comment: One comment noted that the information needs for the Conservation Strategy identified in Appendix B to the 1997 Forest Plan were presented as a static list of studies that were priorities in 1997 with no mechanism that allowed this list to evolve over time. The comment noted that funding for research and monitoring is limited and stated that Appendix B to the amended Forest Plan needs to incorporate a "dynamic, well-defined process to identify and prioritize information needs, and compare results against original hypotheses."

Response: Appendix B of the Final Proposed Forest Plan has been updated to better reflect the ongoing nature of pursuing new information and the fact that many agencies, academics, and others are involved in this process. The appendix also acknowledges that coordination between different agencies and researchers is important.

Comment: Many general comments on Forest Plan monitoring were received. Identified concerns included issues related to adaptive management, evaluation needs and working with cooperative agencies. Some comments were concerned about the overall ability of the Forest to fund adequate and appropriate monitoring.

Response: The Monitoring plan for the Final Proposed Forest Plan was extensively edited from the Draft EIS. These changes reflect these issues in light of declining budgets while maintaining a robust monitoring plan that is adaptable and serves the needs of the Forest Plan.

General

Comment: One respondent felt that the Draft EIS failed to adequately scope and analyze the effects of emergencies and natural disasters.

Response: The potential effects of emergencies and natural disasters are beyond the scope of this analysis. It may, however, be noted that the Forest Service has emergency procedures in place to deal with these types of events. These measures include coordination with other state and federal agencies.

Comment: Some respondents felt that the Forest Plan objectives were becoming more general and vague. They suggested that the objectives be rewritten as narrowly defined, precise, and measurable statements. One respondent was particularly concerned about the removal of specific trail construction targets, which are expressed in miles of new trail in the existing Forest Plan.

Response: Some of the objectives were edited for clarity in the Proposed Forest Plan. In the past, objectives were often expressed as targets in discrete, measurable units, such as numbers of acres, structures, or miles. This often resulted in a disconnection between the broader goals the Forest Plan is intended to accomplish and these counts of acres, structures, or miles. These types of objectives also failed to take into account changes in budget from year-to-year.

Comment: Concern was expressed that changes to Research Natural Areas and Experimental Forests might preclude the State from exercising its wildlife management responsibilities. In particular concern was expressed about the required approval of routine activities by the Director of the Forest Service's Pacific Northwest (PNW) Research Station. Reference was made to various Memorandums of Understanding (MOUs) that recognize the State's responsibilities for wildlife management.

Response: The Forest Service recognizes the State's responsibilities for wildlife management. Coordination will be needed between the State, the PNW Research Station, and the affected Ranger Districts to ensure that each can fulfill its responsibilities.

Comment: One respondent wanted the Forest Plan to recognize that commercial ventures for raising forest products are a legitimate and authorized use of the National Forest. They also wanted the Plan to allow for production of traditional and customary food stocks in commercial quantity in wilderness areas.

Response: Commercial ventures such as this can be considered on a case-by-case basis. There are too many variables related to the type of venture and the location to make such a broad statement in the Forest Plan. In general, we do not feel that commercial ventures such as this are appropriate in designated Wilderness though such proposals could be examined through the special use permitting process.

Comment: One comment recommended that the Forest Service prohibit all pesticide use on the Tongass. Another comment expressed opposition to "area pesticide spraying" and stated that herbicide spraying should "not be used in case of human health emergencies." Another comment expressed a general concern about herbicide use.

Response: The Forest Service acknowledges the concerns expressed regarding pesticide use, but we are not willing to ban all use on the Tongass. Pesticide use is a tool that needs to be carefully evaluated on a case-by-case basis with the appropriate site-specific analysis, including public comment.

The Tongass does not use herbicide for Forest management. Although it is possible that it may be needed to control invasive species in the future, there are no plans currently to do so. Any plans for herbicide use would require a separate National Environmental Policy Act (NEPA) analysis.

Comment: A number of comments stated that the Draft EIS was flawed and recommended that a revised or Supplemental Draft EIS be issued. Various reasons were cited including the Forest Service's failure to conduct an Analysis of the Management System (AMS), complete the Conservation Strategy Review process initiated in 2006, disclose and respond to scientific opinion that opposed the proposed action, fully disclose when uncertainty exists, and include important information in the Draft EIS.

Response: Resource-specific and procedure-related concerns are addressed in detail elsewhere in this comment response volume. Specific concerns about the conservation strategy are, for example, addressed under Wildlife and Biodiversity. Detailed critiques of the timber demand projections developed for this Amendment process are disclosed and addressed under Timber Demand in the Economic and Social Environment section. The AMS is addressed in response to the following comment summary.

The Forest Service believes that the Draft EIS fully disclosed and responded to conflicting scientific opinion and identified areas where there is known uncertainty beyond that typically associated with all types of scientific impact analysis. These discussions have been expanded in the Final EIS, where appropriate, and this comment response volume discloses and responds in detail to the opposing scientific and other opinions provided by individuals, organizations, and others in response to the Draft EIS and Proposed Forest Plan.

In addition, we believe that the Draft EIS adequately informed the public about the alternatives considered and the potential effects so that informed comments could be received. The comprehensive Forest Plan Adjustment website established for this project (www.tongass-fpadjust.net) made information available to interested parties as the analysis progressed and provided the opportunity for the public to provide feedback and input throughout the process.

Comment: Some respondents felt that the Forest Plan Amendment process was flawed because no new AMS was prepared. One comment stated that the "primary goal of the AMS is to analyze Forest resource supply and demand and determine whether current management direction should change in response to these conditions." The comment argued that an AMS is necessary to determine which lands are suitable for timber production, considering whether the land has been withdrawn by Congress or administratively, can be reforested within 5 years, and if irreversible resource damage would occur if timber is harvested.

Response: The Forest completed the various steps in an AMS and an updated AMS is in the project planning record. The suitability determination was the most complete analysis done anywhere to our knowledge. Building on past efforts, including the recent SEIS (USDA Forest Service 2003) which completed an AMS for all roadless and wilderness areas, we used GIS data to map all areas withdrawn by Congress or administratively. We then mapped unstable areas, sensitive riparian areas, and areas with soil concerns and removed these areas from the suitable land base. Each remaining area of productive forest land was subsequently divided into logical logging settings and individually evaluated using existing NEPA analyses, aerial photographs, LiDAR, LANDSAT, GIS data, and local knowledge. Those areas that appeared to have problems were flagged and risk factors were assigned based on the problems that were identified. Areas considered unsuitable were identified. Logging engineers then identified individual logging settings and the type of yarding methods and road access that would be needed to log each unit. They also identified the silvicultural system that would be most likely to be used. This process took several months and resulted in the best estimate of timber supply we have ever had, both for total supply and for that portion of the total supply that will likely be economical to harvest. The demand for Tongass timber was identified in the timber demand analysis prepared by the PNW Research Station (Brackley et al. 2006a).

Comment: A number of comments stated that the Forest Service should use the "best available science" or "sound science" in the EIS analysis. A number of these statements were made with respect to the existing Conservation Strategy Standards and Guidelines, which some argued are not based on sound science. Others stated that the Final EIS should fully incorporate the findings of the 2006 Conservation Strategy Review. Others made general statements that some of the impact analyses presented in the Draft EIS were not based on scientific analysis, but were just speculation or opinions.

Response: Specific concerns about the scientific basis of particular analyses or components of the Forest Plan are addressed in detail elsewhere in this comment response volume. Specific concerns about the existing Conservation Strategy Standards and Guidelines are, for example, addressed under Timber. Concerns about the Conservation Strategy Review are addressed under Wildlife and Biodiversity.

It is not possible to provide a specific response to general assertions that the Draft EIS analysis is speculative or just opinions, but, in general, the Forest Service believes that the Draft EIS employs the best available science, to the extent possible. The Draft EIS was reviewed by scientists at the PNW Research Station and additional analysis, information, and citations were added to the Final EIS based on the results of this review and comments from the public and other agencies.

Comment: One respondent felt that using total development LUD acres in alternative descriptions and effects analyses overstates potential impacts as only a small percentage of the development LUDs would be developed or otherwise impacted.

Response: The distribution of the Forest by LUD group (Intensive Development, Moderate Development, Natural Setting, and Wilderness) provides a general basis for comparison between different alternatives. Other information, such as suitable acres, provides another basis of comparison about the relative impacts of each alternative.

Comment: Many respondents were opposed to road construction, which was often mentioned in connection with clearcutting. Road-related concerns often centered around impacts to wildlife habitat and reductions in roadless character.

Response: The alternatives feature a wide range of road construction levels and potential effects to roadless areas. Alternative 1 was modified for the Final EIS to greatly reduce the road construction miles and eliminate effects to Inventoried Roadless Areas. However, even in this alternative some road construction is needed to access lands suitable for timber harvest.

Comment: Several comments urged that the Tongass Plan Implementation Team papers be reviewed and incorporated in the Final EIS, as necessary.

Response: These papers have been reviewed and incorporated in the Final EIS, as appropriate.

Comment: Some respondents expressed interest in greater protection of the coastline and coastal valleys then occurred in the past.

Response: The 1997 Forest Plan added extensive protection measures such as the adoption of 1,000-foot beach and estuary buffers. All alternatives, with the exceptions of Alternative 7, retain these important features. Alternative 7 has a 1,000-foot estuary buffer and a 500-foot beach buffer.

Comment: One comment expressed concern that the Draft EIS said the 5-Year Forest Plan Review was part of the purpose and need for the Amendment despite the fact that the Forest Supervisor concluded at the end of the 5-Year Review that the plan did not need to be revised at that time.

Response: The 5-year review pointed out many areas that needed updating but that overall there was no reason to begin a full scale revision of the Forest Plan. With the need to respond to the Court order of August 2005, it seemed like an excellent opportunity to address some of those items from the 5-year review at the same time we responded to the Court.

Comment: One comment noted that a reduction in timber harvest in temperate zones results in the transfer of the needed harvest to tropical areas.

Response: It seems reasonable to assume that demand for timber will be met and, provided demand remains constant or increases, a reduction in harvest in one area will likely lead to an increase in harvest somewhere else. The Forest Service is required to seek to provide a supply of timber from the Tongass that meets market demand. The Proposed Forest Plan alternatives address a range of potential demand estimates. None of the proposed alternatives are expected to result in a transfer of harvest that would otherwise occur on the Tongass to other regions of the world.

Comment: One comment requested that the Final EIS explain the relationship between the Amendment and previous planning documents. Concern was also expressed about the statement on page 2-8 of the Draft EIS that: "The individual alternative descriptions on the following pages only identify items that are not consistent with the current Forest Plan or Proposed Forest Plan." Several respondents found this confusing and were concerned that this would result in information not being fully disclosed.

Response: The Final EIS and Record of Decision (ROD) will clarify this relationship. In summary, the amended Forest Plan and ROD will be stand alone documents giving management direction for the Tongass. Previous analyzes, such as the 1997 Final EIS, are tiered to and will continue to be used at the project level.

The alternative descriptions presented in Chapter 2 of the EIS focus on the main changes from the current Forest Plan to the Proposed Forest Plan, as noted in the above quote. The entire Proposed Forest Plan, which includes all the unchanged elements of the current Forest Plan, as well as the proposed changes, was published with the Draft EIS. A revised version of the Proposed Forest Plan has also been published with the Final EIS.

Comment: One respondent felt that the Draft EIS should discuss in more detail the laws related to the management of the Tongass and other national forests. They stated that "these statutes and their current applicability should be more clearly referenced in the (Forest Plan) and the Draft EIS."

Response: The Draft and Final EIS documents discuss and reference the laws that are most directly applicable to this Forest Plan Amendment. These laws include TTRA, the National Forest Management Act, and ANILCA. There are, however, many other laws that have a direct bearing on the management of national forests, as well as implementing regulations and court decisions interpreting these laws. These laws, regulations, and court decisions are not specifically discussed in the EIS, but additional general information is available on the Forest Service's web site (www.fs.fed.us).

Key Issues

Comment: There were several comments regarding the three key issues. Some thought that issues one and three were very much the same. Other comments identified additional issues that the comment authors thought should be identified as separate key issues. Subsistence, salmon conservation, and the social and economic well-being of Southeast Alaska communities were proposed as other key issues.

Response: Key issue one emphasizes the protection of high value roadless areas from development. Key issue three emphasizes the protection of wildlife habitat and biodiversity. While the two issues are certainly linked, they are two different issues. The key issues for the EIS were developed based on a review of the public input received prior to publication of the Draft EIS and are directly related to the purpose and need for the Forest Plan Amendment process. This issue identification process is discussed in the *Public Issues* section of Chapter 1 of the EIS. The other resources and resource uses identified in the above comment summary are also important aspects of the Forest Plan and are addressed in the proposed Forest Plan and the EIS, as appropriate.

Comment: One comment stated that Allowable Sale Quantity (ASQ) was not an indicator of a viable economy. They felt that Southeast Alaska could have a viable economy without timber harvest.

Response: The ASQ is not used in the EIS as an indicator of a viable economy. Rather it is a measure of the maximum potential harvest that could be achieved under each alternative. Definitions of viable vary, but based on recent trends it appears that population and employment in Southeast Alaska has declined slightly and stayed relatively the same, respectively, despite relatively large declines in timber harvest over the past decade and more. Other indicators suggest that some communities have been more negatively affected by this decrease than others (see the *Subregional Overview and Communities* section in the EIS).

Comment: One comment requested that the description of Key Issue 2 be revised as follows (underlined words to be added):

> **The Tongass National Forest needs to provide a sufficient <u>economic</u> timber supply to meet market demand and help maintain a vibrant, <u>diverse</u> economy"**

The comment defined "economic" timber as timber that a purchaser can harvest at a profit.

Response: The description of Key Issue 2 presented in the Draft EIS summarizes the issue adequately and remains unchanged in the Final EIS. Timber demand and concerns regarding timber supply are discussed in more detail under Timber Demand in the Economic and Social Environment section of this appendix.

Multiple Use

Comment: Many respondents talked about the importance of multiple use in guiding future management of the Tongass. A balanced approach to managing the Tongass was a common theme. But there were two distinct perspectives. Some felt that the multiple use concept supports the idea of a large timber industry and higher levels of timber harvest. They often mentioned the relatively small area of the Tongass open to timber harvest and stated that these lands should be managed intensively. Other comments discussed the idea of multiple use in the context of the various other uses found on the Tongass. They felt that timber harvest was emphasized too much and, when done at a large scale, was not compatible with other uses.

Response: Each alternative in the Final EIS represents the concept of multiple use by incorporating the full spectrum of land uses, from designated wilderness to lands emphasizing timber management or mineral extraction. Each alternative balances these uses differently and the range of alternatives covers the various points of view expressed in the comments.

Comment: One comment argued that the "multiple use" concept is: "a fancy way of (bypassing) the trust responsibility of protecting the habitat" and characterized this concept as a "popular political maneuver to try to please everyone a little, and still damage the habitat by allowing tree cutting so roads can be built without taxpayer expense."

Response: Multiple use is required by law (the Multiple Use-Sustained Yield Act of 1960). Changing this policy would require an act of Congress and is beyond the scope of this analysis. The Forest Service disagrees with this characterization of the application of the multiple use process.

Comment: Some felt that this Forest Plan Amendment should not decrease the land area open to commercial uses such as logging and mining. A number of comments cited ANILCA as indicating that no more restrictions would be put into place.

Response: The Final EIS looks at a wide range of alternatives built around the issue of timber harvesting. Three alternatives feature a reduced land base available for logging, two alternatives would increase the lands available, and the remaining two would maintain the current land base. No major changes to mining opportunities are proposed.

Public Involvement

Comment: Some respondents had suggestions for how the public meetings on the Draft EIS could have been conducted differently. For example, one person suggested that a question and answer session be held between the open house and the public hearing.

Response: There are many different ways to conduct a public meeting. The people that attend our meetings often have very different objectives for being there. Some are interested in listening to presentations and learning about the issues and planning process. Others want to ask questions about issues or places of concern to them. Others have formed their opinion and want nothing more than to have a forum to express it. We believe that our meetings, which featured an open house followed by a public hearing, made efficient use of the available time and offered a format that met most peoples' needs.

Comment: Some respondents requested that the Forest Service have public meetings in more small communities. Elfin Cove was one particular community mentioned.

Response: The Forest Service held public meetings in 24 Alaska communities during the comment period for the Draft EIS. We also held an internet public meeting and hearing open to anyone with computer access. In addition, Forest Service staff were available by telephone or email to answer questions, and comments could be submitted via letter, fax, email, or online comment form. We worked hard to get to as many of the smaller communities as possible as evidenced by public meetings in smaller communities such as Whale Pass, Port Protection, and Point Baker. One of the reasons the comment period was extended by 18 days was to reschedule public meetings cancelled by the weather. Unfortunately, we were not able to visit all of the communities in the region.

Comment: Some respondents felt that the 90 day comment period for the Draft EIS was not adequate and that the comment period needed to be extended.

Response: The Forest Service believes that the comment period was adequate. This is especially true given that much of the information in the Draft EIS and Proposed Forest Plan has been on the project website (www. tongass-fpadjust.net) for months. For example, the track changes version of the Forest Plan showing many of our proposed changes was posted during the summer of 2006. The new timber demand study completed by the PNW Research Station was posted in March of 2006. The comment period was extended to April 30, 2007 (108 days total) due to the bad weather in Southeast Alaska, which caused several of the public meetings to be rescheduled.

Comment: Some people felt that a hard copy of the Draft EIS should have been mailed to everyone because not everyone has a computer to get online or view a CD.

Response: Nearly 1,000 copies of the Draft EIS and Proposed Forest Plan were distributed. A hard copy set of documents costs over $140 with postage. Most people found the CD met their needs and distributing CDs rather than hard copies resulted in a significant cost savings to the taxpayer. Anyone who requested a hard copy was mailed one at no charge. Hard copies were also placed in libraries across Southeast Alaska.

Comment: Some readers felt that the Draft EIS was not written very well for the lay person in that it was too long and technical.

Response: The Final EIS has been edited to fix areas that seemed to cause confusion and to be more consistent in use of terminology. Unfortunately the documents remain fairly lengthy and technical due to the complex nature of current science and natural resource management, as well as the need to stand up to intense scrutiny and legal challenge. Summary level information is, however, presented in the Comparison of Alternatives section in Chapter 2.

Comment: One comment requested that the Final EIS include a map that identifies the percent of public hearing participants that want to protect certain areas and present this information by community.

Response: This is an interesting request, but it is not possible to produce this type of map for a number of reasons. These include the fact that many people participating in the public hearings did not identify specific areas. Further, even if the Forest Service had surveyed all meeting participants, which we did not, there is no guarantee that the people who attended the public meetings are representative of their respective communities.

Restoration

Comment: A number of comments expressed support for more habitat restoration to reverse the negative impacts of timber harvest and road building. Many emphasized fixing culverts on salmon streams and deer habitat management in young growth. Many said they wanted their tax dollars spent in that manner instead of on building new roads. Some pointed out that restoration could support good jobs.

One comment stated that a substantive program needs to be put in place to promote, support, and fund a riparian and forest restoration program. The comment also recommended that this program have a dedicated funding source, such as a federal trust fund, to ensure it is actually implemented.

Another Comment recommended that the Forest add an objective for the "speedy replacement or removal" of all culverts that block fish passage to the Transportation System Riparian Standards and Guidelines (RIP2, II, H.1).

Response: The Final EIS and Final Proposed Forest Plan place more emphasis on restoration including management of young growth forest. The Tongass has prioritized the culverts that need to be replaced and many of the high priority ones have been replaced. The rate of future replacement is dependent on funding. Creating a federal trust fund would require an act of Congress and is beyond the scope of this analysis. Although the "speedy replacement or removal" of fish passage blocking culverts has not been added to the Riparian Standards and Guidelines in the Final Proposed Forest Plan, this continues to be a priority on the Tongass, but is, as noted above, dependent on funding.

Comment: One comment suggested that the Forest Plan contract restoration work associated with past practices to companies actively engaged in the forest products industry to enhance the viability of existing Southeast Alaska logging companies.

Another comment requested that the Forest Service incorporate local and Native hire provisions in its hiring practices and reduce the non-resident component of the wood products sector to less than 10 percent on Baranof Island.

Response: Contracts with the Forest Service are awarded on a competitive basis in accordance with federal contracting standards. In general, the Tongass National Forest prefers to contract with local operators, where possible. ANILCA provides for Native Alaskan hiring provisions for federal employment. The hiring practices of private sector companies are outside the scope of this Amendment process.

Schedule

Comment: Concern was expressed that some sort of "timeout" proposal might be advanced which would delay a decision on the Amendment and not really lead to any long-term solution to the issues.

Response: A decision will be made on this proposed Amendment. References to a "timeout" generally refer to how the Forest Plan might be implemented, with the intent to facilitate continued discussions about the issues, rather then delay the decision process.

Standards and Guidelines

Comment: There were many detailed comments on the wording of standards and guidelines and goals and objectives. They ranged from expressions of support or disagreement to detailed edits of the language used.

Response: These comments were carefully evaluated on an individual basis and changes were made to the Forest Plan, as appropriate. Space does not allow for an individual response to each of these detailed comments here.

Comment: One respondent commended the Forest Service for incorporating standards and guidelines that address invasive species and recommended that the new section be expanded to include discussions of Integrated Pest Management and Executive Order 13112 on invasive species.

Response: The 5-year review of the existing Forest Plan highlighted the need to update the Forest Plan to address the threat of invasive species. We believe the direction added provides the appropriate guidance to address future invasive species issues.

Comment: Several respondents discussed the importance of various resource protection standards and guidelines and the need to insure that these are mandatory requirements.

Response: The language in each Standard or Guideline indicates how mandatory the direction is. For example, "Commercial timber harvest is not permitted in this LUD" is a standard. "Salvage may be permitted…" is a guideline. Standards are mandatory while guidelines, as the name implies, provide guidance and are not mandatory. While the Forest Plan provides broad strategic direction that employees must follow, there also has to be flexibility for on the ground managers to tailor actions to meet the needs of specific locations. Managers always have the option, with appropriate documentation, to amend the Forest Plan to meet the needs of specific situations.

Comment: One respondent suggested that the definition of the estuary fringe presented in Chapter 4 of the Proposed Forest Plan include reference to a source, or sources, that identify the location of estuaries on the Tongass.

Response: Estuary is defined in the Forest Plan glossary. This definition clearly identifies where estuaries occur and provides sufficient information for the identification of these areas at the project level.

Comment: Concern was expressed about Wild and Scenic Rivers direction in the Proposed Forest Plan that appeared to restrict temporary improvements such as weirs which are fully compatible with ANILCA.

Response: Direction in the Final Proposed Forest Plan has been revised to address this concern.

Tribal Consultation

Comment: Concern was expressed that tribal governments and tribal corporations were not adequately consulted during this forest planning process.

Response: The record shows that tribal governments and tribal corporations were consulted throughout the process. The District Rangers took the lead in communicating about the Forest Plan Amendment and in organizing meetings with tribal organizations.

Comment: One comment objected to the use of Alternative 5 as a baseline for the other alternatives because they felt that the 1997 Forest Plan did not feature adequate consultation with tribal governments.

Response: Alternative 5 is used as a baseline for comparison for some of the resource analyses because it represents the current Forest Plan and is the no action alternative. The record shows that considerable tribal consultation took place in developing the existing Forest Plan. In addition, the current Amendment featured a new consultation effort to ensure that tribal issues are heard and understood.

Comment: One comment expressed the desire for native communities to build a more collaborative relationship with the Forest Service. The comment author felt that this type of relationship could help these communities be more effective in community development and better understand how to take advantage of economic opportunities. This comment specifically pertained to the city of Hydaburg.

Response: The Forest Services supports continued collaboration between the Forest Service and native communities and encourages interested parties to work with their local District Rangers.

Resource and Issue Comments

The resource and issue comments are divided into the following subsections:

- Climate and Air
- Economic and Social Environment
- Fish and Watersheds
- Geology, Soils, Karst and Caves
- Heritage and Sacred Sites
- Lands
- Minerals
- Recreation, Tourism and Scenery
- Roadless Areas and Wilderness
- Subsistence
- Timber
- Transportation and Utilities
- Wetlands
- Wildlife, Biodiversity and Plants

Climate and Air

Comment: A number of respondents were concerned about how climate change would affect the Tongass. They believe that the results of climate change will be catastrophic for the Tongass and include expansion of new species, increased blowdown, and an increase in forest fires. Several comments stated that the Draft EIS did not address the significance of the Tongass in global carbon storage. Others stated that that global warming will affect Alaska and logging old growth forest would release stored carbon into the air, further aggravating the situation. Several comments stated that there should be no logging on the Tongass until the Forest Service determines how much logging can be done without significant effects on global warming.

Response: The Draft EIS acknowledges that climate change is occurring and that it is affecting the forests of Southeast Alaska; the exact changes likely to occur over the coming decades are not certain but are expected to include warmer winters, continued severe storms, and perhaps drier summers. These factors, in turn, may lead to increased blowdown and increased insect populations, which would adversely affect existing forests and may lead to an increase in fires, although the warming trend has not resulted in these events to date, as noted in the Draft EIS. Information on the risks and uncertainty related to the effects of climate change has been added to the Final EIS. As the Draft EIS states, models available for estimating climate change are designed to predict changes on a regional level and are not detailed enough to predict changes to the Tongass. Consequently, existing models do not agree on how global warming will affect Southeast Alaska. Additional information has been added to the Final EIS dealing with carbon sequestration and climate change which incorporates recent research.

As noted in the *Climate and Air* section of the EIS, logging old-growth forest can result in additional carbon entering the atmosphere; although not all of the carbon stored on the logged area is lost. Much of the carbon stored in organic matter in the soil, as well as carbon stored in down wood, cull logs, and low-value logs left on the site, remains sequestered. Carbon stored in lumber can also be sequestered for a time, depending on how it is used. Also, even under the alternative with the highest allowed harvest level, more than three-quarters of the existing old-growth forest on the Tongass would be exempt from harvest (nearly 3.8 million acres under Alternative 7 and nearly 4.7 million acres under Alternative 1), as would nearly all non-productive forest (2.4 million acres). No carbon stored in these forests would be lost due to logging.

As the EIS states, cumulative effects on carbon sequestration depend on the amount of forest land harvested; how the harvested wood is used; the management of the non-National Forest System (NFS) land in Southeast Alaska; the amount of carbon released during harvest, processing, and transporting wood products; on-site decomposition; and the length of the rotation (the period between harvests). If the products resulting from harvest are primarily lumber and other building materials, then there is a potential that the carbon in these products would be stored for the life of the buildings, longer if the wood is recycled or placed in landfills. If the wood is used for paper products or fuel, carbon storage would be short term. Any temporary storage of carbon in lumber products may be completely offset by carbon released during and after harvest, transportation, and processing. Whether carbon sequestration would actually increase or decrease under the alternatives considered in this analysis is unknown. However, recent estimates indicate that all the carbon stored in the forests of the Tongass (including carbon stored in its soil) represents approximately one quarter of one percent of the stored carbon in forests worldwide.

Further, carbon stored in all of the world's forests represents only a small portion of the total carbon stored in land vegetation and other terrestrial biomass, in soils, in the oceans, and deep below ground. Therefore, the Final EIS concludes that, while carbon storage on the Tongass is important for many reasons, small changes in carbon sequestration on the Tongass, whether positive or negative, would have only minor effects on atmospheric carbon levels. For comparison, Leighty et al. estimate that between 6.4 and 17.2 million metric tons (0.2 to 0.6 percent) of stored carbon has been lost on the Tongass since timber harvest began in the early part of the 20th century. For comparison, approximately 4.5 million metric tons of carbon was released every day to produce electric power in the United States in 2005 (U.S. Department of Energy 2006).

Comment: Some respondents believe that the protection of old growth forest may offer the best hedge against global warming because old growth forests sequester carbon. Comments also noted that old-growth forests may have value on the carbon trading market.

Response: About 8 percent of the commercial size old growth had been harvested on the Tongass National Forest as of 2005. Leighty et al. (2006) estimate that this represents between 0.2 to 0.6 percent of stored carbon on the Tongass. If the current Forest Plan (Alternative 5) were to be implemented for the next 100 years, which would only occur if new industries and markets developed to process and utilize the wood, 82 percent of the old growth forest would still be present in 100 years time. Approximately 88 percent would remain under Alternative 1, which has the lowest harvest level, and approximately 76 percent would still be present in 100 years under Alternative 7, which has the highest harvest level.

Using the Leighty et al. estimate, this suggests that under 1 percent of the total carbon would be lost under Alterative 1 (cumulatively) and less than 2 percent (cumulatively) under Alternatives 5 and 6.

Based on Leighty et al., approximately 0.6 to 1.8 percent (cumulatively) would be lost under Alternative 7, the alternative with the highest harvest level. This is the equivalent of approximately 17 days carbon emissions from power plants in the United States (refer to the *Climate and Air* section in the Final EIS). These comparisons assume that the projected maximum harvest levels associated with these alternatives would be fully implemented over the next 100 years. However, the proposed Forest Plan Amendment would only cover the next 10 to 15 years and approximately 90 percent of the remaining old growth would still remain under all alternatives when the next Forest Plan is developed. Also, monitoring and adaptive management during the planning period may result in changes to harvest levels prior to developing a new Plan. It is also worth noting that actual harvest is likely to be lower than the projected ASQ under all of the alternatives.

Whatever carbon is lost during old growth harvest would also be partially offset by young stands which accumulate carbon as they grow. Therefore, it is unlikely that preserving all of the remaining old-growth forest on the Tongass would have a much greater effect on atmospheric carbon levels than preserving the majority of it, which would be the case under all of the alternatives. As noted in the Final EIS, all the carbon stored in the Tongass represents a small fraction of the world's stored carbon. Leighty et al. (2006) estimate that all the carbon stored in the forests of the Tongass represents approximately one quarter of one percent of the stored carbon in forests world wide. Carbon stored in the world's forests, including forest soils, represents a small portion of total global carbon storage (terrestrial, ocean, and fossil carbon pools). As noted in the Final EIS, all terrestrial sources (croplands, tundra, grasslands, savannas, etc.) store about one-twentieth of what the oceans store. Therefore, the Final EIS concludes that small changes in carbon sequestration on the Tongass, whether positive or negative, would have a minor effect on atmospheric carbon levels.

The possible future value of old-growth forests in the world carbon trading market is currently unknown and speculative at this point.

Comment: Some respondents felt that the impacts of climate change described on pages 3-98 and 3-99 of the Draft EIS are exaggerated. They believe that it is impossible to predict the effects of climate change over the 10 to 15 year life of the plan. Also, many believe trees absorb carbon as they grow and, therefore, they argue, society should support timber harvest. In addition, they note, young trees consume more carbon dioxide than old trees.

Response: As noted in the preceding comment response, the Draft EIS acknowledges that while climate change is occurring and it is affecting the forests of Southeast Alaska, the exact changes likely to occur over the coming decades are uncertain. As the Draft EIS states, models available for estimating climate change are designed to predict changes on a regional level and are not detailed enough to predict changes to the Tongass. Consequently, existing models do not agree on how global warming will affect Southeast Alaska. Additional information has been added to the Final EIS dealing with carbon sequestration and climate change which incorporates recent research.

While research confirms that young trees accumulate more carbon on a yearly basis than old trees, one must also take into account the amount of carbon already stored in old forests, including above ground vegetation, logs and organic matter on the forest floor, and organic matter in the soil. Some of this is lost when the forest is logged and the site is exposed to the sun, increasing decay rates and releasing carbon into the air. Also, carbon is released as fuel is burned during harvest, processing, and transporting of wood products. As noted in the EIS, carbon can also be stored in lumber and other building materials for the life of the buildings, longer if the wood is recycled or placed in landfills. Whether carbon sequestration would actually increase or decrease under the alternatives considered in this analysis is unknown.

Comment: Some respondents want the Forest Service to consider the impact global warming will have on yellow-cedar and end logging of this species.

Response: The EIS recognizes that the decline and mortality of yellow-cedar is one of the most widespread and important forest health problems in Southeast Alaska (see the *Forest Health* section of the Final EIS). This decline is associated with wet, poorly drained sites, and research suggests that reduced snow pack in low-elevation areas associated with a warming trend that started in the 1800s has exposed fine surface roots to freezing, which in turn kills trees. As the climate continues to warm, yellow-cedar decline is likely to continue to spread, especially in the south and east. Conversely, yellow-cedar appears to be spreading northward as climate warms, into areas that retain snow longer into the spring. Not cutting cedar trees on sites that can no longer support yellow-cedar will not change the fact that these trees are growing in areas that cannot support them. Planting yellow-cedar on suitable sites north of its current range has a reasonable prospect for success and may aid the species natural movement north.

Comment: One comment stated that the EIS should measure air quality impacts in terms of the total carbon footprint associated with cruise ships, float planes, and related commercial uses of the Wilderness. The comment stated that on calm days haze can be seen in Ketchikan, parts of Misty Fjords, and Glacier Bay National Park.

Response: This Amendment responds to the 2005 Court decision which held that the EIS and ROD for the 1997 Forest Plan had errors relating to the use of projected market demand for timber, the range of alternatives relative to market demand calculations, and cumulative effects of timber harvest activities on non-NFS lands. Measuring the total carbon footprint for cruise ships, float planes, and other commercial uses in Southeast Alaska would be difficult and time consuming and is not necessary for the analysis of the issues identified by the court. In addition, all of the action alternatives propose the same standards and guidelines with respect to cruise ships and commercial use in Wilderness. The main variables that could potentially affect the size of the carbon footprint from these activities are the number of visitors to the region and the demand for commercial recreation activities in Wilderness. The *Recreation and Tourism* section in the EIS discusses potential recreation demand, but it is not possible to project how the number of visitors to the region and demand for Wilderness recreation would be affected by each alternative with the type of precision required to estimate differences in the resulting “carbon footprint.”

We were unable to find information on carbon footprint for cruise ships, float planes, or other commercial uses in Southeast Alaska in the literature, but we are aware of studies underway to identify cruise ship emissions. No results for carbon emissions into the atmosphere have been reported to date specific to the cruise ship business in Southeast Alaska to our knowledge. However, we did find a general estimate of CO_2 released per passenger mile (0.43 kg) (http://www.responsibletravel.com/Copy/Copy100858.htm). A rough extrapolation of this, based on the estimated number of cruise ship passengers visiting the Southeast Alaska (948,226 in 2005), results in an estimated total of 78,000 metric tons of carbon released in 2005 (this assumes each cruise was 7 days and ships averaged 100 miles per day travel, including port stays). The portion of this that may have been released in or near wilderness areas is unknown. Please note that this is a very rough estimate. For comparison, as noted in response to one of the preceding comments, approximately 4.5 million metric tons of carbon were released every day to produce electric power in the United States in 2005 (U.S. Department of Energy 2006).

As noted in the Draft EIS, the air quality for all of Southeast Alaska, except for the Juneau area, is rated as good by EPA. Air quality in the Juneau area has improved and has met EPA’s air quality standards in recent years, as noted in the Draft EIS. Also, as noted in the Draft EIS, smoke from fires in western Canada sometimes crosses into the Southeast Alaskan air shed, causing haze.

Comment: Some respondents stated that although climate models predict warmer winter temperatures, they also predict more snow at higher elevations. One comment noted that Juday et al. (1998; 41), for example, state there is a strong possibility of heavy snow at high elevations. They respondents expressed concern that in some years there will also be more snow in low-elevation areas and note that the deer model does not take this into account.

Response: It is certainly possible that there will be heavy snowfall in some winters at low elevation, just as it is possible that, with global warming, there will be less snow in low-elevation areas in most winters. Weather models are not able to accurately predict next year's snowfall, much less snow levels over the next several decades. However, Juday et al (1998) predict ("with some confidence") low snow accumulations in most low-elevation forest in Southeast Alaska. Concerns about the deer model and severe winters are discussed in the Wildlife, Biodiversity and Plants section of this appendix under Deer.

Comment: One comment states that both the HAFCM2SUL and the CGCM1 climate models predict a 30 percent increase in the mean seasonal severity rating for fires in Southeast Alaska by 2060. The comment notes that Dale, Juday, and other scientists predict an increased risk from insects and disease. The comment also states that increased rain will lead to more landslides, adversely affecting water quality and fisheries in Southeast Alaska. The comment notes that Salathe (2006) suggests that a 15 percent increase in precipitation over the whole of Southeast Alaska is indicated and the comment states that the resulting increase in soil moisture would increase likelihoods of windthrow, stem snap, and mass wasting.

Response: Our reading of the HAFCM2SUL and the CGCM1 models indicate that they predict a 10 to 30 percent increase in the fire severity rating, depending on the model. In any case, a 30 percent increase in almost no fires (the current condition) would still result in little damage due to fires. As noted in the Final EIS, Berman et al. (1999) state that it is difficult to predict the magnitude of area likely to be burned in a region with no historic fire record, but they believe that most fires would be small and of low intensity. They suggest a scenario in which 5,000 acres might burn over a period of decades, an average of perhaps 100 acres a year in an ecosystem that includes over 10 million acres of forest. Juday et al. (1998) also suggest that the effects of fires on resources are likely to be low.

There is no evidence that there has been increased damage from windthrow or insects in the last several years, as noted in the Draft EIS. There was a big up-swing in insect damage in the 1990s but this has subsided. We can expect other periods of increased insect activity, as insect population cycles ebb and flow. This is a natural part of the ecosystem. That said, it is likely that there will be some additional risk to forests from both insects and disease as the climate continues to warm. However, there is little evidence of increased insect, disease, or blowdown during this decade even though the climate has warmed considerably and gale-force storms have increased, as discussed in the Draft EIS. Juday et al. (1998), for example, suggest that the increase in gale force winds could result in increased blowdown. However, they also state that this had not occurred as of their study, nor did the 2006 survey report such an increase, despite the large increase in storm events over the last several decades. Periodic catastrophic windthrow has long been a factor in Southeast Alaska and can be expected to continue to be.

The Draft EIS notes that most studies predict wetter weather in Southeast Alaska over the coming decades. As noted in the comment, some researchers believe that increased rain could lead to more landslides. This in turn, could affect water quality and fish habitat. There's quite a lot of research about rain and snowmelt-driven landslide events (particularly in Washington and Oregon). Whether more rain would mean more landslides in Southeast Alaska would depend on local conditions at the time of the event, such as the rain characteristics (intensity, duration), the soil conditions (degree of saturation, pore pressure), the vegetation characteristics (vegetation cover, root strength) all of which could be affected by climate change as well as other factors that might not be so directly affected by climate change (including slope angle and any changes in lateral support, loading, or vibrations). Until climate models at the sub-regional scale include these factors it will be hard to quantify the risk.

The Salathe (2006) paper referenced in the comment finds "greater precipitation over the North Cascades and extending southward along the Cascades. Increases in precipitation are also found for the Idaho Rockies…" We did not see a prediction specific to Southeast Alaska.

Specific concerns regarding the potential effects of climate change on wildlife are addressed in the Wildlife, Biodiversity and Plants section of this appendix

Comment: Some respondents believe that the forests of the future will need to be resilient to novel conditions presented by climate change. They stated that old-growth forests, having survived fires, droughts, and insect and disease outbreaks of the past, have shown themselves to be resilient to change. Once comment cited recent research in California that indicates that old growth is more resilient to fires than plantations and fires are expected to increase in the future climate which is expected to have drier conditions. One comment stated that replacing old growth forest with young stands would expose the forest to increased risk of fire, insects, and disease, and concluded that, therefore, the Forest Service should avoid cutting old growth.

Response: The old-growth trees present today began life in the cooler climate of the little ice age, which began about 700 years ago and ended about 150 years ago. They have not endured fire to any notable extent, nor prolonged drought. Southeast Alaska has a cool, wet climate even in the warmest, driest years. This is a very different situation than in California, where tree species present in old-growth forests have evolved along with fire and drought and have developed coping mechanisms, such as thick bark, as a protection from periodic fires. There is little reason to think that old Sitka spruce or western hemlock trees would be better suited to a warmer climate than young trees of the same species, nor could one make a strong case for the opposite.

If the climate does get warmer and drier (some predict that it will get warmer and wetter) then hemlock and spruce trees would be less well suited to Southeast Alaska than they were during the past cool period. The fact that thick-barked, old-growth pine and Douglas fir trees in California are more resistant to fire than young trees says little about the resilience to fire of thin-barked, old-growth hemlock and spruce trees. Also, as noted in one of the preceding responses, the predicted 10 to 30 percent increase in the fire severity rating would still result in few fires and little resource damage. A more realistic threat to forest health comes from insects. Experience indicates that insect outbreaks have had a greater effect on old forests than on young ones (refer to the *Forest Health* section of the EIS).

Comment: One comment stated that it is important to preserve northern forests, which preserve 50 percent of Earth's carbon, and also noted that cutting trees will lead to more fires.

Response: The great majority of the earth's carbon is in the oceans as discussed in the *Climate and Air* section of the Final EIS. Also, the risk of fire in Southeast Alaska is very small, as discussed in the Final EIS.

Comment: Some respondents believe that the effects of climate change on values/resources should be given the same consideration as timber harvest. They state that just because there is uncertainty that does not mean the EIS does not have to analyze the possible effects, just as it does with timber demand, which is also uncertain. They believe the EIS should analyze the range of possible effects that climate change will have on values and/or resources and on achieving the desired future condition for these resources.

Response: Information that discusses the range of effects that climate change may have on achieving the desired future condition for various resources has been added to the appropriate sections in the Final EIS.

Comment: One comment stated that the Forest Service should lead by example and "enable ecosystems to adapt to climate change" by applying the principles outlined in Forest Service publications. The comment also stated that the Forest Service should analyze 11 studies that were listed in the comment.

Response: The Tongass planning team reviewed the cited studies, as well as many other studies on climate change. Some of the studies recommended in the comment are applicable to Southeast Alaska and the Tongass National Forest (e.g., Berman et al. 1999, Juday et al. 1998) and information from these studies was added to the Final EIS. Others are very broad based, general discussions on what may happen, often in other distant parts of the U.S. (i.e., effects on trout in the southeast U.S., fire risks in the western continental U.S., carbon dioxide [CO_2] effects on growth rates in the continental U.S.). The planning team reviewed this literature, with guidance from scientists at the PNW Research Station, and sought to use the most appropriate studies to show the range of possible outcomes for the Final EIS. We favored local studies where available. Some of the studies referenced in the comment had limited applicability to the Tongass. For example, the comment recommended that we consider Pratsad and Iverson (1999), which considers the effect climate change will have on 80 tree species in Eastern North America as an example of how we should model changes on the Tongass. However, this study deals with trees on a subcontinent-level, and in a less complicated region geographically. By comparison, the Tongass is about the size of West Virginia and is made up of a series of islands and a narrow strip on the mainland bordered by tall mountains and glaciers to the north and east and by the Pacific Ocean to the west. Consequently, it is difficult to predict changes using existing models designed to predict changes on a continent or subcontinent level.

As noted in the Final EIS, models are based on predictions for large regions and do not agree on exactly what is likely to happen in local areas such as the Tongass beyond the likelihood that the climate will be warmer. Researchers have modeled changes in the range of species at the Alaska regional scale. They estimated that the boreal forest will likely move approximately 100 miles north, coniferous and mixed forest would advance into the boreal zone, and the southern coastal forests are likely to expand westward (various studies cited in Parson et al. 2001). Studies also predict that trees in Southeast Alaska will expand their range upward into higher elevations and both yellow-cedar and red cedar will expand their range northward. As one of the papers cited in the comment (Hansen et al. 2001) notes, topographic barriers between Canada and Southeast Alaska are likely to limit the northward expansion of species into Southeast Alaska, therefore we do not anticipate species such as Douglas-fir migrating to the Tongass in the foreseeable future.

The Aber et al. (2001) paper cited in the comment discusses the effects of higher CO_2 on tree growth and illustrates the difficulties involved in trying to estimate the effects of global warming on the Tongass National Forest. While their focus is on the continental United States rather than on Alaska, Aber et al. demonstrate the problem of applying general theory to specific areas. There is research indicating the higher CO_2 levels driving climate change may increase the rate of photosynthesis and therefore tree growth, at least in the short term. However, this and other studies indicate that this would only occur if no other factor is limiting, such as water or nutrients. Whether water will be limiting in Southeast Alaska is unknown. Some models indicate a 10 percent reduction in summer rain across the Tongass but others do not. This leaves us without much certainty as to whether growth rates will increase. All we can really take from this, and similar studies, is a note of caution; therefore, the Final EIS does not predict increased tree growth for the Tongass, though it acknowledges the possibility. Increased tree growth, if it does occur, could increase carbon sequestration and future timber production, which in turn could lead to shorter recovery rates for disturbed habitats.

Comment: Several comments stated that the Forest Service should conduct research on greenhouse gases and carbon dioxide and identify how logging and re-growth change the carbon budget on the Tongass.

Response: Estimates of the amount of carbon stored in existing forests and the amount lost as a result of harvest are included in the Final EIS, as is a discussion of the problems encountered in attempting to estimate the amount of carbon released due to harvest. The PNW Research Station continues to conduct research on global warming.

Comment: One comment expressed concern that timber harvest results in air pollution which causes asthma and lung problems.

Response: As discussed in the *Climate and Air* Section in the EIS, air quality is good on the Tongass and timber harvest has little effect on air quality in the region. In many other regions, logged areas are broadcast burned following harvest to dispose of logging slash and this can adversely affect air quality. Broadcast burning is not used on the Tongass.

Comment: One comment pointed out that the construction of interconnecting electric power lines would reduce air pollution from diesel generators, and result in a reduction in CO_2 emissions.

Response: Information on this subject has been added to the *Climate and Air* section of the Final EIS. The alternatives would not affect power line construction; all alternatives propose the same Transportation and Utility System LUDs.

Economic and Social Environment

The Economic and Social Environment comment and response subsection is divided into the following categories:

- Timber Demand
- Regional Economy
- Economic Efficiency Analysis
- Tongass National Forest Budget
- Payments to the State
- Communities

Timber Demand

Comment: Some respondents felt that the model used by the PNW Research Station to determine timber demand was obsolete. In particular, they felt that using a model built around exports to the Pacific Rim was a fatal flaw now that domestic markets are the primary destination for Tongass timber. They note that the model does not include a single parameter to account for changes in domestic markets.

Response: Brackley and Haynes (in press) state that "the existing model is a robust system that remains a valid approach to model demand for Tongass timber because of the limited data on lumber shipments and values and production costs." They go on to explain that Alaska producers are sawing lumber products that are, on average, better quality and enter higher priced markets, than lumber manufacturers are producing in the western Pacific states and in Canada. These high quality products have similar prices in domestic and foreign markets. Using historic data with scenario assumptions to model movement of these products in both domestic and foreign markets is a valid approach.

The method to project timber harvests and output in Alaska followed by Brackley et al. (2006a) is essentially the same as that described in publications about previous estimates of Alaska timber demand by Haynes and Brooks (1990), Brooks and Haynes (1990), Brooks and Haynes (1994), and Brooks and Haynes (1997). The method begins by estimating Alaska forest products output, by product, followed by calculating the raw material requirements necessary to support this production, using explicit product recovery and conversion factors. The total raw material requirement (the total derived demand for timber) is a combined projection of timber harvest from private ownership, from National Forests, and from non-

National Forest public owners. The projected National Forest timber demand is the quantity of timber required to satisfy projected derived demand given harvest by other owners, and given explicit assumptions about markets and implicit assumptions about prices.

Brackley et al. (2006a) assembled historic data that describe relevant components of the Alaska forest sector and calculated possible future wood needs by using an analysis of trends in factors that influence harvests. A historic period of about 40 years (1965 to 2004) was used as a basis for a projection of 20 years (2005 to 2025), to avoid emphasis on short-term cycles. They used information about US exports to Japan, and Japanese import data, as a benchmark for the historic data, as such exports represented, until very recently, the vast majority of sawn wood production from Southeast Alaska.

Data about recent domestic end markets for sawn products from Southeast Alaska has been available since about 2000. The data on domestic end markets is difficult to verify. One major question is how much of the product shipped to the Pacific Northwest is trans-shipped. Trans-shipments are products that are shipped into foreign markets from a different customs district than the one in which they were manufactured. In the case of Southeast Alaska, lumber manufactured in Alaska is apparently being shipped to foreign markets from the Seattle customs district, making it difficult to track many of the very recent end markets and subsequent demand for manufactured products from Alaska.

Other data used in the Brackley et al. (2006a) analysis includes log sources from all ownerships in Southeast Alaska, log and chip shipments out of Alaska to various destinations from all owners, harvest by owner, the Alaska market share for manufactured products in North America, and the North American market share in Japan. Brackley et al. (2006a) allocated their projections of total derived demand to foreign export markets (17 percent) and domestic markets (83 percent). They used information from Resource Planning Act (RPA) projections and assessments of future demand to estimate increases in derived demand in the future, allocated between domestic and foreign markets.

Predicting demand for federal timber in the wood products market in Southeast Alaska is difficult, due to the relatively small size of the market, the kinds of data available, and the structure of land ownership in the region. The structure of the model used by Brackley et al (2006a) makes it difficult to assess changes in domestic markets. This will need to be addressed in future demand predictions for Southeast Alaska, but gathering historic data that can be used in such a trend analysis for recent market shifts is problematic. It became clear from data reported by Kilborn et al. (2004) that shipments of manufactured wood products from Alaska were shifting from foreign to domestic destinations by 2000, and the continued significance of the domestic market through 2004 is illustrated by data reported by Brackley et al. (2006b). However, checking this data against data sources for domestic shipments and foreign exports is difficult at present, because of lags in reporting and the issue of transshipments. Data used in the Brackley et al. (2006a) model was cross-checked by the authors to ensure its reliability. It will take more research to assess if the end market information reported by Kilborn et al. (2004) and Brackley et al. (2006b) can be reconciled with other sources of data, such as the Harmonized Trade Code information, so that verifiable domestic shipment data can be used in future Southeast Alaska wood products demand assessments.

Comment: Some respondents felt that the PNW Research Station demand report was overly optimistic and did not accurately account for the challenges faced by producers in Alaska related to the competitive disadvantages of higher harvesting, transportation, and manufacturing costs. They pointed out that in most years the existing industry has been operating at less than 50 percent of the installed mill capacity. They felt that new industry investments, associated with the higher demand scenarios, were unlikely to occur. Some comments stated that the harvest level for the past few years represented the actual demand.

Response: Brackley and Haynes (in press) state that “current production levels and shipment patterns in Southeast Alaska demonstrate how the industry has transitioned to operate in current market opportunities”. They go on by saying that shifts to “higher proportions of shop lumber, larger sizes of dimension lumber, heavy timbers, and cants should give Alaska producers an opportunity to supply products of relatively higher value to both domestic and export markets."

Brackley et al. (2006a) selected four scenarios they deemed reasonable and possible, given their assumptions. The Limited Lumber Production and the Expanded Lumber Production scenarios assume the wood processing industry in Southeast Alaska is focused only on processing of sawlogs. The primary difference between these two scenarios is the assumption that Alaska will increase its market share in the North American export market from 0.39 percent to 1.14 percent in the Expanded Lumber scenario, while the Limited Lumber scenario maintains the same market share for Alaska products in the North American market as a whole. The Medium Integrated Industry and High Integrated Industry scenarios both assume one or more chip and utility processing facilities will be added to the Southeast wood processing industry. These two scenarios assume an increase in Pacific Rim lumber imports, but not to the extent assumed in the first two scenarios. These two integrated industry scenarios also assume varying increases in the Alaska share of the North American export market. The Medium Integrated scenario assumes markets for chip and/or utility material will increase in 2008, while the High Integrated scenario assumes markets for chips and/or utility material will increase in both 2008 and again in 2012. Although Brackley et al. (2006a) assumed these markets would be the result of processing facilities built in Alaska, any market stimulation that results in higher demand for chip or utility material would have the same result. The recent policy change regarding appraisal of lower grade material for shipment to the lower 48 states could have a similar effect to building a processing facility for lower grade material, in terms of demand stimulation.

Comment: Some respondents felt that demand scenarios should not have been based upon non-existent facilities. They noted that the demand study prepared by Brooks and Haynes (1997) did not count potential demand from proposed facilities.

Response: Brooks and Haynes (1997) had scenarios labeled high, medium, and low. They chose not to go into detail in their discussion about how these demand levels might be achieved, simply leaving the discussion more general. Brackley et al. (2006a) chose to discuss how their scenarios might look "on the ground", to give an idea to the reader how demand might actually be stimulated under their assumptions in their model. The structure of the model itself, however, is simply driven by changes in relative market shares based on a number of assumptions, as discussed in response to the preceding comments in this section. Brackley et al. based this discussion of how changes in demand might take place based on efforts to plan and build various facilities in Southeast Alaska that would utilize lower grade material and have been under discussion for some time. However, as mentioned above, the demand stimulation could also take place as a result of other events, such as policy changes in timber sale appraisals.

Comment: Some respondents questioned why a timber demand scenario was not developed for a declining timber demand. They cite studies that indicate the possibility of the United States playing a smaller role in global wood products markets in the future.

Response: Brackley et al. (2006a) recognized that the US is a net importer of timber. A mill in Alaska has the option to ship products to traditional export markets (Japan), emerging new markets, or the lower 48 states. Demand for wood products is global in nature and increasing amounts of wood products are being imported into the United States. Alaska products constitute a small proportion of the total US market; very small shifts in how much of the US market Alaska supplies can mean a big change in Alaska.

Brackley and Haynes (in press) state that several short and long-term changes point to an increase in demand for wood products from all sources, including Alaska. These changes include a slowing in lumber production in sawmills in western Canada, in addition to longer-term factors, such as increased interest in renewable energy applications and a projected steady increase in US population and a concurrent growth in demand for softwood products. Brackley and Haynes state that the probability of a future decrease in demand for lumber from all Pacific Rim markets is virtually zero. In fact, they argue that projected consumption in domestic markets alone will increase substantially. Therefore, there was no compelling reason for the Brackley et al. study to include a scenario showing demand falling, which would be contrary to the best scientific information available.

Estimated demand for Alaska sawn products declined considerably between Brooks and Haynes (1997) and Brackley et al. (2006a). The lowest projection of derived demand for sawn products from Alaska in Brooks and Haynes (1997) for the period 2003 to 2007 was 130 million board feet (MMBF). The lowest projection in Brackley et al. (2006a) for the same period was 30 MMBF. These differences were due to changing assumptions from one projection to another, and shifts in the structure of the industry as it adjusted after the end of the long-term contracts. Also see Chapter 2 of the Final EIS, Alternatives Considered but not in Detail.

Comment: Some comments stated that even when supplemented by state and private wood Alternatives 1 through 6 would not produce enough wood to meet market demand. Others argued that Forest Service demand studies have not adequately recognized the value of 100 percent wood utilization and the critical need to restore an integrated wood products industry to Southeast Alaska. Some stated that only Alternative 7 would produce enough timber (360 MMBF per year) to supply a fully integrated timber industry.

Response: The Medium Integrated Industry (Scenario 3) and High Integrated Industry (Scenario 4) scenarios in Brackley et al. (2006a) both assume one or more chip and utility processing facilities would be added to the Southeast wood processing industry, creating an integrated industry. The timber demand analysis presented in the *Economic and Social Environment* section of the Final EIS indicates that both Alternatives 4 and 7 would provide sufficient volume to meet projected demand under Scenario 4 in the second decade following plan implementation.

Comment: Some comments were concerned that as designed none of the alternatives provide enough timber to sustain a fully integrated timber industry (Brackley et al. Scenario 4). Alternative 7 has one-third of its harvest in Scenic Viewshed and Modified Landscape LUDs, which would not result in economic timber sales. Some stated that a total of 1.5 million acres of commercial forest land is required to allow economic timber harvest and provide annual harvest levels of 360 MMBF (or some said 370 MMBF) per year. Others commented that the Forest can harvest 360 MMBF per year using only 25 percent of the forest land.

Response: The range of alternatives evaluated in the EIS provides sufficient volume to meet the four demand scenarios, when timber from state and private land is considered. One assumption is that, if an integrated industry does develop, lower-grade logs from private land would be available for local use, for example, in an MDF plant. These logs are currently exported or shipped to the lower 48 states because there is no local market for them. As noted in the preceding comment response, the timber demand analysis presented in the *Economic and Social Environment* section of the Final EIS indicates that both Alternatives 4 and 7 would provide sufficient volume to meet projected demand under Scenario 4 in the second decade following plan implementation.

Some areas on the Tongass are designated as Scenic Viewshed or Modified Landscape because the Forest Service is required to manage for multiple use. The conservation strategy requires managing some lands outside of the Wilderness for wildlife (e.g., beach fringe, OGRs). Managing scenic areas as Scenic Viewshed protects the scenery resource while making some timber available from these areas. Many other areas are important for recreation and therefore are managed as either Scenic Viewshed or Modified Landscape. This protects these resources while providing some timber. The bulk of the timber harvest under all the alternatives comes from areas classified as Timber Production; these are areas that allow more intensive timber harvest, while still protecting other resources, such as fish and water quality through stream buffers and other standards and guidelines.

Comment: Some respondents felt that the PNW Research Station demand study did not adequately take into account the lack of a reliable and economic supply of timber. They argued that poor timber sale design is a greater problem than poor markets. A number of comments stated that industry would respond to a reliable, economic supply of timber with investments to build a competitive integrated industry.

Response: The PNW Research Station has published several demand studies conducted in support of Tongass Land Management planning efforts (Brooks and Haynes 1990, 1994, 1997; Brackley et al. 2006a). These studies estimate derived demand for timber in Southeast Alaska. They do not address supply issues. The supply of timber from the Tongass National Forest is determined by two main factors. The first is the volume of timber offered for sale by the Forest Service. In April 2000, procedures to determine the estimated supply needed were published in 'Responding to the Market Demand for Tongass Timber' (Morse 2000). These procedures to estimate the timber offer target (supply) incorporate the demand numbers from the PNW Research Station studies as an input into a spreadsheet. The procedures developed by Morse (2000) to estimate the annual sale offering targets from the Tongass National Forest address the uncertainty associated with forecasting market conditions, considering the continuing transformation of the timber industry and the inability of the Forest Service to respond quickly to market fluctuations due to the time it takes to prepare timber for sale.

The second factor affecting timber supply is the cost of harvesting and delivering wood to its respective intermediate markets: mills in the case of locally processed material, and ports in the case of log exports. Although a significant issue, reduced volume offered for sale by the Tongass National Forest is not the sole reason for recent harvest declines. Rather than merely securing volume, the challenge facing Tongass National Forest timber purchasers is being able to make a profit from new sales volume and volumes currently under contract.

Profitability for Tongass National Forest timber can be affected by (1) the combination of valuable materials versus logging costs in a given timber sale, (2) market options for lower grade material coming off the Forest, and (3) prices for Southeast Alaskan premium species and grades. Limited market options for lower grade material is at least partially the result of the closure of the region's two pulp mills in the 1990s, though the removal and sale of low grade and utility logs had been a challenge for independent operators in low markets prior to the closures. Many contracts now allow the option of leaving utility stumpage in the woods, but current market conditions are still challenging profitability.

Planning the timber program requires more than just pure economic factors. To account for delays in timber sale preparation, administrative appeals, and/or litigation, sufficient contingent volume must be included in the annual timber sale program to account for realistic fall-downs. Budget and organizational constraints limit the extent to which the Forest Service can respond to economic cycles and the associated fluctuations in timber demand. All of these factors must be considered in evaluating the market demand for timber and setting timber offerings. In the final analysis, planning the timber sale program is an exercise in professional judgment.

The current status of the timber industry in Southeast Alaska is discussed in the *Economic and Social Environment* section of the EIS and includes the following summary of the difficulties involved in accurately projecting future demand.

> Accurately projecting future demand is difficult and cannot be considered an exact science. Market demand for Southeast Alaska timber and wood products depends upon numerous difficult to predict factors, including changes in technology, growth and exchange rates in key markets, changes in consumer tastes and preferences, as well as developments in other producing regions whose products compete with those of Alaska. While demand is difficult to predict, industry relies on a stable timber supply in order to conduct long-term business planning.

The section also states specifically with respect to Brackley et al.'s Scenario 1 that: "The current status is believed to be largely the result of supply limitations and not necessarily related to market demand."

Comment: One comment stated that the estimate of installed capacity of 261 MMBF identified on page 2-47 of the Draft EIS is low. The manufacturers of the mill equipment estimate that the "active, installed capacity" is 370 MMBF.

Response: The active processing capacity of the timber industry in Southeast Alaska in 2004 and 2005 was 261 MMBF, as stated in the Draft EIS. This estimate is from the detailed mill surveys conducted in those years (Brackley et al. 2006b, Juneau Economic Development Council 2006). This, as stated on page 2-47, was the estimated active installed processing capacity in 2005. Total estimated processing capacity for those years was 376 MMBF. The difference is the capacity of three mills that were installed but not active in 2004 or 2005. These mills were: KPC/Annette Island Hemlock Mill (70 MMBF), Gateway Forest Products Veneer Mill (30 MMBF), and Kasaan Mountain Lumber & Log (15 MMBF). This is noted in Table 3.22-5 in the Draft EIS. It may also be noted that the analysis summarized on page 2-47 uses both the active (261 MMBF) and total (376 MMBF) processing capacities as benchmarks for evaluation.

The mill capacity discussion presented in the Economic and Social Environment section of the Draft and Final EIS documents has been updated in the Final EIS to include the findings of the 2006 mill survey, which was completed following publication of the Draft EIS (Juneau Economic Development Council 2006). There was a net decline of 5.5 MMBF in total and active processing capacity in 2006. Northern Star Cedar in Thorne Bay sold equipment capable of processing 8 MMBF and Icy Straits Lumber in Hoonah added a linebar resaw and 2.5 MMBF of capacity (Juneau Economic Development Council 2007). The installed capacity benchmarks used for evaluation of the alternatives have been updated accordingly in the Final EIS.

Comment: One comment stated that the installed capacity figures used in the Draft EIS appeared to substantially overstate existing mill capacity. The comment noted that the figures for the mills in Hoonah, for example, appeared to be 6 to 10 times their actual processing levels.

Response: The installed capacity figures included in the Draft EIS are from the annual mill surveys conducted in 2004 and 2005 (Table 3.22-5). As explained in the Draft EIS, installed capacity is the volume of material that the mill could process in 500, 8-hour shifts. This is not the necessarily the same as the amount actually processed in any given year. The actual amounts processed in 2004 and 2005 are also shown by facility in Table 3.22-5. Actual utilization (or actual processing levels) for the sawmills in Hoonah were, as noted in the comment, substantially below the installed capacity in 2004 and 2006 (see Table 3.22-5). This table has been updated in the Final EIS to include the results of the 2006 mill survey (Juneau Economic Development Council 2007).

Comment: One comment questioned whether the timber demand projections used in the EIS considered peak oil concepts and the projected increase in oil prices, which will negatively affect the competitiveness of the timber industry in Southeast Alaska.

Response: The methodology used to develop the PNW Research Station demand projections is explained in Brackley et al. (2006a), with additional information provided in an addendum prepared in response to comments on the Draft EIS (Brackley and Haynes, in press).

Comment: One respondent asked if Brackley et al. considered a potential increase in demand from the lower 48 states.

Response: The Brackley et al. (2006) study included the assumption of increasing demand in domestic markets. Brackley and Haynes (in press) add further detail to this assumption. Populations in the US are projected to continue to rise in the future, along with demand.

Comment: One comment stated that there is too much wood fiber on the market from domestic and foreign producers and the glut will continue for decades. They believe that the building industry doesn't need or want additional wood from the Tongass.

Response: Brackley and Haynes (in press) argue that Alaska producers have a unique advantage over all other manufacturers in the Pacific Northwest in their access to high quality wood. Alaska producers compete in different market segments with higher value products, on average, with better visual and strength characteristics. Demand for this high quality wood is strong and consistent.

The Forest Service uses a scientific process, Morse 2000, to determine timber sale offer levels to seek to meet annual demand. Among other things it takes into consideration volume under contract and past harvest to help determine what the current demand is for timber.

Comment: The alternatives in the Draft EIS are based on the same faulty logic as those alternatives evaluated in the 1997 EIS. TTRA requires that the Forest Service seek to meet market demand. Market demand for the past several years has been about 50 MMBF and, therefore, only Alternative 1 is consistent with TTRA and the Court order.

Response: Timber harvest in what economists call an "imperfect market", with one major seller and with supply limitations, does not equal demand. In other words, recent harvest levels on the Tongass National Forest do not equal demand.

The basic approach of all the PNW Research Station demand studies over the last 17 years has been to derive the demand for timber from the Tongass from estimates of demand for the end products manufactured from Tongass timber in the markets in which those products are sold. This approach makes it possible to estimate the demand that would exist in the absence of the considerable constraints currently placed on the supply of timber. Examples of such constraints include appeals and litigation, difficulties in preparing sales with positive appraisals, legislation unique to the Tongass that disallows timber purchasers from requesting sales with negative appraisals be offered, and funding levels. In addition, the limited interstate shipment policy has only recently made it possible for sales to be appraised on the assumption that low-grade and small diameter material will be sold in continental US markets, which is expected to enable more sales to appraise positive, and allow them to be offered, than was the case before the policy was adopted. Finally, the Brackley et al. report mentions other developments such as biofuels that could substantially increase future demand, even if the current model cannot quantify such effects.

For all these reasons, we believe the level of timber harvested on the Tongass in recent years is not a good basis for estimating market demand for the next decade or two.

Comment: One comment stated that the following harvest levels represent important thresholds for the timber industry:

- **83.5 MMBF is the bare minimum needed to keep Southeast Alaska mills in operation over the next one to two years, while the supply of timber from the Tongass is increased. This would allow short-term, single-shift operation of the existing mills.**
- **167.5 MMBF per year is needed to allow existing mills to operate two shifts daily and provide 30 MMBF for development of a new facility that would use low-value timber.**
- **231.7 MMBF is needed for the existing mills to operate at full capacity (three shifts daily) and provide 30 MMBF for a facility that would use low value timber.**

This, they note, needs to be economically feasible timber, not the ASQ, which has historically been much higher than the economically feasible level.

Response: The above volumes are broadly similar to the minimum timber volumes required by various processing facilities that are identified in Table 3.22-17 in the EIS. These volumes are used as one set of benchmarks against which the projected NIC I component of the ASQ available under each alternative is compared.

Comment: One comment stated that the analysis prepared for the Southeast Conference and referenced in the Draft EIS—"Timber Markets Update and Analysis of an Integrated Southeast Alaska Forest Products Industry" (McDowell Group et al. 2004)—has been updated. This updated version should be used in the Final EIS. The Southeast Conference has also commissioned another study—"Level of Harvest Capability Required to Support an Integrated Forest Products Industry in Southeast Alaska" (Cascade Appraisal Services, Inc. 2007). The results of this study should also be included in the Final EIS.

Response: The industry capacity reports referenced in the above comment have been reviewed and the updated McDowell Group study is cited in the Final EIS. These reports both included comments on the Draft EIS. These comments are summarized and responded to in this appendix.

Comment: One comment stated that the analysis should not use market demand or installed capacity to determine how much of the Tongass should be cut. Timber should be harvested on a sustained yield basis.

Response: The EIS used market demand to identify the range of alternatives to be evaluated in the Draft EIS because Key Issue 2 for the EIS responds to the requirement under TTRA that the Forest Service seek to meet market demand for timber in Southeast Alaska. Installed capacity is not used to determine harvest levels, but as one benchmark against which the projected ASQ available under each alternative can be compared. All alternatives propose that timber harvest be conducted on a sustainable basis.

Comment: One comment stated that the Morse method used by the Forest Service to establish annual timber sale objectives and meet demand for Tongass timber on an annual basis has a number of shortcomings including a low mill capacity estimate, a "contrived" capacity utilization rate, and unrealistic estimates of non-federal sources of timber. The same comment author also points out that the Forest Service is not meeting its goal of having an approximate three-year supply of timber under contract. The proposed sales identified in the Forest Service's current 5-year plan added to the existing volume under demand would not provide three years worth of supply for an annual harvest of 150 MMBF, let alone the 350 MMBF industry representatives believe is necessary for an integrated industry.

Response: The Morse methodology is referenced in the Draft EIS, but is not part of the analysis and has no bearing on the decision making process. As a result, questions surrounding this methodology are beyond the scope of this analysis. This methodology is, however, discussed in Appendix G.

The Draft EIS identifies that the goal of the Forest Service is to have an approximate three-year supply of timber under contract, as cited in the above comment. However, in the same paragraph, the text explains that: "(i)n recent years the Forest Service has not been able to achieve a three-year supply under contract, mostly due to litigation and administrative policy changes (i.e., Roadless Area decisions)." This discussion has been expanded in the Final EIS.

Comment: One comment pointed out that the Draft EIS (page 3-424) incorrectly references a Juneau EDC/Tongass Futures Roundtable demand projection of 248 to 268 MMBF. The comment author points out that the Tongass Futures Roundtable has not developed any demand projections.

Response: This discussion has been revised in the Final EIS and the reference to the Tongass Futures Roundtable estimate has been deleted. This projection and the correct source are presented in Table 3.22-17 in the Final EIS. The correct source is as follows: Estimates developed by the Forest Service based on McDowell Group et al (2004), Brackley et al. (2006b), and the Juneau Economic Development Council (2006) with updates by Southeast Alaska sawmills.

Comment: One comment stated that the mill capacities presented in Table 3.22-17 in the Draft EIS are incorrect and represent "some very temporary, rough estimates of how much timber the currently operating mills needed to survive one year." The comment then refers the Forest Service to the 2005 Mill Capacity and Utilization Study for actual capacity information.

Response: The estimates presented in Table 3.22-17 in the Draft EIS are, as stated in the title to the table, the minimum timber volumes required by various processing facilities. The capacities identified in the 2005 Mill Capacity and Utilization Study are presented in Table 3.22-5 in the Draft EIS. A 2006 Mill Capacity and Utilization Study was completed between the publication of the Draft and Final EIS documents. The results of the 2006 study have been incorporated in the Final EIS (Juneau Economic Development Council 2007).

Comment: One comment stated that the minimum volumes identified in Table 3.22-17 are not "additive." An MDF facility needs 80 to 100 MBF to operate but this volume needs to be utility logs and sawmill chips only. If an MDF facility had to rely on higher priced sawlogs for its supply it could not be competitive with MDF facilities located elsewhere. The comment author, therefore, concludes that a harvest level of approximately 360 MMBF would be required to supply an MDF facility. Further, different facilities require different types of logs.

Response: Table 3.22-17 in the Draft EIS identifies the minimum volumes required by various processing facilities. These volumes are used in the following analysis by alternative. The analysis does not simply assume that total demand is 248 to 268 MMBF, although this is one measure that could be employed. Rather, the analysis evaluates whether each alternative would meet all or part of the estimated minimum requirements and discusses ways in which these estimated demand levels could be met based on the average timber harvest composition. The average timber harvest composition used in this analysis is estimated based on the average composition of recent sales on the Tongass (see Table 3.22-18 in the Final EIS).

This alternative-by-alternative analysis also uses the maximum annual average harvest levels (NIC I component of the ASQ) with respect to the active and total installed processing capacity and the potential planning cycle demand estimate of 360 MMBF.

Comment: One comment stated that the: "Figure 3.13-11 on page 3-261 (of the Draft EIS) incorrectly depicts the volume that must be harvested to supply a veneer plant and an MDF plant. The 80 to 100 MMBF of utility logs and chips required by an MDF facility cannot realistically be produced from 250 MMBF of timber harvest."

Response: This comment is not clear. There is no Figure 3.13-11 on this page. It is possible that the comment author actually meant to refer to Table 3.13-11, which is on this page, but the comment does not appear to pertain to this table, which identifies the sawlog and utility volume identified for each alternative and does not identify the volume needed to supply a veneer plant or any other specific facility. The ability of each alternative to supply the minimum volumes required by various processing facilities is evaluated in the timber demand analysis in the *Economic and Social Environment* section of the EIS.

Comment: Many comments disagreed with the estimates of demand presented in the Draft EIS. Some requested that the Final EIS be clear that not everyone agrees with these estimates of demand.

Response: Projected timber demand is discussed in detail in the *Economic and Social Environment* section of the Final EIS. This section presents a range of demand estimates and projections, and discusses uncertainty about future demand, other studies, and differences of opinion.

Comment: One comment pointed out that the likelihood of a third party developing an MDF or veneer plant in Southeast Alaska was very low, even under Alternative 7. The comment author cited the recent closure by Weyerhaeuser of two of their veneer plants in Oregon. Weyerhaeuser reportedly stated that these closures were the result of reduced demand for plywood panels due to the decline in the housing market and the increased availability of competing products. The comment author pointed out that Weyerhaeuser supplied these mills from tree farms adjacent to highways and the facilities themselves were located less than two hours from a major Pacific port.

Response: The derived demand scenarios developed by Brackley et al. (2006a) presented MDF plants as an example of how derived demand for low-grade and utility wood might be stimulated. Other possibilities include development of biofuels markets, bioenergy applications, or shipment to markets and processors elsewhere. Chip prices are volatile and depend on many factors; if chip supplies go down regionally and demand increases, prices will increase to the point that shipments of low-grade material over longer distances will become a viable option. In the case of biofuels or bioenergy, as the prices of substitutes (e.g. oil and gas) increase, the probability of using wood products in these applications will increase. The scenarios presented in Brackley et al. (2006a) are designed to encompass a variety of future possibilities.

Comment: A number of comments stated that it is not the Forest Service's responsibility to develop a wood products industry in Southeast Alaska if that industry cannot be operated in an economically and ecologically sustainable manner. Others felt that the current industry was sustainable.

Response: The Forest Service is required to seek to meet market demand under the terms of TTRA. The existing and proposed Forest Plans are designed to ensure that timber harvest on the forest is conducted in a manner that is ecologically sustainable. The EIS evaluates potential demand using a number of possible future scenarios. The timber industry will not develop in the region if individual facilities are not economically sustainable (i.e., able to operate at a profit).

Comment: One comment stated that given that the Forest Plan is revised every 5 years it is not necessary to project timber demand far into the future and current demand levels should be used as a guideline.

Response: The Forest Plan undergoes a periodic review process every 5 years. The results of the most recent 5-year review are discussed on the Tongass National Forest's 5-year review web site (http://www.tongass-5yearreview.net/). The review process is not, however, the same as revising or preparing a new plan, this occurs every 10 to 15 years.

The Tongass estimates timber demand on an annual basis, but is also required under TTRA to seek to meet demand for each planning cycle. In order to seek to meet this demand, it is necessary to develop projections of demand over the planning cycle and into the future. It is, however, also important to note, as stated in the Draft and Final EIS documents, that the Forest Plan itself does not authorize any timber harvest. Rather, harvest is authorized by site-specific timber sale projects, which implement the plan. In other words, the plan does not directly meet demand for timber; rather it sets the conditions under which the Forest Service can seek to meet market demand through the cumulative sales of the annual timber sale program over the planning cycle.

Comment: One comment asked whether TTRA requires the Forest to meet global timber demand or only local demand.

Response: The TTRA does not make a distinction between local and global demand. The Tongass seeks to meet annual demand with the timber offer calculation outlined by Morse (2000). The calculation of planning cycle demand by PNW Research Station scientists is derived demand in end markets for Tongass wood products, wherever those end markets may be.

Regional Economy

General

Comment: One comment stated that the McDowell Group's 2007 report to the Southeast Conference shows that population in Southeast Alaska has decreased since 2000, while the total population in Alaska has increased by 6.9 percent over the same period. The comment authors urged that the Forest Service to consider and use this information in the Final EIS.

Response: This information is presented in both the Draft and Final EIS documents. See Table 3.22-33 in the Draft EIS. (Note that according to the U.S. Census Bureau, the population of Alaska grew by 5.9 percent between 2000 and 2005, not 6.9 percent as stated in the comment [Table 3.22-33; U.S. Census Bureau 2007]). Population data for 2006 are now available and have been added to the Final EIS. These data indicate that the population of Southeast Alaska declined from 70,822 in 2005 to 70,053 in 2006 (Alaska DOL 2007a).

Comment: One comment noted that population has increased by 31 percent in Southeast Alaska since closure of the pulp mills and total personal income increased by 14 percent. The comment author noted that if the timber industry really were the "be all and end all" of the Southeast Alaska economy, these numbers would be going down, not up.

Response: Data for key economic indicators for 1995 and 2004 are presented in Table 3.22-1 in the Draft and Final EIS documents. These data do not support the trends identified in the above comment. When adjusted for inflation, total personal income decreased by 4 percent over this period and per capita income decreased by 1 percent. Total population decreased by 4 percent over this period and total employment was approximately the same in 2004, as in 1995. These data provide a useful overview of the Southeast Alaskan economy, but it is important to understand that the costs and benefits of the current transition in the regional economy are not evenly distributed. This is discussed further in the *Subregional Overview and Communities* section of the EIS.

Comment: One comment cautioned the use of regional statistics to evaluate the economy of Southeast Alaska and pointed out that Juneau accounts for 40 percent of the population and more than half of the region's economy, and may mask significant trends in other parts of the local economy.

Response: This concern is specifically addressed in the Draft and Final EIS documents. The section of the EIS that characterizes the Regional and National Economy presents regional data, as noted in the comment, but cautions that the trends exhibited by these data are not evenly distributed throughout the region and refers the reader to the *Subregional Overview and Communities* section of the document. The *Subregional Overview and Communities* section of the EIS addresses this concern directly and provides and analyses data at the Borough and Census Area level. This is noted on the second page of the *Economic and Social Environment* section of the EIS.

Comment: One comment stated that the 1995 total personal and per capita income figures for Southeast Alaska presented in 2005 dollars in Table 3.22-1 appear to be incorrect.

Response: The 1995 income figures presented in Table 3.22-1 were developed using data from the U.S. Bureau of Economic Analysis (2006a). These data are compiled by Borough and Census Area. The estimates presented in Table 3.22-1 were developed by combining the Bureau of Economic Analysis data for the Boroughs/Census Areas that comprise Southeast Alaska. The resulting estimates were then adjusted for inflation using the Consumer Price Index (All Urban Consumers). A review of these calculations did not identify any errors. Table 3.22-1 has been updated in the Final EIS.

Comment: One comment stated that the data presented in Table 3.22-3, which estimate natural resource-based employment for 1995 and 2004, "significantly understate the magnitude of the decline experienced by the timber products industry following the passage of the Tongass Timber Reform Act in 1990."

Response: Table 3.22-3 is part of the section of the EIS that provides a general overview of natural resource-based industry in Southeast Alaska and is not intended to illustrate the full extent of the reduction in wood products employment that has occurred since employment peaked at 3,543 jobs in 1990. (Note that this table has been updated and revised in the Final EIS). The general overview is followed by sections that discuss specific natural resource-based industries in detail. The section that discusses the wood products industry presents employment data from 1986 to 2005.

Comment: One comment stated that the EIS should explain that the data presented in Table 3.22-2 provide a poor representation of the contribution made by natural resource-based industries to the economy of Southeast Alaska, especially the commercial fishing and recreation and tourism sectors. Another comment noted that this table "inexplicably" lumps together "forestry, fishing, related activities, and other" into one category and fails to distinguish between these important sectors.

Response: The shortcomings of the data presented in Table 3.22-2 are discussed with respect to Recreation and Tourism in the paragraphs immediately following Table 3.22-2. (Note this table has been updated in the Final EIS). The section of the EIS that follows Table 3.22-2 presents estimates of natural resource-based employment by sector and includes estimates of commercial fishing and recreation and tourism-related employment developed from other sources. More detailed employment estimates are provided in the following sections that address each natural resource-based industry in turn.

The data presented in Table 3.22-2 are from datasets compiled by the U.S. Bureau of Economic Analysis. These data are compiled and made available in accordance with the North American Industry Classification System (NAICS), which groups establishments and employees into the categories shown in Table 3.22-2.

Comment: Several comments expressed the concern that the economic analysis in the Draft EIS failed to adequately consider the impacts of logging on other sectors of the economy, and failed to adequately quantify other sectors. One comment noted that the Draft EIS "alternatives fail to consider the economic realities of standing forest and what it represents monetarily via tourism and other recreational and commercial uses beyond timber." One comment recommended that logging be phased out as jobs increase in recreation, tourism, and other sectors. Another comment noted that timber harvest is a single use of the forest that reduces other uses of harvested areas for many decades.

Response: The economic and social analysis presented in the EIS assesses the potential economic impacts of the proposed alternatives on recreation and tourism in terms of the effects that projected timber harvest and associated road building would have on available recreation opportunities on the Forest. The current and proposed Forest Plans include standards and guidelines specifically designed to protect Forest values and resources and the economic activities and values associated with them.

The affected environment portion of the *Economic and Social Environment* section discusses natural resource-based economic sectors of the economy at some length, including wood products, recreation and tourism, commercial fishing, mining, and the economic value of natural amenities and quality of life. The environmental consequences addresses the potential impacts to these resources, as well as other non-use values, including passive use values and ecosystem services.

Comment: A number of comments expressed concern that timber harvest in areas surrounding local communities or areas that are popular for recreation and other uses would have detrimental effects on these areas and the economic activities that depend upon them. The same concern was expressed with respect to fish and the recreational angling and commercial fishing industries that depend on healthy populations of fish.

Others expressed the same general concern, noting that the Tongass National Forest is worth more intact than as harvested timber. Along these lines, many comments stated that the Forest should be managed to support sustainable levels of recreation and tourism, commercial fishing, and subsistence, with timber harvest limited to small sales for local, value-added processing.

Response: Concerns raised with respect to impacts to specific places are addressed in Section C of this appendix. In general, it may be noted that this EIS provides a programmatic forest-wide analysis appropriate for a strategic Forest Plan Amendment. Site-specific projects or activities are best examined locally during the decision making process as appropriate for that action. Specific concerns raised with respect to the potential impacts of the proposed alternatives on the commercial and recreational fishing industries are addressed in the following Commercial Fishing subsection.

The management alternatives presented in the EIS are all designed to support sustainable levels of recreation and tourism, commercial fishing, and subsistence. The areas potentially available for timber harvest would, however, vary by alternative, with projected harvest volumes ranging from approximately 49 MMBF per year under Alternative 1 to 421 MMBF per year under Alternative 7.

Comment: One comment requested that the EIS disclose the opportunities for commercial timber, minerals, and other uses that are foregone in areas allocated to Wilderness, National Monument, OGRs, and other restrictive LUDs. They requested that these foregone opportunities be quantified in acres, volume, value, and improved habitat.

Another comment urged the Forest Service to "conduct a comparative economic analysis of the short and long term economic impacts of leaving unprotected roadless areas as intact wilderness or having these same areas logged." Another comment requested that the environmental and opportunity costs of opening an area to intensive resource development be quantified in the overall feasibility evaluations of opening any new areas to this type of development.

Response: There are trade-offs or opportunity costs associated with all of the alternatives evaluated in the EIS. The decision to allocate an area to one type of use or management often precludes another use, although this isn't always necessarily the case. The EIS analysis evaluates the potential environmental impacts of the proposed alternatives by resource and, as a result, implicitly includes the trade-offs or opportunity costs associated with each alternative. The EIS does not, however, provide a Forest-wide inventory of resources that would be available assuming that existing Congressionally-mandated land designations and other management policies were not in place because these designations and policies will remain in place regardless of the alternative selected. As a result, this type of inventory would not contribute to the decision making process that the EIS is designed to facilitate.

The alternatives evaluated in the Final EIS examine a broad range of options concerning roadless areas and logging. Although the EIS does not provide a comparative analysis of the economic impacts of preserving existing roadless areas or logging all of these areas, Alternative 1 in the Final EIS protects all roadless areas and may be compared with the other alternatives that each include varying levels of harvest in roadless areas (see the *Economic and Social Environment* section in the Final EIS).

The analysis presented in this EIS is programmatic and provides overall Forest-wide direction. Project-specific analyses are conducted for specific projects, such as a timber sales or recreation developments. Project-level analyses do not typically use the term “opportunity costs”, but essentially quantify all the impacts—negative and positive—of a proposed project. Potential impacts may include impacts to subsistence, wildlife, or particular sectors of the economy.

Comment: One comment noted that the data included in the Socioeconomic Setting section on page 3-8 of the Draft EIS were from 1999 and pointed out that these data should be updated in the Final EIS. The comment author stated that the updated data will show that the economy is even worse now then it was in 1999 and will show that it is “crucial that the (Forest Plan) do everything possible to help the economy.”

Response: The data identified in this comment have been updated in the Final EIS. These data simply identify total population and the largest economic sectors in the region based on employment. More detailed analysis of economic and social trends is provided in the *Economic and Social Environment* section of the EIS. The *Economic and Social Environment* section in the Draft EIS included the most recent data available when the Draft EIS was prepared, and these data have been updated for the Final EIS, as appropriate.

Comment: One comment requested that the introduction to the Economic and Social Environment section of the EIS (page 3-403 in the Draft EIS) identify “adequate infrastructure” as an essential element of a healthy economic and social environment.

Response: The introduction to the *Economic and Social Environment* section provides a brief overview of the contribution of resources from the Tongass National Forest to local communities and the regional economy. A general statement about infrastructure is not consistent with the intent of this short section. Potential impacts to transportation and utilities are discussed in the Environmental Consequences part of the *Economic and Social Environment* section of the EIS, as well as in the *Transportation and Utilities* section.

Comment: One comment stated that commercial fishing is the largest natural resource industry in Southeast Alaska, not recreation and tourism, as stated in the Draft EIS. The comment also stated that the number of pages spent discussing each natural resource sector in the economic impact analysis reflects the relative level importance assigned by the Forest Service, as well as the level of analysis, with Timber assigned 16 pages and Commercial Fishing less than 1 page.

Response: Natural resource-based industries and their relative contribution to the regional economy of Southeast Alaska are discussed in detail in the subsection titled “Natural Resource-Based Industries” in the *Economic and Social Environment* section of the Draft and Final EIS documents. Based on estimates for 2004 presented in the Draft EIS, the recreation and tourism sector employed more people than the commercial fishing sector (see Table 3.22-3 and Figure 3.22-2 in the Draft EIS). These estimates have been updated in the Final EIS.

The relative number of pages allocated to a subject is not a reliable indicator of the importance assigned to an issue by the Forest Service. However, the commercial fishing section of the economic impact analysis is relatively short because: 1) it is not one of the key issues identified through the 2005 Court ruling or the 5-Year Forest Plan Review (see Chapter 1 of the Draft and Final EIS documents for details); and 2) there are no effects to commercial fishing employment anticipated over the 10 year timeframe of this analysis. This conclusion draws upon the analysis prepared for the 1997 Final EIS, which is incorporated in this EIS by reference.

In contrast, the supply of timber is a major focus of this EIS. Key Issue 2 for the EIS responds to the requirement under TTRA that the Forest Service seek to meet market demand for timber in Southeast Alaska. Estimating market demand is a difficult and contentious task and this is reflected in the Draft and Final EIS documents. The timber section of the economic impact analysis assesses the alternatives with respect to a number of different demand indicators and other measures of demand and supply.

Comment: A number of comments emphasized that the timber industry provides relatively highly paid jobs that last all year round. This type of comment often involved a comparison with recreation and tourism-related employment, which was typically characterized as relatively low paid and seasonal. One comment also argued that employment in the timber industry is more stable than that in other natural resource sectors.

Response: Wood products jobs do tend to be relatively high paid, with recreation and tourism-related employment often relatively low paid and seasonal, but this is not necessarily always the case. The Final EIS looks at a wide range of alternatives built around the issue of timber harvesting. Three alternatives feature a reduced land base available for logging while two alternatives increase the lands available.

Multipliers

Comment: **One comment stated that the economic impact analysis presented in the Draft EIS is "fatally flawed" because it uses economic multipliers, derived from the IMPLAN economic model, to estimate indirect and induced employment and income impacts. They cite several studies, both empirical and theoretical, to support their claim that impact multipliers in general, and input-output models in particular, do not provide accurate estimates of total economic impact. The comment also argued that IMPLAN does not provide comparable details for all resource-based sectors of the economy and is biased toward timber. The comment author sees evidence of this bias in the structure of the model data, which provides data for the lumber and wood products sector, but does not identify a recreation sector.**

Response: Some professional economists disagree on the utility of static impact multipliers of the type produced by IMPLAN and similar input-output models. These models are, however, a standard tool for a broad range of regional analyses conducted by government agencies, academics, and other entities interested in estimating the economic impacts of different policy options. IMPLAN in particular has been used in numerous and various policy analyses and research settings. The economic impact analysis presented in the EIS follows standard analysis procedures by using the IMPLAN model. The analysis in the EIS is accompanied by an explicit caveat recognizing that some economists may have reservations about the validity of this methodology. As noted in the Draft EIS (pg. 3-410):

> "Concerns have been raised with respect to the ability of IMPLAN and similar input-output models to accurately predict indirect and induced effects. Alternate techniques for estimating these effects are, however, subject to the same, or similar, criticisms and more accurate estimates are not readily available for this analysis. While the multipliers presented here should be viewed with caution, the resulting estimates of indirect and induced employment provide a basis for comparison between alternatives."

In addition, the EIS is careful to distinguish between direct effects on one hand and indirect and induced effects on the other.

The multipliers used to assess timber impacts are easier to derive from the IMPLAN model than those used to assess recreation and tourism, as noted in the comment. As noted in the same comment document, "recreation is scattered among a variety of industries generally classified in services and retail, with some in transportation." The IMPLAN model uses data compiled from standard economic sources and it is more likely that the absence of a single recreation sector in the model reflects the form of the source data, rather than a deliberate bias toward timber.

Comment: Another comment also urged caution in the use of IMPLAN data noting that employment and income multipliers for Southeast Alaska can be highly variable from year-to-year and provided examples of employment multipliers based on 2004 IMPLAN data: logging (2.18), sawmills (2.1), gold/silver mining (1.92), commercial fishing (1.22), and seafood processing (1.94). The same comment also provided examples of income multipliers.

Response: As noted in the above comment and on page 3-410 of the Draft EIS, the actual magnitude of the estimated multipliers should be viewed with caution.

The numbers provided in the above comment are different from those used in the EIS, which are based on IMPLAN data from 1998. The differences are less than 0.5 in all cases, except sawmill income where the difference is 0.78. The use of different multiplier coefficients would affect the total employment estimates across all alternatives, but would not affect the relative ranking of the alternatives. Using the employment coefficients for timber (sawmills and logging) provided in the comment instead of those used in the EIS would, for example, increase the total employment estimate for each alternative by about 8 percent. As noted in response to the preceding comment: the EIS is careful to distinguish between direct effects on one hand and indirect and induced effects on the other.

The main purpose of using multipliers in this analysis is to acknowledge that economic activity in one sector has impacts elsewhere in the economy and these potential impacts should be taken into account when considering the employment impacts of the alternatives.

Comment: One comment noted that a study of the multiplier effect in Southeast Alaska found that the multiplier effect with respect to jobs in Southeast Alaska was effectively zero. Another comment noted that: "IMPLAN, while useful for appraising the total economic impacts of a Forest Plan is insufficient for evaluating impacts on communities."

Response: The Forest Service is not aware of a study with the finding that the multiplier effect in Southeast Alaska is effectively zero. Research conducted in Southeast Alaska communities did, however, find that indirect employment coefficients while applicable at large scales, such as large regional or statewide assessments, are not useful at small local scales and may be misleading (Robertson 2003). This may be the study that the comment author is referring to.

The multipliers derived from IMPLAN are used in the EIS analysis to assess the total economic impacts of the Forest Plan (as recommended in the comment) at the regional level (Southeast Alaska as whole). They are not used to evaluate impacts at the community level.

Comment: One comment noted that inadequate supplies of timber not only affect loggers and mills, but also specialized support businesses and other elements of the timber industry infrastructure. The comment notes that if these people leave the industry will fail.

Response: The economic impact analysis presented in the EIS uses economic multipliers to account for potential indirect and induced employment and income impacts. The indirect component for the timber industry includes employment and income in industries that provide specialized support and other inputs for the timber industry. This type of analysis does not establish levels of economic activity necessary to sustain particular industries or support services, but it seems reasonable to assume that the size of an industry or business is directly related to its market.

Timber

Comment: The statement on page 3-415 of the Draft EIS that the overall patterns of harvest levels shown in Figure 3.22-5 generally reflects broader trends in the wood products market oversimplifies the situation. Market trends were just one of many factors influencing harvest levels, equally important were reductions in timber supply from the Tongass.

Response: The comment takes the cited statement out of context. The EIS acknowledges that timber demand and harvest has been influenced by a number of factors. The overall trend shown in Figure 3.22-5 does, however, mirror broader trends in the wood products market, as discussed in the Draft and Final EIS documents.

Comment: Table 3.22-8 in the Draft EIS compares the ASQ on the Tongass from 1994 to 2005 with actual harvest levels. One comment observed that the Ketchikan Pulp Corporation would have logged "a lot more in the 1990s" if the volume had been available and noted that "1995 was the highest market of all time."

Response: The table referenced in the comment compares actual harvest levels from 1994 through 2005 with the ASQ for those years. Harvest volumes from 1986 to 2005 are shown graphically in Figure 3.22-5 in the Draft EIS. (Note: this table and figure have been updated in the Final EIS). These data are provided to illustrate the discrepancy between ASQ levels and actual harvest and display trends over time. As noted in response to the preceding comment, the EIS acknowledges that timber demand and harvest have been influenced by a number of factors.

Comment: The wood products employment projections in the EIS assume a linear relationship between harvest and employment levels, with a one percent change in harvest resulting in a one percent change in employment. One comment was concerned that given current trends in automation, there is no direct linear relationship between harvest and employment and the use of this assumption may lead to an overestimate of timber employment under the higher volume alternatives.

Response: As noted in the Draft and Final EIS documents, the linear relationship between harvest and employment is an approximation assumed for the purposes of analysis to allow a comparison between alternatives. The relationship between harvest and jobs expressed in the Final EIS as jobs/MMBF is based on data collected from 2000 to 2005 (Alexander 2007). The logging and sawmill jobs/MMBF coefficients were revised between the Draft and Final EIS documents. These coefficients are believed to be representative of current conditions and are suitable for a comparison of alternatives.

While the resulting projections are suitable for a comparison of alternatives, the absolute values should be treated with caution, especially those for the higher volume alternatives. The main reason for this caution pertains to the jobs/MMBF coefficients, rather than the idea that ongoing automation could sever the relationship between harvest volume and related employment. The existing job/MMBF coefficients are based on the current industry structure. The higher volume alternatives assume that a veneer mill and some other form of "demand stimulation", such as an MDF plant, will also be in operation. The jobs/MMBF coefficients associated with these facilities are likely different than those associated with the sawmills that comprised the industry from 2000 to 2005. Other changes in industry structure or outputs, such as an increase in value added products oriented toward local markets, could also result in different coefficients.

Comment: One comment noted that many logging jobs go to people from out of state and do not contribute to the local economy. This, they stated, is probably not considered in the Draft EIS analysis.

Response: As noted in the Draft and Final EIS documents, nonresidents account for approximately 35 percent of the employment in the logging industry. This is not accounted for in the direct employment estimates, but the total employment estimates are based on region-specific multipliers that take into account the fact that some of the income generated through logging employment is spent outside the region. Non-resident participation is high for all resource-based employment in Southeast Alaska (see Figure 3.22-2 in the Final EIS).

Recreation and Tourism

Comment: One comment stated that the Draft EIS incorrectly used studies by McDowell Group (1999) and Global Insight (2004) to estimate the economic activity associated with the recreation and tourism sector in Southeast Alaska. The comment notes that both studies include resident and non-resident business travel, as well as vacation travelers and, therefore, estimates developed using these studies overestimate recreation and tourism-related economic activity.

Response: The basic approach and estimated coefficients from the 1999 McDowell Group study were used to develop estimates of recreation and tourism-related economic activity for 1999 and 2001 in the Draft and Final Tongass SEIS documents, respectively. The findings of this study were used indirectly in the Draft EIS to help estimate the current contribution of recreation and tourism to the regional economy. The McDowell Group study addressed vacationers, business travelers, and those combining business and pleasure, as noted in the comment. However, the study identified the relative share of the total visitor impacts associated with what they termed the “vacation/pleasure visitor component” and this ratio was used to adjust the data used in the Draft EIS analysis. The resulting estimates were, as a result, broadly representative of recreation and tourism (or vacation/pleasure visitors), and not all visitors. This estimate and discussion has been substantially revised in the Final EIS, which presents employment data for the Leisure and Hospitality sector as a proxy for recreation and tourism.

Comment: One comment stated that the Draft EIS does not account for the differences in the value of different types of recreational experiences. The comment cited a recent study that compared sportfishing expenditures in unroaded areas around Bristol Bay with those in road-accessible areas on the Kenai Peninsula and found that expenditures in the unroaded areas were 38 times higher than those in road-accessible areas.

Response: As discussed in the Draft EIS (page 3-429), the recreation and tourism economic analysis is based on a number of simplifying assumptions, including the following:

> “This approach assumes that the average amount of employment generated by a single RVD is constant over time and that this number is the same for both Tongass-related recreation and the region as a whole, as well as for different types of recreation on the Tongass.”

The Draft and Final EIS documents explain that: “While these assumptions may not accurately reflect underlying realities, they are necessary to produce a quantified estimate of the relation between recreation activity and employment.”

Comment: One respondent presented the following comments. The analysis assumes that the projected reduction in the supply of primitive and semi-primitive recreation opportunities would not be severe enough to limit consumption because it assumes that demand would only increase by 18 percent over the 2005 to 2010 period. Evidence from California suggests that the demand for wilderness hiking and camping by residents increased by 42 percent between 1990 and 1998

(Outdoor Industry Foundation n.d.). The EIS should at a minimum include a sensitivity analysis that assesses the relative impacts of different projected consumption growth rates.

In addition, given the long-term impacts of timber harvest and other development activities, the recreation component of the economic impact analysis should extend beyond 2010. Even at the low growth rates assumed by the analysis, projected demand would begin to exceed supply in 2017 under Alternative 7 and 2019 under Alternative 1.

Response: The recreation and tourism component of the economic impact analysis presented in the EIS is based on projected future demand and changes to Recreation Opportunity Spectrum (ROS) settings in recreation places by alternative. The key assumptions used in this analysis include the use of a linear projection based on 1984 to 1995 data collected for recreation places to project future demand (see Figures 3.22-7 and 3.22-8 in the EIS) and a series of assumptions about the effects that timber harvest would have on ROS settings to estimate the effects of the alternatives on recreation supply.

The demand projection used for the analysis in the EIS relies upon a number of simplifying assumptions (as noted in response to the preceding comment and in the Draft and Final EIS documents), but is based on Tongass-specific data and is the best currently available information for the Tongass. The analysis in the Final EIS has been adjusted and compares projected changes in ROS supply for the first decade following implementation (presented as annual average estimates by alternative) with projected demand for 2015.

The demand projection used in this model assumes that overall recreation demand would increase by 36 percent from 2005 to 2015. This analysis suggests that demand for ROS1 opportunities would begin to exceed supply in 2020 under Alternative 7 and in 2022 under Alternative 1. Increasing the expected growth rate in ROS1 demand, as suggested in the comment, results in demand for these opportunities exceeding projected supply sooner under all alternatives, but does not increase the differences between the alternatives. Projected ROS1 supply under all alternatives would be exceeded within a two to three year period and, therefore, the overall effects would remain similar.

It is also important to recognize that, as explained in the Draft and Final EIS documents, the purpose of this analysis is to allow a quantitative comparison between alternatives. The likelihood of demand for primitive and semi-primitive recreation opportunities exceeding supply on the 16.9 million acre Tongass National Forest in the foreseeable future is low for at least two reasons. First, the analysis discussed in the comment is for identified recreation places only (see the *Recreation and Tourism* section of the EIS for details), not the entire forest. In other words, ROS1 supply is assumed to be limited to just 2.2 million acres from the total of 13.4 million acres of ROS1 available on the Forest (see Table 3.15-3 in the *Recreation and Tourism* section of the EIS), which viewed in RVDs (using the same assumptions as the model) is seven times the projected demand in 2015.

Second, in order to emphasize the differences between the alternatives, the analysis assumes that 25 percent of the change in ROS settings projected to occur over a 160 year analysis period would happen in the first decade following implementation (by 2015 in the Final EIS). This would not happen, but without this assumption there is very little difference between alternatives.

This analysis is designed to assess the programmatic effects of the alternatives and the finding that there is little difference between the alternatives is consistent with this scale of analysis, with standards and guidelines expected to minimize potential impacts on cruise ship routes and popular activities and reduce the potential for overcrowding in wilderness areas under all alternatives. There could, however, be important differences between alternatives on a project-by-project basis, with the alternatives that permit more intensive timber harvest potentially impacting existing or potential outfitter/guide use areas and other nature-based activities. These potential impacts are identified with respect to important recreation places in the *Recreation and Tourism* section of the EIS.

Commercial Fishing

Comment: Several comments questioned the finding that there would be no impact to the commercial fishing industry.

One comment referenced a recent study prepared for Trout Unlimited (Curley and Bristol 2006), which suggests that the majority of salmon originate on the Tongass and depend on roadless watersheds. This study, they argue, suggests that timber harvest and road building in roadless watersheds would have negative impacts on fish and the commercial fishing industry. The comment also pointed out that the fact that much of the future of the fishing industry in Alaska is expected to be dependent on factors outside of the Tongass National Forest is beside the point. The EIS, they argue, needs to evaluate the potential impacts of the alternatives with all other things assumed to be equal.

Another comment stated that the conclusion that there would be no impact to the commercial fishing industry under any of the alternatives ignores a number of issues, including harvest on steep slopes with unstable soils and problems with road maintenance and culverts, among others.

Response: The economic impact analysis presented in the Draft and Final EIS documents does discuss broader trends that are likely to affect commercial fishing in the future, but also states: "There is not expected to be any significant effect to the commercial fishing or fish processing industries over the next decade as a result of National Forest activities" (Draft EIS, page 3-457). This, as explained in the Draft and Final EIS documents, is because the projected levels of timber harvest represent a relatively small proportion of the remaining productive old growth (POG) on the Tongass and an even smaller proportion of the entire Forest. In addition, the Riparian Management Standards and Guidelines established in the current Forest Plan and included in the Final Proposed Forest Plan are designed to protect salmon habitat and prevent impacts to salmon and other aquatic species.

Risks to aquatic resources would increase with more harvest (see the *Fish* section in the Draft and Final EIS documents). Site-specific evaluations would occur with each timber sale to evaluate potential adverse impacts to aquatic resources and identify mitigation measures to reduce any potential impacts. One of the goals of project-specific NEPA documents is to ensure that project actions do not result in significant adverse impacts to important resources. The potential impacts of the alternatives on fish are discussed in more detail in the *Fish* section of the Draft and Final EIS documents. The study referenced in this comment is discussed in the Fish section of this comment response appendix.

The potential impacts of the past practices and related management actions identified in the last part of the comment are part of the baseline for all of the alternatives and would not vary by alternative. These potential impacts are discussed in the Fish section of this comment response appendix and the *Fish* section of the EIS.

Comment: One comment stated that in addition to direct timber harvest-related impacts to fish, the commercial fishing industry would also be severely impacted if any species of concern, such as the marbled murrelet, were listed as endangered under the Endangered Species Act (ESA) as a result of timber harvest practices.

Response: As discussed in response to comments on the *Wildlife* section of the EIS, the potential effects of timber harvest on old-growth habitat are discussed under the marbled murrelet subsection of the wildlife analysis, and tables indicating the distribution and protected status of this habitat are provided in the *Biodiversity* section. The potential effects of the proposed alternatives on other species of concern are also addressed in the *Wildlife* section of the EIS. None of the alternatives are expected to result in fish or wildlife species on the Tongass being listed as endangered under ESA.

Comment: One comment questioned why the discussion of the commercial fishing and seafood processing industries in the Draft EIS focuses on salmon, even though the text acknowledges that other species comprise about one-quarter of the region's total catch on a total value basis. The comment also expressed concern that the Draft EIS uses data from 1994 to discuss salmon's share of the commercial fishing industry and requested that this information be updated in the Final EIS.

Response: The rationale for this decision on page 3-431 of the Draft EIS (and cited by the above comment author) is as follows:

> "While commercial salmon fishing comprises the bulk of Southeast Alaska's fishing industry, halibut, crab and herring fishing combined makes up a substantial proportion of the region's total catch (approximately 24 percent in 1994 on a value basis). There is an important connection between salmon and other wildlife and fish species on the Tongass. Crab, halibut, herring, bears, eagles, and other species depend on the annual return of millions of salmon and on the juvenile salmon produced in the Tongass streams and lakes. As a result, management decisions that affect salmon indirectly affect other species that are commercially fished. These relationships are, however, poorly understood and difficult to quantify. The commercial fishing discussion presented in this section, therefore, focuses on the salmon fishery. Data available for the seafood processing industry, however, do not allow for an easy distinction between salmon processors and other firms. Data presented for the seafood processing sector, therefore, include the entire seafood processing industry."

This statement is also included in the Final EIS. This is consistent with the analysis presented in the 1997 Final EIS and the 2003 SEIS.

Salmon comprised approximately 42 percent of the commercial fishing industry in 2005 based on ex-vessel value. Halibut, crab, and herring combined, comprised 30.7 percent of the industry in 2005, 6.7 percent more than in 1994 (Alaska DOL 2007e). From 2000 to 2006, salmon harvesting ranged from 41 percent to 48 percent of total fish harvesting employment in Southeast Alaska, comprising 47 percent of the total in 2006 (Alaska DOL 2007d). This information has been added to the Final EIS. Employment data have also been added for the non-salmon components of the commercial fishing industry. However, as noted above, the focus of the commercial fishing impact discussion remains on the salmon fishery.

Comment: One comment was concerned that self-employed commercial fishermen were not included in Tables 3.22-1, 3.22-3, and 3.22-4 in the Draft EIS. The comment asked: "how is it … that whole fisheries and their self-employed participants have … 'disappeared' from the … employment estimates presented in the Draft EIS?" The comment author states that the analysis is "hopelessly flawed and patently dishonest" because it fails to include these numbers.

Response: As stated in the Draft EIS and contrary to the concern raised in the comment, self-employed salmon fishermen <u>are</u> included in the salmon harvesting employment estimates (see, for example, page 3-410, final paragraph or page 3-432, footnote 3). These totals were calculated using data from the Alaska Commercial Fisheries Entry Commission and the methodology employed in the 1997 Forest Plan Revision Final EIS analysis (see, for example, Table 3.22-3 in the Draft EIS, note 4).

Employment data were presented in the Draft EIS for the salmon component of the commercial fishing industry only. Employment data associated with other components of fishing industry were not included in these totals. Salmon harvesting continues to be the focus of the commercial fishing discussions in the Final EIS. Employment data are, however, provided for the entire commercial fishing sector in Southeast Alaska in the Natural Resource-Based Industries overview presented in the Final EIS.

The following paragraphs address the specific tables referenced in the comment.

Table 3.22-1: This table provides an overview of the Southeast Alaska economy and does not present data by industry. The average annual employment data presented for Southeast Alaska are from data compiled by the U.S. Bureau of Economic Analysis (BEA) and include self-employed workers.

Table 3.22-2: The data presented in this table were also compiled by BEA. These data are compiled and made available in accordance with the North American Industry Classification System (NAICS), which groups the industries, as shown. Self-employed workers are included in the "proprietors employment" category. This information is not available by industrial sector at the borough/census area level.

Table 3.22-4: This table presents employment and income multipliers for various natural resource sectors in Southeast Alaska, including the salmon harvesting and seafood processing sectors. It does not present employment estimates.

Natural Amenities and Quality of Life

Comment: One comment states that while the Draft EIS acknowledges that natural amenities and quality of life are important for attracting and retaining residents, it does not quantify this impact in the economic impact analysis because the Forest Service essentially claims it would be too hard to do so. The Draft EIS does not provide any data, studies, or explanation that supports the contention that the proposed alternatives would have no significant effect on the economic activity that these amenities are believed to generate.

Further, the comment continues, the Draft EIS "seems to have made up its own science in support of the sophism that protecting natural amenities will somehow degrade quality of life" by stating that: "changes in the local economy such as a shift to tourism may impact local atmosphere and amenities… These impacts are largely assumed to be negative as tourism leads to crowding and the loss of traditional charm, but this need not always be the case" (Draft EIS, page 3-437).

Response: The Draft EIS concludes that in most cases and localities the effects of the action alternatives relative to the no action alternative are not expected to be significant enough in of themselves to result in measurable changes to amenity-driven economic activity. This conclusion is based on the standards and guidelines that are designed to protect and/or mitigate negative effects to natural resources on the Tongass, as well as the relatively small proportion of the Forest that would be disturbed under any of the proposed alternatives.

The importance of the standards and guidelines are discussed with respect to quality of life and other difficult to quantify values in the *Economic and Social Environment* section of the EIS (under Ecosystem Services).

Potential harvest activities under the proposed alternatives would affect a relatively small proportion of the Tongass and would be unlikely to affect the predominantly wild and undeveloped nature of the region and the role it presently plays in attracting visitors and residents. The EIS notes that this is likely to be the case in most cases and localities, but it is possible that this type of impact could potentially occur at a local level, if timber harvest were to occur in a presently undeveloped location that is used and valued by local residents. This type of impact would be more likely to occur under Alternatives 4 and 7, which include more timber harvest, but quantifying the possible extent of this effect would require site-specific analysis that is beyond the scope of this programmatic EIS.

In addition, it should be noted that the existing literature does not provide much direction with respect to this type of analysis. Studies to date have tended to focus on a comparison between rural counties that include designated Wilderness, and those that do not (see, for example, the literature reviews included in Rudzitus and Johnson 2000, Colt 2001, and Sonoran Institute 2006). These broad macro-scale analyses have important implications, as discussed in the EIS. However, even proponents of this relationship caution that while data suggest that rural counties with Wilderness outperform those without, "a correlation does not imply a cause and effect relationship" or "guarantee that economic prosperity ... (in a county) … will automatically rise following the designation of Wilderness" (Sonoran Institute 2006; 28).

Indeed, the same comment author who submitted this comment also provided a copy of a paper prepared on their behalf, *Greater than Zero: Toward the Total Economic Value of Alaska's National Forest Wildlands*, in which the authors (Phillips and Silverman 2007, 20) explain that they do not attempt to estimate these types of values because Alaska presents a "particular econometric problem" in this regard, with the uniform and high presence of "wildlands" across the region preventing a "comparison of communities with and without nearby wildlands, because almost all communities fall into the category 'with nearby wildlands'."

The Draft EIS (page 3-437) states:

> "Although it is difficult to directly measure the importance of natural amenities in attracting and keeping residents, proximity to natural environments and the recreational activities they support are undeniably a benefit enjoyed by residents, especially in the more rural communities of Southeast Alaska."

The paragraph continues to explain that changes in traditional economies may not always be perceived as positive and uses the example of tourism, which can lead to overcrowding and a loss of traditional charm. The discussion also notes that some aspects of tourism development such as restaurants, meeting centers, or entertainment facilities that are also used by local residents may have positive effects on local residents. It is not clear why the comment author believes this discussion is the result of made-up science and it is not the intent of the EIS authors to convey that "protecting natural amenities will somehow degrade quality of life." The statement quoted in the comment has been revised in the Final EIS to discourage this misinterpretation.

Comment: One respondent noted that the Draft EIS discusses the role of natural amenities and quality of life factors attracting new residents to the region. Anecdotal evidence suggests that this has happened in Southeast Alaska. The comment notes that this has had positive impacts, as suggested in the EIS (e.g., local purchases, human capital), but there is another side to this issue with impacts to life-long residents, who may experience increases in home and property values and property taxes, as well as a change in collective attitudes, with new residents favoring policies that do not necessarily reflect the positions of long-time residents who may make their living from the surrounding Forests. The comment states that if this issue is "really relevant to Tongass management issues it ought to be addressed in appropriate detail rather than speculatively."

Response: The issue of natural amenities and quality of life is relevant to the Forest Plan to the extent that proposed management decisions may impact these values and affect local residents and communities. There are potential downsides associated with retirees and others moving to small communities, including those noted in the comment. The discussion presented in the EIS is intended to provide a balanced perspective on this issue, but the main point is to assess the potential effects of the proposed alternatives on the economic aspects of this issue. As noted in the EIS, local amenities and quality of life do not provide employment or generate income in the same way as a sawmill or a tourist lodge, but they can serve to attract and keep residents. The EIS concludes that the effects of the action alternatives relative to the no action alternative are not expected to be significant enough in of themselves to result in measurable changes to amenity-driven economic activity. This is discussed further in response to the preceding comment.

Economic Efficiency Analysis

General

Comment: One comment noted that the calculation of net public benefits is missing or has been conflated with the economic efficiency analysis summarized in Table 3.22-29. The comment author observed that "(i)n order to accurately represent the PNV (Present Net Value) of alternatives it must include all Forest Service costs for all program areas, not just variable costs of timber." Another comment noted that the analysis should include the costs, as well as the benefits of non-timber programs, such as recreation and commercial fishing.

Response: The net public benefit analysis conducted for the EIS is presented in the Economic Efficiency portion of the *Economic and Social Environment* section of the EIS. The introduction to this section has been revised to explain the relationship between net public benefits and the economic efficiency analysis. The economic efficiency analysis has been expanded in the Final EIS to include program costs for: Inventory and Monitoring; Minerals and Geology; Recreation, Heritage, and Wilderness Management; Land Management Planning and Land Ownership Management; Vegetation and Watershed Management; and Wildlife and Fisheries Habitat Management, in addition to variable timber costs. The costs assigned to these categories are estimated based on the average 2005/2006 costs for these cost categories and are assumed to remain constant across all alternatives.

Comment: One comment stated that recent District Court decisions indicate that it is "erroneous to presume that monetary values need to be assigned to non-timber resources as you have attempted to do in the Draft EIS" and the presentation of this "flawed and misleading" information "permeates the Draft EIS and will unduly influence the ultimate outcome without basis in law or fact." The comment further stated with reference to Table 3.22-29 in the Draft EIS that the "assumptions, conclusions and management directions based on this table are problematic throughout the plan."

Response: The economic efficiency analysis summarized in Table 3.22-29 assigned monetary values to those goods and services where they could be reasonably assigned in accordance with the 1982 Forest Planning rules (36 CFR 219). These resources and the associated potential impacts were important factors in formulating the alternatives evaluated in the Draft EIS, but the difference in estimated values between timber and recreation and tourism, as shown in Table 3.22-29, did not have an undue bearing on this process. As noted in response to the preceding comment, the economic efficiency analysis has been expanded in the Final EIS.

Comment: A number of comments were concerned that the economic efficiency analysis presented in the Draft EIS is misleading and represents an "apples and oranges" comparison, with actual projected timber receipts and costs compared to hypothetical willingness-to-pay values for recreation that are based on outdated survey data from 1988. Comments disagreed on how this was misleading. Some felt that the analysis incorrectly suggests that "non-timber uses of the Tongass are grossly more beneficial than timber uses from an economic standpoint." Others felt that the comparison overvalues timber harvest relative to other non-timber uses not included in the table.

One comment stated that the following statement on page 3-461 of the Draft EIS was particularly misleading: "Recreation and tourism estimates range from approximately 76 times (Alternative 7) to 380 times (Alternative 1) higher than those for timber, indicating the importance of the Tongass National Forest as a recreation resource for both local residents and outside visitors."

Response: The economic efficiency analysis has been revised in the Final EIS. The analysis includes the consumer surplus (willingness-to-pay) estimates for recreation and tourism, but also includes receipts to the Forest from recreation activities as a separate category, as well as recreation program costs. Program costs are also included for: Inventory and Monitoring; Minerals and Geology; Heritage and

Wilderness Management (this category also includes recreation costs); Land Management Planning and Land Ownership Management; Vegetation and Watershed Management; and Wildlife and Fisheries Habitat Management.

The high consumer surplus values estimated for recreation and tourism on the Tongass are believed to reflect the importance of these activities to local visitors and outside residents. There is, however, little variation in these estimated values by alternative, as discussed in the Draft EIS. The text in the Final EIS has been revised to further emphasize this point.

Comment: One comment noted that Table 3.22-29 suggests that recreation and tourism revenues are a reflection of the amount of timber harvest and also suggests that rather than being a broad-based plan that seeks to balance multiple uses this plan is an analysis of the effects of timber harvest on other uses. The comment further noted that the table also suggests that other program costs are not expected to vary by alternative. Another comment stated that the summary in Table 3.22-29 "denies the multiple use concept" by suggesting that recreation and tourism and the timber industry cannot work side-by-side without impacting one another. In addition, the comment author felt that the values in this table indicate that the "non-use" values of nonresidents are given priority over employment opportunities for state residents.

Response: The analysis summarized in Table 3.22-29 in the Draft EIS has been expanded in the Final EIS, as discussed in response to preceding comments on this issue. The revised table provides estimated costs and revenues for other Tongass program elements, as well as timber and recreation and tourism. While it is likely that program costs would vary by alternative, it is not possible to project these variations at this time.

The table presented in the Draft EIS was not intended to convey that recreation and tourism and timber cannot co-exist. However, higher timber harvest levels, especially those projected under Alternatives 4 and 7, would affect recreation and tourism over the 160 year planning horizon considered in the economic efficiency analysis. Timber harvest and road building in unroaded areas would result in an increase in Roaded Modified (RM) recreation opportunities, and a corresponding decrease in the availability of unroaded recreation opportunities. This is discussed in the Environmental Consequences part of the *Recreation and Tourism* section of the Draft and Final EIS documents under Recreation Opportunity Spectrum.

Comment: One comment stated that the economic efficiency analysis incorrectly suggests that the Tongass National Forest should be managed to achieve maximum economic return. The Forest Service is required to manage NFS lands for multiple uses, but not necessarily the combination of multiple uses that returns the greatest dollar returns or unit outputs.
Response: The economic efficiency analysis is not intended to suggest that the Tongass National Forest should be managed to achieve maximum economic return. More discussion regarding the purpose of and requirement for the economic efficiency analysis has been added to the introduction to the Economic Efficiency section in the Final EIS.

Timber

Comment: Several comments noted that the net timber benefits shown in the economic efficiency analysis only include direct sale revenues paid to the government and do not capture the full benefits of the Tongass timber program. One comment stated that the timber benefit estimate should also include the impacts of the money spent harvesting and manufacturing the timber, which the comment author estimated as approximately $600 to $700 per MBF. Another comment suggested that the benefit estimate should include federal payroll taxes and associated corporate income taxes.

Response: The economic efficiency analysis has been revised in the Final EIS. The timber portion of the analysis has been adjusted and revenues to the federal government are now estimated using base rate values by species and the average species composition of timber on the Tongass. The base rate is the minimum value that must be bid for timber to be sold or cut. This rate is lower than the average value per MBF harvested in 2005/2006 that was used in the Draft EIS ($7.12/MBF versus $11.69/MBF).

The regional economic impact benefits of the various alternatives are evaluated in the economic impact analysis presented in the Draft and Final EIS documents. This analysis includes the jobs and income generated by the money spent to harvest and manufacture the projected timber sale volumes under each alternative. As noted in the timber part of the Economic Efficiency section in the Draft and Final EIS documents, industry revenues are omitted from the timber benefit calculation "because efficiency analysis commonly assumes perfect competition in the private sector. This implies, in turn, that competing purchasers of federal timber will bid up the price of stumpage to the point where all economic profits (i.e., profits over and above a competitive rate of return to capital) are dissipated." Federal payroll taxes and corporate income taxes are associated with all economic activities supported by Tongass resources. No attempt is made to estimate these tax revenues in the Draft or Final EIS documents.

Comment: Other factors than just stumpage values need to be included in timber appraisals. These factors include direct and indirect jobs in the timber industry, as well as other multiplier effects. When the value of recreation, tourism, and fishing are estimated these factors are always included, but the costs of these other uses versus the user fees are never shown.

Response: The procedures used for timber appraisals are outside the scope of this Forest Plan Amendment. With respect to the Forest Plan Amendment and this EIS, potential timber-industry related impacts are discussed in two sections, along with impacts to other resources (recreation and tourism, commercial fishing, etc.). These sections are the Economic Impact Analysis and Economic Efficiency Analysis parts of the *Economic and Social Environment* section of the EIS. The economic efficiency analysis has been expanded in the Final EIS and includes the costs of administering other programs on the Tongass. The economic impacts of the alternatives are evaluated in terms of jobs and income (including multiplier effects) in the economic impact analysis.

Comment: One comment stated that the cost of future remediation for roads and logging should be factored in and borne by those who profit from the logging and road building.

Response: The costs associated with planning, implementing, and administrating timber sales, as well as associated mitigation activities, are included in the projected costs used in the economic efficiency analysis presented in the EIS. These costs include sale preparation, environmental assessments, and cultural resource surveys, among others. A second group of costs related to the actual harvest of the timber are included in the purchaser's contract requirements and are reflected in the stumpage value received. These costs include the costs of reforestation, road obliteration, and culvert removal among others. A third group of costs are largely fixed costs associated with long-term forest management and Forest Plan implementation and monitoring, and are not expected to vary significantly by alternative.

Comment: One comment stated that the Draft EIS fails to identify the true costs of the Tongass timber program because it does not disclose the costs of building roads that are necessary for a timber sale to go forward ("pre-roading"). Pre-roading contracts are let in advance of timber sales and nearly all large sales, especially those in roadless areas, are dependent on this practice. Other sales are dependent on advance road improvements to existing logging roads that are contracted under maintenance contracts, although this maintenance has no purpose other than to facilitate future timber sales. The comment states that these costs need to be disclosed in the Draft EIS.

Response: Pre-roading is a process whereby roads are constructed into a NEPA cleared project area prior to and separate from a timber sale or other resource activity. The intent of pre-roading is to develop or expand the transportation network without requiring one resource to carry the entire burden of road construction costs. Pre-roading is an administrative decision that requires funding from Congress and is subject to the same environmental laws and regulations (NEPA, NFMA, etc.) as other federal actions. This practice is best addressed at the project level and is outside the scope of this programmatic EIS.

Comment: One comment stated that the Draft EIS failed to accurately account for the costs associated with the proposed levels of harvest. They argue that the $101/MBF figure used to estimate timber costs in the economic efficiency analysis is based on an undocumented estimate, which "any examination of expenditures in relation to outputs over the last decade" shows to be an underestimate. In addition, this cost per MBF derived from budget allocations assumes that all planned sales are actually sold, which is not the case. The Forest Service plans for more volume than is actually cut and even projects that make it through the planning phase may not necessarily be sold, as was the case with 30 percent of the sales offered between 1998 and 2003.

Response: The economic efficiency analysis presented in the EIS uses the $101/MBF figure cited in the comment to estimate the timber sale costs for each alternative and assumes for the purposes of analysis that all sales offered are sold. This estimate is based on historic timber sale preparation costs and includes costs for NEPA preparation, sale preparation, sale administration, and engineering support. The Forest Service uses the $101/MBF figure to estimate costs as part of its timber sale planning process at the individual timber sale level. The use of this figure in this EIS to assess potential costs is consistent with these practices and provides an adequate basis to allow a comparison between alternatives, recognizing that economic efficiency analyses conducted at the Forest Plan level project outcomes and assign approximate valuations to costs and benefits more than 100 years into the future and require numerous simplifying assumptions.

The timber component of the economic efficiency analysis has been revised in the Final EIS. This revised version uses the base rates—the minimum value that must be bid for timber to be sold or cut—to estimate timber revenues. The average base rate value per MBF used in the Final EIS ($7.12/MBF) was estimated using 2006 base rates by species and the average timber sale composition. The benefits estimated in the economic efficiency analysis using this value are the absolute minimum that must be bid for a timber sale to go forward. These estimated cost and benefit figures indicate that viewed in terms of direct costs and revenues to the Forest Service, timber harvest results in a net loss per MBF. These flat rates are used to evaluate the alternatives and result in the total projected net loss increasing as the projected harvest volume increases.

Comment: One comment pointed out that a large component of the costs that make logging uneconomical on the Tongass are the costs associated with court litigation brought by opposition groups.

Response: These costs are not directly factored into the average timber sale costs used in the economic efficiency analysis presented in the EIS. However, litigation has increased the timber sale preparation costs incurred by the government and has also had the effect of interrupting the supply of timber to local mills.

Comment: One comment stated that the Draft EIS failed to consider that the effects of non-competitive bidding reduce estimates of timber revenues. The comment also pointed out that almost 50 percent of new sales offered between 1998 and 2005 did not sell and that 20 of the sales that did sell were returned to the Forest Service.

Response: The economic efficiency analysis in the Draft EIS implicitly considered the effects of non-competitive bidding in the Draft EIS by using the average stumpage value ($11.69/MBF) from actual sales to estimate revenues. This portion of the economic efficiency analysis has been adjusted in the Final EIS and revenues to the federal government are now estimated using base rate values by species and the average species composition of timber on the Tongass. The base rate is the minimum value that must be bid for timber to be sold or cut. This rate is lower than the average value per MBF harvested in 2005/2006 that was used in the Draft EIS ($7.12/MBF versus $11.69/MBF).

Comment: One comment stated that the timber industry has manipulated stumpage prices in the past and that this could happen again. They recommended that the Forest Service look into this practice.

Response: Analyzing stumpage prices is beyond the scope of this analysis. The economic efficiency analysis presented in the Final EIS has been revised to use base rate values to estimate potential revenues to the Federal government.

Recreation

Comment: One comment identified the following specific concerns with the "contingent valuation" methodology used to estimate the net benefit of recreation/tourism activity:

- **The estimated sport fishing "willingness-to-pay" value of $1,025.27 (1988 survey data adjusted to 2005 dollars) per Recreation Visitor Day (RVD) "defies reason" because it is "highly unlikely" that guided and unguided fishing operators would so "vastly under-price their product."**
- **Willingness-to-pay methodologies employ survey research to place hypothetical dollar values on non-market goods. Use of these values in economic analysis is contentious because this type of analysis produces hypothetical, unverifiable values and research has found that stated willingness-to-pay is often very different to actual willingness-to-pay.**
- **If tourists were willing to pay additional money to visit the Tongass the tourism businesses would already be charging them that money**.

Response: There is an extensive academic literature that addresses contingent valuation with respect to outdoor recreation and benefit cost analysis, and a number of methodological concerns have been identified, including those identified in the above comment. There is, however, broad consensus surrounding the use of willingness-to-pay measures with respect to recreation in the academic literature and various Federal agency planning regulations and guidance documents, including the Forest Service Handbook (FSH 1909.17, Chapter 10).

The analysis presented in the EIS uses the average net willingness-to-pay value used in the 1997 Final EIS (USDA Forest Service 1997a) adjusted for inflation. This value was originally developed based on survey research conducted at the national level and then adapted for the Tongass. This is the best information currently available for the Tongass. While the estimated sport fishing value is high, as noted in the comment, the analysis uses an aggregated figure of $69.13 per RVD.
The analysis presented in the Draft and Final EIS documents illustrates that there is little difference between estimated recreation consumer surplus values by alternative. The overall intent of this analysis is to compare alternatives and, while different levels of timber harvest affect the types of recreation that may be available in the future, the analysis is not intended to compare the relative values of different resources.

Non-Market Values and Ecosystem Services

Comment: A number of comments expressed concern that the Draft EIS did not adequately address non-market values, which they thought should be assigned monetary values and treated on a par with market timber values. Several comments provided lists of “important net benefits” that the comment authors felt had been incorrectly excluded from the Draft EIS analysis. The most detailed list identified the following “unpriced benefits” that the comment author felt the Draft EIS “largely overlooked”:

> **“biological diversity; cultural connection to the land such as subsistence; quality of life; endangered/threatened species protection; water quality; special non-timber forest products; passive use values such as bequest, option, and existence values; educational and scientific values; unearned income; ecological services such as carbon sequestration; hydrological services; irreversible consequences and lack of substitutes; property values and offsite benefits; and visual amenities”**

Response: The items listed in the above comment are all discussed and evaluated in the Draft and Final EIS documents and will be considered in the overall decision-making process, as appropriate. The fact that these items are not assigned monetary values and quantified in the economic efficiency analysis does not lessen their importance to the overall process. This is discussed further in the Economic Efficiency section of the Final EIS.

While the EIS does not attempt to assign monetary values to the non-use values potentially associated with each alternative, the text does acknowledges that the non-use values associated with the Tongass are likely to be high, especially given the national importance of this issue. The fact that no monetary value is attached to non-use values does not lessen their importance in the decision making process; decision-makers routinely choose alternatives that do not maximize PNV. Many forest benefits are incorporated into forest planning decisions in a qualitative fashion. Also, a large proportion of the Draft and Final EIS documents are devoted to revealing impacts to the forest resource that cannot be readily expressed in monetary terms. The Forest Service Manual states that decision makers must “[c]onsider economic efficiency, *along with other factors* (emphasis added), in making decisions and in implementing and reviewing projects, programs, and budgets” (FSM 1970.3(3)).

Comment: Several comments stated that the Forest Service is required by the 1982 planning regulations to assign monetary values to non-market goods and services. Two comments supported this contention by quoting the following definition of net public benefits from 36 CFR 219.3:

> **“An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not”**

One comment supported this position with the following:

> **“Economists have made great advances in developing methods to estimate the economic benefits generated from the production and conservation of non-commodity resources. Therefore, in addition to qualitative descriptions of all non-commodity benefits and costs the decision documents must quantitatively estimate the benefits (costs) of conserving (damaging) non-market resources.”**

Response: The introduction to the Economic Efficiency Analysis subsection has been revised in the Final EIS and highlights the 1982 planning regulations and their relationship to this analysis. The revised section explains that the approach taken in the EIS is consistent with the 1982 planning regulations, which state that “quantitative and qualitative criteria” may be used to evaluate alternative outputs “when monetary values may not be reasonably assigned” (36 CFR 219.12(g)(3)(ii)). This approach is also consistent with the definition of net public benefits cited in the above comment, which allows that not all effects can be "quantitatively valued" (36 CFR 219.3). As noted in the response to the preceding question, the economic efficiency analysis is one piece of information for the decision maker to consider, but is by no means the only one and a large portion of the EIS is spent evaluating potential effects that cannot be reasonably assigned a monetary value at this time.

Comment: One comment submitted an unpublished draft report that presented the commenting organization's own assessment of non-market values on the Tongass and Chugach National Forests (*Greater than Zero: Toward the Total Economic Value of Alaska's National Forest Wildlands*, Phillips and Silverman 2007). The comment stated that this report estimates that the value of wildlands on the Tongass ranges from $1.5 billion to $1.8 billion per year and provided a summary of the results (adapted from the Phillips and Silverman draft report). The comment expressed surprise that the Forest Service had not included similar estimates in the Draft EIS and argued that not including these types of monetary estimates in the Final EIS would "constitute a violation of NEPA for failing to disclose significant effects."

Response: The analysis prepared by Phillips and Silverman (2007, 3) takes a benefit-transfer approach and applies values developed elsewhere and broad macro-scale dollar figures to, in their own words, estimate "the total benefits of the wildlands on the Tongass and Chugach National Forests" at "an admittedly coarse scale—a first approximation." In some cases, they note that they were unable to provide separate estimates for each forest, instead providing one estimate that covers both forests. This analysis provides a rough approximation of total economic values for various "benefit categories" (e.g., subsistence, passive use, ecosystem services not otherwise counted, etc.) that are included in the Final EIS as illustrations of one set of possible total economic values, where appropriate. The Phillips and Silverman analysis also illustrates the difficulties in developing accurate estimates suitable for policy analyses that require data at a finer resolution than this type of "coarse scale" approach and, in effect, supports the Forest Service's decision to use these types of estimates to support a qualitative discussion of potential impacts to these resources, rather than use these very general values to attempt to quantify differences between alternatives in monetary terms.

In addition to the problems with the total value estimates, Phillips and Silverman (2007) do not address or even mention one of the main challenges in implementing this type of analysis in a policy or management context, namely, identifying the impacts of the proposed alternatives in units or outputs that can be accurately measured in sufficient detail to allow meaningful comparison between alternatives. The ecological impact assessments presented in the Draft and Final EIS documents follow standard scientific approaches to these types of analysis and typically assess impacts in terms of probability and risk, not in numbers of affected deer or salmon, etc. The difficulties associated with identifying production relationships and the corresponding units of measurement is generally considered one of the main challenges currently facing ecosystem services analyses (Kline 2006).

Interest in ecosystem services has increased in recent years and, as noted in the preceding comment summary, economists have made useful progress in developing and improving methods and techniques that can be used to value non-market ecosystem services. Recognizing the potential utility of the ecosystem services concept, the Forest Service recently proposed that ecosystem services be used as a framework for describing and evaluating the many benefits associated with NFS lands and established an Ecosystem Services web site (http://www.fs.fed.us/ecosystemservices/) that provides detailed information and resources, identifies and discusses Forest Service efforts in this area, and issues a regular Ecosystem Services newsletter. In addition, the PNW Research Station recently issued a technical report that attempts to define an economics research program to describe and evaluate ecosystem services (Kline 2006). One of the long-term goals of this type of agenda is to allow these types of non-market ecosystem services values to be incorporated into management decisions in the future. We are just not there yet.

With respect to the Tongass National Forest, scientists from the PNW Research Station in Juneau have recently initiated an ecosystem services research program that is aimed at using the Tongass as a case study of the impacts of forest management on the long-term provision of ecosystem services and goods.

The initial phase of this program has involved working with the MIMES (Multiscale Integrated Models of Ecosystem Services) model developed by leading ecosystem services researchers at the University of Vermont. Initial work has focused on developing a simplified, dynamic model of forests and ecosystem services and goods. Future research plans involve adapting MIMES to model the impacts of management decisions on the flow of ecosystem services and goods.

Tongass National Forest Budget

Comment: One comment stated that the Final EIS should disclose the detailed budget (by EBLI) and staffing projections needed for each alternative. At least one alternative, they argue, should have a smaller budget and ASQ than Alternative 5 (No Action) and mirror more closely what will be possible in the future with reduced budgets. The comment notes that: "The plan alternatives are all built on a budget and staffing level that will expand to meet potential accomplishments; this is unrealistic."

Response: The Draft and Final EIS documents evaluate three alternatives (Alternatives 1 though 3) with an ASQ that would be lower than is currently the case.

As discussed in the Draft and Final EIS documents, the Forest Service budget is appropriated through Congress on an annual basis. National Forest budget requests are considered as part of total budget requests submitted to the United States Congress by the executive branch each year, with Congress having final say. The overall forest budget would be affected by variations in the projected level of timber harvest, with timber-related budget requirements likely higher under Alternatives 4, 5, 6, and 7, and Alternative 1 requiring the lowest level of funding. Budget shortfalls are likely in the future, especially for the more timber-intensive alternatives.

The information presented in the Draft and Final EIS documents is sufficient to allow a comparison between alternatives. Detailed budget estimates will continue to be developed on an annual basis following the selection of a preferred alternative.

Comment: Several comments stated that the Forest Service should use the funds presently spent managing the timber program to fund programs that manage recreation and tourism. These funds should also be used to repair damage from past logging practices and sustain wild salmon runs.

Response: As noted in response to the preceding comment, the Forest Service budget is appropriated through Congress on an annual basis. Funds provided in the budget are allocated for specific purposes. Funds allocated to the timber program, for example, are used for that program and the Tongass does not have budget authority to reallocate these funds to other uses. Other Tongass programs address recreation and tourism, restoration, and salmon, and are also funded by Congress.

Payments to the State

Comment: One comment stated that the 2000 Secure Rural Schools Act provided a safety net for communities that have historically depended on revenue from timber sale receipts. This legislation expired in 2006 and unless the act is reauthorized, Southeast Alaska communities will experience a loss of revenues, which at current harvest levels would be approximately $9 million annually. This would include about $400,000 the Ketchikan Gateway Borough uses to fund its school system.

Response: The 2000 Secure Rural Schools Act has been extended to 2007, as noted in the Final EIS. Future government funding or legislation will be decided in Congress and is beyond the scope of this EIS. This Act has provided funds to counties hard hit by reductions in timber harvest throughout the Pacific Northwest and other regions, as well as Southeast Alaska.

Communities

Comment: One comment stated that the "community use areas" used to assess potential effects to Sitka and Kake do not appear to adequately represent what these communities consider their use areas.

Response: The community use areas identified in the Draft EIS were originally identified for the 1997 Forest Plan Revision EIS. These areas are intended to generally represent the areas commonly used or related to by community residents in their local, day-to-day work, recreation, and subsistence activities. The community use areas are used to provide a more localized representation of data provided elsewhere in the Draft EIS. These identified areas may not fully encompass all areas used by local residents, but they provide a useful overview of LUD designations and suitable acres within the immediate vicinity of each community. Local residents concerned about potential impacts in areas outside the identified community use areas can find comparable information for these areas elsewhere in the EIS.

Comment: One comment expressed concern that the Communities subsection of the Draft EIS fails to adequately assess the economic effects of the alternatives on each community. The comment stated that the "section is focused subsistence use of deer and contradictory and not substantiated." Another comment stated that the Draft EIS does "little to nothing to show the effects of each alternative on individual Southeast Alaska communities."

Response: The comment does not identify what type of analysis the author thinks would be appropriate at the community scale, and does not provide any specific comments that can be addressed or examples of how the sections might be considered contradictory. As a result it is not possible to provide a specific response. The introduction to the Communities subsection in the Draft and Final EIS documents identifies some of the difficulties involved in trying to predict the effects of forest-wide management alternatives on community economies and explains that the community analyses do not attempt to quantify economic impacts in absolute terms because this is simply not possible (see the subsection titled: Analyzing Impacts to Communities).

The community analyses presented in the Draft and Final EIS documents do, however, provide a considerable amount of information about each community and illustrate how each community might be affected by the various alternatives. This analysis is consistent with those presented in the 1997 Forest Plan EIS and the 2003 SEIS.

Comment: A number of comments stated that the existing sawmills in Southeast Alaska require an economically viable wood supply from the Tongass to operate at full capacity and provide jobs in local communities. One comment also stated that the EIS analysis needs to evaluate impacts on a community-by-community basis and must not: "claim that the benefits from a growing community that does not depend on the timber industry somehow offset the negative impacts on communities that depend on the timber industry."

Response: The Draft and Final EIS documents evaluate the potential impacts of the proposed alternatives on a community-by-community basis in the Communities subsection of the *Subregional Overview and Communities* section. The EIS analysis is programmatic and not site-specific, which limits the ability of the analysis to project impacts at the community level. This is discussed further in the Communities subsection of the EIS (see the subsection titled: "Analyzing Impacts to Communities"). The EIS does not make any "claims" that suggest that benefits to one community outweigh negative effects to another. The positive impacts of Forest-wide planning decisions may not, however, be distributed evenly across the Forest, with some communities, those in the south, for example, bearing a larger share of the negative impacts associated with timber harvest than those to the north.

Comment: One comment pointed out that the discussion of the Silver Bay sawmill in Wrangell in the Communities subsection of the Draft EIS needs to be updated. Silver Bay came out of bankruptcy in 2004 and has stated that the mill would like to operate at capacity (65 MMBF annually).

Response: This section has been updated in the Final EIS and now states that Silver Bay continues to operate. The updated section also provides summary data based on the 2006 mill survey, which included the Silver Bay mill. The facility processed an estimated 6 MMBF in 2006 and employed 30 people (Juneau Economic Development Council 2007).

Comment: One comment noted that the discussion of Hoonah in the Communities subsection of the Draft EIS did not mention the Icy Straits Lumber Company mill and its role in the economy of Hoonah, and requested that this be added to the Final EIS.

Response: The Icy Straits mill and its location in Hoonah are discussed elsewhere in the Draft EIS (see Table 3.22-5, for example), but the mill was not specifically identified in the general discussion of Hoonah's economy presented in the Communities subsection. This information has been added to this discussion in the Final EIS.

Comment: The Draft EIS states that: "Tenakee Springs residents have been vocal in their opposition to tourism development." One comment noted that small-scale, locally-owned businesses catering to independent travelers are a large part of the Tenakee Springs economy. Local residents opposed cruise ship development, not all tourism development. This should be clarified in the Final EIS.

Response: The cited statement is attributed to Dugan et al. (2006) in the Draft EIS and is taken directly from their report: *Nature-Based Tourism in Southeast Alaska: Results from 2005 and 2006 Field Study*. The report presented the results of interviews with nature-based tourism businesses in Southeast Alaska communities, including Tenakee Springs. A note of clarification citing the comment author (Chichagof Conservation Council) has been added to this statement in the Final EIS.

Comment: One comment requested a balanced Forest Plan that provides employment opportunities in local communities. The comment author noted that people are moving from villages to larger urban areas for work and cited the examples of people moving from Hydaburg, Craig, and Klawock to Ketchikan, and people moving from Hoonah, Angoon, Kake, and Yakutat to Juneau.

Response: Population data are presented by community in the Communities subsection of the Draft and Final EIS. These data indicate that all of the communities referenced in the comment, with the exception of Juneau and Hoonah, experienced a net loss in population from 2000 to 2005. Ketchikan also lost population over this period. The seven alternatives presented in the Draft and Final EIS documents each provide a balance between different land uses on the Tongass, but the balance is weighted differently under the different alternatives.

Comment: Several comments stated that the data provided in the *Subregional Overview and Communities* and Environmental Justice sections of the Draft EIS indicate that Southeast Alaska is "in dire economic straits and fully justifies that the … (Forest Service) … should do everything possible to improve the viability of the forestry and mineral industries."

Response: This represents one perspective. Others providing comments believe that the future health of Southeast Alaska's economy is predicated on recreation and tourism and commercial fishing. These comments argue that continued large-scale logging and mineral exploration seriously jeopardize this future. These represent contrasting visions for the future of the region. The Forest Service has proposed a range of alternatives that try to balance these competing visions.

Comment: Many general comments were received expressing concern about the economic plight of small isolated communities that have few well paying year-round jobs. One respondent focused especially on the community of Hyder in this respect and had a number of requests that might improve the situation such as designating a minerals development overlay LUD for the historic mining area near Hyder.

Response: As noted in response to the preceding comment, there are a number of competing visions for the future of the region. The EIS evaluates a range of alternatives that try to balance these competing visions. A minerals overlay has been added to the Hyder area under all of the action alternatives in the Final EIS.

Comment: One organization providing comments included several lists of "core principles" the authors believed the Forest Plan should address and implement with respect to community use. These lists included the following:

- **"Establish a shared and balanced vision of the values and uses of the Tongass National Forest**
- **Protect customary and traditional uses of the forest**
- **Protect key community use areas which Southeast Alaskans cherish and benefit from economically, socially, and culturally**
- **Provide a long-term management vision of the forest which ends the unsustainable practice of logging Inventoried Roadless Areas and seeks to meet the needs and benefit all who care about the forest, including residents, visitors, and other stakeholders."**

Response: The proposed Forest Plan alternatives evaluated in this EIS are designed to meet the goals identified in the above comment, to the extent possible, recognizing that the Forest Service is required to manage the Tongass for multiple uses and also seek to meet demand for timber under TTRA. The alternatives considered in this EIS range from Alternative 1, which involves the lowest projected levels of timber harvest and would not involve logging in roadless areas, to Alternative 7, which involves the highest projected levels of timber harvest and includes logging in roadless areas. The potential impacts of the proposed alternatives on customary and traditional uses of the forest and community use areas are assessed in the *Subsistence* and *Communities* sections of the EIS.

Fish and Watersheds

The Fish and Watersheds comment and response subsection is divided into the following categories:

- General
- Buffers
- Culverts and Roads
- Watersheds
- Forest Plan and EIS Revisions

General

Comment: Some comments disagreed with the assessment that none of the alternatives would result in significant declines of major fish and marine resources. Concern was expressed that none of the alternatives adequately protect fish and their habitat because all alternatives include some development LUDs in primary fish producing watersheds. Further, one comment stated that under all of the alternatives there would be large changes in temperature, sediment, and physical conditions in watersheds that supply important habitat for rearing fish.

Response: The suite of Forest-wide and LUD-specific standards and guidelines that have been in place since 1997 have proven through monitoring and research to be effective in protecting fish habitat and fish populations. These protections and monitoring efforts will continue under all alternatives. The Final Proposed Forest Plan does, however, include a number of changes to the standards and guidelines for riparian areas and for fish management, based on information developed in the 5-Year Forest Plan Review.

The EIS acknowledges that risks to aquatic resources would increase with more harvest and would vary by alternative (see the *Fish* section). Site-specific evaluations, and, if needed based on standard and guidelines, watershed analysis would be conducted for all timber sale proposals to evaluate if specific adverse affects would occur and identify how best to modify the actions to minimize these specific effects. One of the goals of the site-specific timber sale NEPA assessments is to ensure that significant adverse effects do not occur to important resources as a result of the timber sale.

Comment: One comment stated that the Draft EIS overstated possible impacts to fish passage and karst (page 2-53, Table 2-18) given the protective measures found in the Forest Plan.

Response: Table 2-18 (Summary of Effects Matrix) in the Draft EIS displays the effects of the seven alternatives on all potentially affected resources, including Karst and Fish, in a consistent manner to aid in comparison of the alternatives. Forest Plan standards and guidelines are implemented to protect or minimize the potential effects at the project level. Specific comments with respect to fish passage are addressed elsewhere in this section. Specific comments about karst are addressed in the Geology, Soils, Karst, and Caves section of this comment and response appendix. Table 2-18 has been updated in the Final EIS to reflect changes made between the Draft and Final EIS and for the Final Proposed Forest Plan.

Comment: One comment requested that additional discussion of the potential effects of the alternatives on fish populations and fisheries be provided. Another comment requested additional discussion of the potential effects of the alternatives on stream flow, temperature, transport of nutrients and feed from headwaters to fish rearing habitat, and the influence of large woody debris and beaver dams on fish productivity. One comment also questioned whether there really has been no effect on fish or fish populations from past harvest over the last 30 years.

Response: A general discussion of the types of effects that occur from timber harvest has been added to the *Fish* section of the Final EIS. This discussion includes potential impacts to many of these factors (e.g. temperature, nutrients, large woody debris). The effects of the alternatives on these factors are addressed indirectly by quantifying the relative difference in risk factors that influence these parameters. These factors include acres of harvest and miles of roads, which may, for example, influence temperature and large woody debris in streams. The likely effects at specific sites would be addressed through the project-specific NEPA process for any future timber sale or other development projects.

Additional discussion has been added to the Final EIS concerning the effects of past timber harvest practices on fish or fish populations. (Also see the cumulative effects subsection of the *Fish* section in the Final EIS for overall factors, including past, present, and reasonably foreseeable future actions that could affect fish). Effects to fish populations from future actions cannot be directly quantified given the number of outside variables, such as ocean conditions and population fluctuations. However, past, present and future actions are discussed by quantifying factors known to have increased risk to fish habitat. It should be noted that all of the proposed alternatives have a substantial number of measures that would be implemented during timber harvest to protect fish habitat, many of which were not in place during most of the past timber harvest.

Comment: One comment requested that the EIS acknowledge the importance of salmon and their carcasses as input to the ecosystem of the forest and streams. The comment also stated that indirect and cumulative effects to salmon should be considered as part of the EIS analysis.

Response: Additional information has been added to the Final EIS discussing how salmon carcasses contribute to production in forest and stream ecosystems. Some general discussion of local effects to some anadromous and resident fish populations from older harvest methods has also been added. Cumulative effects are addressed relative to the effects of overall timber harvest-related actions with respect to risks to fish habitat. Overall effects to fish populations and returning salmon to streams cannot be directly determined from this analysis, but the relative direction of effects among the alternatives can be inferred.

Comment: Several comments raised the concern that timber harvest would adversely affect spawning fish in upper Tenakee Inlet, noting that this appeared to have occurred in other local streams. One comment suggested that the success of salmon production in Tenakee Inlet is due to the pristine conditions and noted that cool water is essential for salmon spawning.

Response: The amount of timber harvest in the Tenakee Inlet area varies by alternative (as shown in the alternative maps that accompany the Final EIS). Forest Plan standards and guidelines are intended to minimize or eliminate adverse effects to important aquatic resources. Further, specific effects to these resources would be evaluated during the project-specific NEPA process for timber sales and other projects.

Comment: One comment stated that the claim that logging harms fishing is contradicted by harvest data, which indicates that catch was much higher after most of the heavy harvest occurred then it was before.

Response: Some information has been added to the text in the *Fish* section discussing likely effects of past logging actions on fish numbers. Information is supplied that indicates there have been adverse effects from old logging practices on numbers of fish at specific sites. However, changes in the number of returning salmon are the result of many factors, including climate and ocean conditions, which play a large role and can change returns dramatically. Also there has been dramatic increase in hatchery fish production in recent years, affecting overall harvest. Additionally, the total amount of area directly affected by timber harvest, relative to the entire Tongass National Forest, is small so that any local changes in salmon runs would likely not be apparent in total harvest numbers from Southeast Alaska. These concepts are discussed in a number of the references cited in the Final EIS.

Comment: One comment recommended that the information used to summarize sport fishing effort and demand in the introduction to the Fish section in the Draft EIS be updated using the Alaska Department of Fish and Game (ADF&G) Statewide Harvest Survey. The comment also requested that Dolly Varden and cutthroat trout be added to Table 3.5-1, which lists commonly harvested sport, subsistence, and commercial fish.

Response: This information has been added to the Final EIS.

Comment: One respondent wanted to know when and how known problems with siltation from forest roads and deposits of detritus from log transfer facilities would be remedied.

Response: Potential siltation from forest roads would be addressed on a site-specific basis during the NEPA process for specific timber sales. Siltation would be controlled using Best Management Practices (BMPs) for roads, with these practices applied on a site-specific basis. This would also be the case for log transfer facilities. Additional information has been added to the text in the *Fish* section in the Final EIS. (See also the *Transportation and Utilities* section for more detail on potential log transfer facility effects.)

Comment: One comment noted that the latest definition of Essential Fish Habitat in Alaska should be used in the text. Another comment clarified how Essential Fish Habitat and the Magnuson-Stevens Act applies to this Forest Plan Amendment.

Response: The current definition of Essential Fish Habitat is included in the Final EIS**.** The Final EIS also discusses the Magnuson-Stevens Act and how it applies to the Forest Plan Amendment.

Comment: One comment provided a citation they believed was important relative to addressing fish die offs in Southeast Alaska streams. The paper noted that adult returning salmon mortalities were from natural conditions and not directly related to past harvest conditions.

Response: This information has been added to the *Fish* section of the Final EIS under the Important Components of Fish Habitat subsection.

Comment: One comment recommended that the Forest Service, in consultation with the State, develop objective criteria and protocols to use for stream classification, and train Forest Service staff in the application of these protocols. The comment also urged the Forest Service to maintain existing flexibility in the Class III guidelines to protect water quality and downstream fish habitat in a manner that is practical for timber harvesting.

Response: The Final Proposed Forest Plan includes objective criteria and protocols for stream classification. The Forest Service agrees that taking measures to promote consistent interpretation and application is important. A Forest Plan implementation training program will be developed and used to promote consistency after the Amendment is completed. That effort will be done collaboratively with the State and others.

Comment: One comment expressed concern over adequate funding for the maintenance of BMPs designed to protect fish. The comment author also felt that more protection, beyond BMPs, is needed on smaller streams, and pointed out that even non-fish streams have valuable riparian functions and also contribute wildlife habitat.

Response: Overall Forest Service funding is declining but implementation of standards and guidelines is not funding-dependent. Protection of fisheries is a high priority and adherence to standards and guidelines and monitoring of results will continue. Monitoring has not identified a problem with the current level of protection.

Comment: One respondent was concerned that hatchery fish would compete with wild fish to the detriment of wild fish. The comment stated that the Forest Service is standing by and allowing hatcheries to destroy the integrity of the wild habitat.

Response: The Forest Service manages habitat for wild fish (and other wildlife) within the Tongass National Forest. It does not manage hatcheries. This is a state issue and beyond the scope of this analysis.

Comment: Several comments wanted the Forest Service to reprioritize activities to make maintaining and enhancing salmon runs a top priority.

Response: The Forest Service in the Final EIS and Final Proposed Forest Plan is placing more emphasis on habitat restoration, including that relating to salmon habitat. This also includes prioritizing culvert replacement for areas that have the greatest need. Funding for this activity is dependent on Congress and Forest Service Management decisions. The Final Proposed Forest Plan includes standards and guidelines that are intended to protect aquatic resources and prevent effects that would inhibit maintaining fish runs.

Buffers

Comment: Some respondents felt that global warming may raise stream temperatures and could harm anadromous fish. One comment recommended that stream buffers be expanded to ensure waters stay cool and fish die offs are not caused by forest practices.

Response: Generally, stream temperatures on the Tongass are well below the point where fish would be affected. Some streams do have periods when they exceed optimal temperatures and the warming trend could compound this problem. The stream buffers required by the Final Proposed Forest Plan would provide shade which would help keep temperatures cool. Conversely, some streams in Southeast Alaska are colder than optimum, and the warming trend may improve conditions for salmon in these streams.

Past fish die offs have been documented in both harvested and unharvested watersheds and were reported to be primarily the result of flow conditions, air temperature, and the density of fish, not specifically the lack of shade or other harvest-related conditions. Future harvest practices are likely to have little direct effect on the occurrence of fish die offs during spawning. The current buffering system will supply abundant shade along fish streams under all alternatives and widening the buffers would not substantially change the shading. The one exception is Alternative 7, which would not require buffers on Class III streams, which may affect temperature.

Comment: One comment stated with respect to the importance of cool water temperatures for fish that there is an optimum temperature within which temperature changes are not harmful and may even be beneficial.

Response: The text in the *Water* section of the Final EIS was modified to discuss the importance of optimum temperatures**.**

Comment: Some comments stated that where logging occurs there should be wide stream buffers and units should be no larger than 20 to 30 acres.

Response: Current standards and guidelines require large wind firm buffers on streams. These are included in all alternatives. The average opening size is approximately 11 acres currently, primarily due to stream buffers.

Comment: Several comments noted the importance of headwater streams to the whole system. One comment supported including buffers on all Class III streams as recent evaluations and literature suggest that these streams require wood to properly function and Class III streams are important to the whole system by supplying fish food downstream, and are important to water quality.

Response: All the alternatives except Alternative 7 retain buffers on Class III streams. The effects of not having Class III stream buffers on sediment, water quality, and fish food supply are noted in the EIS.

Comment: A number of comments wanted the plan to ensure that buffer areas were present along streams and that roads were not allowed along river banks to ensure good quality habitat and prevent water heating and pollution.

Response: The current Forest Plan provides adequate buffers to ensure temperature is not changed as a result of logging. Trees in buffers are only removed where roads cross streams, and guidelines ensure that long lengths of stream buffer are not removed for road placement.

Comment: Several comments requested that riparian and beach buffers recommended in the Draft EIS be developed in consultation with the Alaska Department of Natural Resources to ensure that they are consistent with Alaska Forest Resources and Practices Act when implemented adjacent to non-federal lands.

Response: The process of establishing riparian buffers and beach and estuary buffers included addressing the concerns of State of Alaska relative to this issue. The establishment of buffer sizes considered many factors including the benefits and deficits of various buffers widths. These buffers were primarily established to protect natural resources, including fish and wildlife. With the exception of Alternative 7, the buffer widths proposed in this Amendment are the same as those under the current Forest Plan and monitoring has shown these buffers to be effective. Reducing buffers adjacent to non-federal lands to make them consistent with State requirements would not provide the level of protection needed to meet the objectives of the Forest conservation strategy.

Comment: One comment stated that no harvest should be allowed along streams or along the beach. Another comment requested that the Forest Service increase stream buffers from 200 to 500 feet depending on the stream channel.

Response: All alternatives except Alternative 7 provide no-harvest buffers along Class I, II, and many III streams and a 1,000-foot, no-harvest buffer along the beach. Alternative 7 provides no-harvest buffers along Class I and II streams and a 500-foot no-harvest buffer along the beach. Stream buffers vary in width, depending on site-specific conditions, including stream class, channel type, and the risk of windthrow. See Appendix D of the Final Proposed Forest Plan.

Comment: One comment questioned whether a 100-foot buffer on Class III streams was needed. The comment noted that studies suggest that 90 percent of sediment runoff was successfully filtered with a 10-foot buffer, and thought a 60-foot buffer would be more than sufficient to filter out contaminants.

Response: There are multiple reasons for buffers on Class III stream, not just for filtering. The Final EIS notes some of the purposes. A recent review by the Forest Service (Paustian et al. 2006) evaluated the appropriateness and need for buffers on Class III streams and the importance of Class IV streams. One of the items noted was that large wood was needed in Class III streams for them to properly function. Wood from adjacent riparian areas enters these streams in many ways, but requires a riparian source.

Typical mature tree height is often in the range of 100 feet, so reducing the buffer width has the potential to reduce wood supply. Some wood from Class III streams, depending on valley morphology, enters fish streams and contributes to habitat in those areas as well. The wood in Class III streams also controls rates of sediment entry into fish streams. Additionally, more than 50 percent of the water in a basin originates in Class III and IV streams. So effects such as changes in water temperature, possibly from small buffers, have potential to affect downstream temperature. Much of the food supply in fish streams originates from Class III streams and a significant portion of that food source is terrestrial, entering from riparian vegetation. A substantial reduction in riparian trees could affect this supply. Alternative 7, however, does not require buffers on Class III streams. This alternative would likely have additional adverse effects to fish resources not common to the other alternatives.

Culverts and Roads

Comment: Several comments were received concerning culverts that block fish passage. A concern was expressed that funds for the replacement of past passage problems at existing culverts have decreased. Some comments requested that the Forest Service commit to replacing existing culverts that currently block fish passage and fund maintenance of existing roads before constructing new roads; others suggested that restoring passage at culverts not currently meeting fish passage criteria should be a high priority for the Forest and that plans to repair passage problems in future timber sales should be included in the Proposed Forest Plan. Some respondents requested that an analysis identifying how culverts influence cumulative effects to fish resources be included in the Final EIS.

One comment requested that a recently developed model for determining the biological significance of not meeting passage at individual culverts be included in the EIS analysis, as well as the cost of fixing past culvert passage problems. The comment also requested that specific citations concerning road and culvert effects on fish be noted in the EIS text.

Response: The Forest Service considers fish passage to be an important priority and has an ongoing program to eliminate or replace culverts that do not provide passage. The Forest Service plans to continue to address past culvert problems as funding is available. The budget for this work is appropriated through Congress on an annual basis. National Forest budget requests are considered as part of total budget requests submitted to the U.S. Congress by the executive branch each year, with Congress determining the annual appropriation. Determining funding levels is outside the scope of this Forest Plan Amendment EIS. Current standards and guidelines for culvert installation have requirements to ensure fish passage is provided when fish are present at the crossing areas. These guidelines differ from the guidelines that were in place when most of culverts that have fish passage problems were installed. As a result, fish passage problems from future installations are expected to be comparatively rare.

Additional information on the status of the current culvert inventory relative to fish passage has been added to the *Fish* section of the Final EIS. The number of potential stream crossings identified in the EIS provides a relative approximation of the potential number of culverts by alternative; an exact number of future culverts cannot be determined prior to site-specific analyses. The exact number of culverts would be determined for each specific timber sale or other project and the potential effects would be addressed as part of the project-specific NEPA analysis at that time. The Forest has a substantial database that identifies the status of nearly all existing culverts and includes fish passage information. Two citations were added to the *Fish* section in the Final EIS, as requested; however, some of the other citations were not added because the issues they addressed had already been discussed in the analysis, and the information these documents provided on the number and status of culverts on the Tongass was less exact and older than the specific data reported in the Final EIS.

Comment: One comment questioned the use of the term "restored" for improving fish passage for culvert replacement. The comment stated that in a substantial number of cases passage conditions before culvert replacement would have allowed most fish to pass most of the year, and replacement in many of these cases was intended only to ensure passage at infrequently occurring flow conditions.

Response: The discussion of culvert replacement presented in the *Fish* section under Fish Habitat Enhancement has been expanded in the Final EIS to provide additional information with respect to culvert replacement.

Comment: One comment stated that the characterization of road effects on stream sedimentation in the *Fish* section under General Effects, Roads, was exaggerated. The comment included a document containing data from some specific sediment studies. Additionally, the comment noted that the Draft EIS statement that roads could contribute to overharvest of fish should be excluded because fish harvest is a fish management issue and not a direct result of road development.

Response: The text does not specifically quantify the magnitude of road effects on sediment and, therefore, the EIS does not exaggerate the effects. Potential sediment effects are evaluated on a site-specific basis during the NEPA evaluation of timber sales. The general statements on road/sediment effects and the effects to fish harvest in the Draft EIS were retained in the Final EIS. Fish harvest is a management issue, but increased access can lead to overharvest in the absence of harvest management actions and it cannot necessarily be assumed that ADF&G harvest management would change fishing regulations in areas where new roads are built. Again, site-specific effects would be evaluated through the NEPA process for each timber sale.

Comment: One comment stated that using the number of road crossings and road miles by alternative as an index of sediment input and fish passage problems was not justified. The comment stated that new culvert designs ensure fish passage and road management would ensure sediment runoff meets standards.

Response: The standards and guidelines in the Final Proposed Forest Plan are intended to achieve these goals. However, even with the best practices not all goals are completely achieved. For example, the EIS notes that culverts installed under the new guidelines are very good at achieving the passage guidelines, with 93 percent meeting current passage criteria. Therefore, if the percent not meeting the criteria (e.g., 7 percent) remains the same the greater the number of culverts installed, the greater the number of potential fish passage problems. Also, monitoring indicates that even under new standards for road construction some short term increases in turbidity occur. Therefore, as with culverts, the greater the number of road miles, the greater the likelihood of exceeding the sediment (turbidity) standards. Thus, the comparison is a reasonable way to assess the alternatives on a forest wide basis. Site-specific evaluations of potential passage and sediment problems would be made for any future timber sale through the NEPA process and more specific information would be used at that time to evaluate potential effects.

Comment: One comment noted that there are always impacts to water from road construction or presence and that the EIS should display a habitat reduction factor for every mile of road constructed.

Response: The EIS acknowledges the risks of roads to fish habitat and states the greater the number of road miles the greater the risk. But with new guidelines for construction, the plan is to keep these risks to low levels with measures such as avoiding steep unstable slopes, taking roads out of use after harvest is complete, including removal or bypassing culverts, and ensuring new culverts meet more stringent fish passage criteria. Therefore it is not reasonable or possible to develop a reduction of habitat amount based on the number of road miles. The specific effects of proposed road systems will be evaluated during the NEPA process for timber sales and other projects, and as needed adjustments will be made to the individual plan to reduce the risks and ultimately the effects of roads to fish habitat.

Watersheds

Comment: Several comments wanted the Forest Plan to prevent all road building and logging in primary salmon producing watersheds as identified by ADF&G and specify that watershed analyses be completed prior to any timber sale. Some comments noted that entire watersheds need to be protected from development to ensure the protection of anadromous fish resources. Some comments recommended that additional protections should be applied to 23 specific watersheds. The suggested protections primarily relate to new roads .

Many respondents asked that watersheds be protected. Some mentioned high value watersheds while others discussed the importance of protecting "intact" watersheds—those that have all their ecological parts and functions—from timber harvest and road construction. One comment included a summary of the findings of the 1997 Panel that evaluated potential harvest alternative guidelines and the potential concerns for these actions, and also cited a document by Bryant and Everest (1998) that discusses the likely effects of past and future harvest on fish stocks in Southeast Alaska.

Response: The Forest Service does not dispute that watersheds without disturbance have a greater chance of having consistent runs of salmonid stocks than those that are highly disturbed. However, current standards and guidelines for timber harvest and road construction are greatly improved over past methods, and comparing past impacts to salmon stocks from old harvesting methods to current ones is not an appropriate comparison. While there is a legacy of some problems from past actions, future conditions in newly harvested watersheds would not have marked impacts. The EIS acknowledges the potential problems, concerns, and risks identified by the 1997 panel and many of the panel recommendations for protecting fish resources and watersheds were included in the alternatives.

Comparisons provided by Bryant and Everest (1998) consider the effects of past harvest practices, as well as those that were implemented at that time (1998). They note the importance of maintaining pristine watersheds, but they also indicated that 75 percent of the Tongass National Forest is in relatively protective LUDs. Current analysis based on road miles indicates that 70 percent of all Tongass National Forest Value Comparison Units (VCUs) have no roads, and are, therefore, undeveloped. The alternatives considered in this EIS could reduce this percent over a 100 year period to between 51 and 68 percent, depending on the alternative. This would only occur if the alternative is fully implemented and it may be noted that harvest over the last decade has been much less than predicted in the current plan. In any case, the majority of the Tongass would remain pristine under any alternative.

As noted in the EIS, the National Marine Fisheries Service (1996) considers most watersheds with less than 2 miles of road per square mile to be "properly functioning" with respect to ESA-listed salmon and steelhead. Currently, less than 3 percent of the VCUs on the Tongass National Forest exceed this road density. Under the alternatives considered in this EIS, this percent could increase to about 6 to 10 percent over a 100 year harvest period if site-specific NEPA analysis indicated that exceeding this road level would not significantly affect the watershed. It is likely that over 90 percent of watersheds within the Tongass would still be considered "properly functioning" 100 years from now even under Alternative 7.

ADF&G (1998) developed a list of VCUs that met certain requirements relative to importance for fisheries, wildlife, and other community factors. They identified about 26 percent of all VCUs in Southeast Alaska as "Primary Salmon Producing Watersheds." The state used this document to provide a request to the Forest Service for revisions to the 1997 Forest Plan. The Forest Service considered the request by the State, which made the following recommendation:

> "work with communities to determine which of these areas should have appropriate management prescriptions that protect community use and fish and wildlife values. Avoiding or minimizing timber

harvest in areas of high community use will increase predictability and reliability of the timber supply and ensure the viability of all forest uses."

The watersheds referred to include the primary salmon-producing watersheds. The quote above indicates there was not a specific request to prevent all harvest and road building in all of the primary salmon producing watersheds, but to work with communities in development of specific harvest plans. The Forest Service has done this in the past and will work with communities in the future. As illustrated by the preceding quote, it is apparent from the ADF&G (1998) document that total elimination of harvest in all these watersheds was not the intent of the evaluation or recommendations at that time.

The Forest Service believes that the standards and guidelines and the NEPA analysis for specific timber sales will adequately protect the fish resources in these watersheds. Reclassifying these watersheds to different LUDs is not required to meet resource protection objectives. Watershed analysis is designed to help set the stage for project planning and associated environmental analysis; however, requiring complete watershed analysis prior to any timber sale is not required to meet Plan objectives. Additional analysis was done for the Final EIS to determine the effect of each alternative on intact watersheds. This type of analysis will help ensure that watershed functions are maintained whatever project may be planned.

Comment: One comment noted that although the proposed Forest Plan includes increased protection for headwater streams, watershed analysis and cumulative effects analysis should be conducted before any significant resource extraction takes place.

Response: The Forest Service believes that the proposed standards and guidelines would adequately protect fish and water resources on the Tongass National Forest and does not see a need for additional restrictions at the Forest Plan level. Analysis conducted under the NEPA process would evaluate site-specific resource impacts and cumulative effects from individual timber sales or other extractive activities, and adjustments would be made as needed to ensure protection of these resources. The amount and location of land available for timber harvest varies greatly by alternative. Forest Plan standards and guidelines protect watershed resources and watershed analysis can be conducted where conditions indicate the need.

Comment: One comment provided information on the status of development in flood plain forests and stated the information provided indicated that some areas that have already been moderately developed should get greater watershed scale protections for flood plain forests associated with anadromous fish streams. They also noted this is justification for protecting a greater number of intact watersheds with high salmon values and pointed out that active restoration should occur in these areas.

Response: The current standards and guidelines include large buffers for floodplain streams, much larger than existed in past decades. The Forest Service believes that these are adequate to protect anadromous fish resources in flood plain areas. Additionally, the level of past development within watersheds is one of the factors considered when developing timber sales. These factors are all considered during the site-specific timber sale NEPA process. As noted in the Final EIS, there already are large tracts of watershed within the Tongass Forest that are not included in any harvest plan. At this time the Forest Service does not believe setting aside additional specific watersheds is needed to protect anadromous fish resources.

Comment: One comment noted that a recent Trout Unlimited document "Where the Wild lands are: Southeast Alaska" (Curley and Bristol 2006) states that 72 percent of all salmon populations in southeast Alaska are found in undeveloped watersheds. Another comment noted that the salmon and steelhead population distribution relative to roadless watersheds ranges from 67 to 76 percent, depending on the fish stock.

Response: Currently, approximately 70 percent of all VCUs in the Tongass National Forest have no roads (see Table 3.6-9 in the EIS), while the remaining 30 percent have varying amounts of roads. The ratio of "roaded" to "unroaded" VCUs is similar to the ratio of where salmon populations occur. Seventy-two percent of the salmon are in 70 percent of the VCUs. One implication of this comparison could be that the relative distribution of salmon populations is independent of roads and other development. We are not implying that past harvest has had no effect on fish resources; only that interpretation of this general statement does not present a good measure of effects of development.

Comment: Several comments requested that certain watersheds be restored. One comment included an ecologically based list of watershed restoration projects they would like the Forest Service to consider.

Response: The Forest Service has increased emphasis on restoration considerations in the Final Proposed Forest Plan. There are several ongoing actions in place, such as road decommissioning and repair, culvert improvement for fish, and various habitat enhancement projects. All of the activities are dependent on funding and overall assessment of needs with consideration of which specific watershed areas have priority for restoration activities. There are general plans to improve the common watershed problems related to roads forest wide.

Comment: One comment recommended that the Forest form one watershed analysis team to perform consistent, high quality watershed analyses prior to any timber harvest.

Response: The Forest uses an interdisciplinary approach to analysis, as required by NEPA. The Forest intends to provide training to ensure that analysis teams provide consistent analysis across the Forest.

Forest Plan and EIS Revisions

Comment: One comment asked why the word "assured" has been removed from before "protect riparian habitat" in Riparian standard and guideline 1.II.A.1?

Response: Numerous minor edits have been made throughout the Proposed Forest Plan to provide clarity, promote consistent interpretation, and to reduce redundancy. These minor edits were carefully considered so as to not significantly change the basic intent of the text or Plan itself. "Protect riparian habitat" is a direct, clear statement, while "Assure the protection of riparian habitat" is a somewhat convoluted way of saying the same thing. The basic objective remains the same.

Comment: One respondent suggested adding a fish restoration section to the Fish Standards and Guidelines in the Proposed Forest Plan.

Response: Fish restoration has been a priority on the Tongass for many years. It is one of the primary goals listed in the Proposed Forest Plan (see page 2-3). Standards and guidelines for fish restoration are included in the Fish section of the Final Proposed Forest Plan.

Comment: Concern was expressed that Class II fisheries value identified in the Proposed Forest Plan might be too closely tied to economic value and not consider ecological, genetic and other values.

Response: The intention was to simply contrast the value of Class II streams with Class I streams. While they all have important values, Class II streams clearly have less overall value to fisheries because, as stated in the text, they are not anadromous and often have natural barriers to fish movement.

Comment: One comment stated that steelhead should be listed as a species of concern in the EIS.

Response: A species of concern is a specific Federal ESA designation used by the U.S. Fish and Wildlife Service or the National Oceanic and Atmospheric Administration (NOAA) Fisheries. No steelhead population in Alaska is currently identified by either agency as a species of concern under this designation. Assigning this type of designation is outside the Forest Service's responsibility and the scope of this Forest Plan Amendment. The Forest Service does, however, develop a list of "sensitive species" which includes some fish, as noted in the EIS. No steelhead stocks have been determined to meet this designation on the Tongass National Forest. This species list is periodically reviewed and if warranted based on the status or sensitivity of a stock, the species on this list can be changed.

Comment: One comment recommended that "bankfull width" be changed to "average bankfull width" in the Fish Standards and Guidelines. They also recommend that the Proposed Forest Plan distinguish between restoration and improvement because they believe that the Forest should focus on restoration activities.

Response: Bankfull width is the correct term. The word "average" from "average bankfull width" was removed from the equation in the next line to be consistent. Restoration was added to the Fish Habitat Improvement section and the following statement: "Give priority to restoration projects" was added under Fish Habitat Restoration and Improvement.

Comment: One comment recommended that the Watershed Resources Improvement subsection in the Soil and Water Standards and Guidelines be changed to Watershed Restoration and that several similar changes be made in the text.

Response: These changes have been made in the Final Proposed Forest Plan.

Comment: One comment recommended that a passage and citation be added to Appendix G concerning the potential harmful effects of bark debris near Log Transfer Facilities.

Response: This change has been made in the Final Proposed Forest Plan.

Comment: One comment stated that the term "riparian project areas" used in Riparian Planning II, B. 3 (on page 4-62 of the Proposed Forest Plan) should be further described.

Response: This term is not used in the standards and guidelines. The term "Riparian Management Areas" is used throughout, including the location referenced in the comment. This term is defined in the glossary to the Proposed Forest Plan.

Comment: One comment recommended that the Riparian Management Area be expanded to include the "entire floodplain for unconfined alluvial flood plain channels, alluvial fan channels, and glacial outwash channel, high mass-movement hazard soils and wetland fens."

Response: As noted in Appendix D of the Final Proposed Forest Plan, the areas identified in the comment are generally included in the riparian buffers.

Comment: One comment stated that some of the groups involved with habitat enhancement activities were not identified in the *Fish* section under Fish Habitat Enhancement.

Response: This section has been modified in the Final EIS to identify additional groups involved in habitat enhancement.

Comment: One comment requested that several edits be made to the subsection of the Draft EIS *Fish* section that addresses invasive aquatic species. These changes included the addition of a specific citation and the addition of cordgrass and green crab to the discussion of invasive species.

Response: This information has been included in the Final EIS.

Geology, Soils, Karst and Caves

Comment: Several comments cited the unique and valuable nature of karst lands in the Tongass National Forest, the connection between karst lands and fisheries resources, and a legacy of damage to karst lands caused by historic timber harvest as justification for further protections of karst lands in the Proposed Forest Plan. Some comments favored no additional timber harvest or road construction activities on karst lands and one suggested that substantial portions of second-growth karst forests should be allowed to return to old-growth conditions. Several comments called for additional research into karst systems and potential impacts of land management before allowing any further timber harvest on karst lands. One comment noted that the Draft EIS did not present permanent protection of karst lands as the best way to ensure ecological integrity. Another suggested greater protections for moderate vulnerability karst lands, including avoiding road construction and rehabilitating and restoring existing roads.

Response: The Forest Service considered a range of alternatives that included differing degrees of potential timber harvest and road construction activities. All but Alternative 5 (the No Action Alternative) would move about 42,870 acres of high vulnerability karst lands into the Special Interest Area LUD. Geologic Special Interest Areas have unique geologic features, including caves. Chapter 3 of the Final Proposed Forest Plan states that Special Interest Areas would be classified as unsuitable for timber production. Under the action alternatives, limited salvage of windthrown timber would be allowed along existing roads within these areas, as long as karst and cave resource values were met. Opportunities for management of the young-growth stands in these areas are emphasized consistent with protection of karst and cave resources.

The Draft EIS evaluated the potential effects of each alternative on karst resources. These alternatives did not exclude harvest from all karst lands, in part based on the findings of the Karst Review Panel that the implementation of the Karst and Cave Standards and Guidelines from the current Forest Plan had ensured a high level of protection for karst resources overall (Griffiths et al. 2002). The Panel noted high standards in both the philosophy of management and the way that specific management practices were formulated and applied. Implementation of specific policies and procedures was found to be very good and in general compliance with the stated goals and objectives of the karst program. The Panel also noted the extent to which high vulnerability karst had been protected since 1997. In addition, the Panel outlined the actions required to more actively manage karst landscapes covered with second growth stands and recommended a new procedure for assessing the autogenic (precipitation on carbonate rocks) recharge component of karst units. These suggestions were incorporated into the action alternatives. Refer to the EIS for additional information.

The Karst and Cave section of Appendix B to the Final Proposed Forest Plan identifies several research needs, including studies that better define the effects of timber harvest and road construction on karst lands, and studies to determine the influences of forest road construction on sediment and woody debris delivery to karst drainage systems. The Proposed Forest Plan requires an adaptive management approach for managing karst resources that will allow incorporation of research results in management approaches. More information is provided in Chapters 4, 5, and 6 of the Proposed Forest Plan.

Comment: A number of comments expressed concern about the lack of enforceable standards in the proposed Karst and Cave Resources Forest-wide Guidelines (and related Appendix H). Several comments noted that this section of the Proposed Forest Plan differed from others by providing only guidelines, as opposed to standards and guidelines. Many offered that the Proposed Forest Plan was significantly improved with respect to karst management, but several comments suggested that the language in the proposed Karst and Cave Resources Forest-wide Guidelines (and related Appendix H) allowed too much flexibility in karst management through the use of terms like "should" and "may" instead of "shall". A few comments noted that the Equivalent Clear-cut Area approach described in Appendix H could mitigate impacts from previous timber harvest on karst lands but that the approach was "hypothetical" and not enforceable.

Many suggested that the adaptive management approach would allow politics to sway decisions to the detriment of karst resources. Furthermore, two comments noted the lack of detailed monitoring requirements to implement the adaptive monitoring approach.

Response: The Proposed Forest Plan includes both standards and guidelines but generally requires managing karst lands with an adaptive management approach. The title of the section has been revised to Karst and Cave Resource Standards and Guidelines to reflect that Karst and Cave Standards and Guidelines are consistent with, and as enforceable as, standards and guidelines related to other resources in the Forest Plan. The Karst and Cave Resource Standards and Guidelines (Chapter 4) allow karst managers to exercise their professional judgment in developing karst management strategies and prescriptions. As knowledge is gained from implementation, monitoring, research, and studies, recommended practices will be modified to reflect the needed changes.

Chapter 5 of the Proposed Forest Plan describes monitoring and evaluation as key aspects of adaptive management, which provide feedback on implemented activities and the effectiveness of associated resource protection or mitigation measures. Additional sources of feedback include scientific literature and studies, resource inventories, changes in technology, and public concerns. Chapter 6 describes the monitoring and evaluation plan for Karst and Cave Resources. The monitoring and evaluation plan is not intended to depict all monitoring, inventorying, and data gathering activities undertaken on the Tongass, or to limit monitoring. Many other monitoring activities are conducted under direction contained in site-specific project plans developed under the programmatic guidance of the Forest Plan.

Comment: One comment supported the Autogenic Recharge Area Assessment Procedure and Equivalent Clear-cut Acre approaches described in Appendix H of the Proposed Forest Plan. These approaches allow for consideration of past timber harvest and other management activities on karst lands in evaluating karst lands for potential future activities. The comment expressed concern, however, that these approaches may not be implemented as proposed.

Response: The Proposed Forest Plan establishes the adaptive management strategy for managing karst resources. Using this approach, the Autogenic Recharge Area Assessment Procedure, Equivalent Clear-cut Acre, and other approaches would be overseen by qualified karst managers. See also the response to the preceding comment.

Comment: One comment stated that impacts from roads on moderate vulnerability karst lands should be monitored, and road maintenance activities, including culvert replacement, should not damage karst areas. Another comment noted that road construction seems to be addressed fairly well in the Proposed Forest Plan, but stated that standards and guidelines should require maintenance of existing roads to include construction of drainage systems that meet current

guidelines. The comment also stated that retired roads should include drainage systems that are protective of karst lands. A third comment requested that a standard be added requiring adequate "restocking on stored roads", and the exploration of restoration options, such as road obliteration, on moderate and high vulnerability karst lands.

Response: The Proposed Forest Plan is programmatic, meaning that it provides forest-wide management direction. Chapter 6 of the Proposed Forest Plan lists monitoring of compliance of land-disturbing projects (which would include roads) with Karst and Cave Forest-wide Standards and Guidelines, as well as monitoring of the effects of management activities (which would include roads) on karst resources. Road maintenance activities and any reconstruction or restoration activities would be covered under a project-specific plan which would be evaluated through a separate NEPA process. Road-related management activities would be implemented under the Karst and Cave Forest-wide Standards and Guidelines.

Comment: One comment stated that no recreation development should be allowed on high vulnerability karst lands and pointed out that the Proposed Forest Plan allows limited recreation development on high vulnerability karst lands.

Response: Section 3 (High Vulnerability Karst Lands), subsection b (Karst Management Objectives and Appropriate Land Uses) describes the limited recreational development that may be appropriate on high vulnerability karst lands. This section further explains that recreational facilities and trails would have to consider karst resource values and objectives, particularly with respect to reducing disturbance of significant epikarst features and sensitive soils, and the use of construction methods that avoid erosion and diversion of natural drainage waters into karst features. The Forest Service believes that this consideration would sufficiently limit recreational developments to protect high vulnerability karst lands.

Comment: One comment applauded the focus on managing second growth on karst lands, but wanted to see thorough scientific studies (including monitoring and evaluation) before any large-scale second-growth management is implemented. The comment stated that road construction for management would damage karst lands, and expressed concern that research be conducted to determine whether pre-commercial or commercial thinning would benefit karst lands and to assess the potential impacts.
Another comment noted that funds for pre-commercial thinning are limited, and that the Forest Service should prioritize thinning on second-growth areas that will be available for future harvesting and can benefit wildlife, rather than on karst areas where timber harvest is not allowed. Other comments stated that implementation and effectiveness monitoring of young-growth management on karst lands should be required to assess whether karst management objectives can be met.

Response: The Proposed Forest Plan notes that pre-commercial thinning is appropriate on all karst lands when the karst management objectives can be met. It does not attempt to prioritize funding for pre-commercial thinning projects on or off karst lands. The specific benefit of pre-commercial thinning projects on wildlife or timber potential would be assessed during the project-specific planning process. Chapter 6 of the Proposed Forest Plan describes implementation and effectiveness monitoring under karst and caves. This includes monitoring the compliance of land-disturbing projects with Karst Standards and Guidelines, and monitoring of effects of management activities on caves and karst landscapes, both of which would address young-growth management on karst lands.

As described in the response to a previous comment summary, the Karst and Cave section of Appendix B identifies the need for research to better define the effects of timber harvest and road construction on karst lands. The results of these studies will be incorporated into management decisions through the adaptive management approach described in the karst sections of the Proposed Forest Plan, as well as in Chapter 5. Finally, all the alternatives except Alternative 5 (the No Action Alternative) would move about 42,870 acres of high vulnerability karst lands into the Special Interest Area LUD. These areas would be classified as unsuitable for timber production.

Comment: One comment stated that the Draft EIS failed to take into account past timber harvest on karst lands, and instead of protecting the remaining karst forest by strengthening standards and guidelines, it proposes to weaken them. The comment specifically notes that future timber harvests are proposed on karst lands in Tuxekan, Hecata, northwest Prince of Wales Island, and Kosciusko. Another comment notes that the cumulative effects of previous timber harvest and road construction on karst lands were not considered in developing the standards and guidelines for future timber harvest.

Response: The Final EIS takes into account past timber harvest activities. Furthermore, the EIS discloses that all but Alternative 5 (the No Action Alternative) would move about 42,870 acres of high vulnerability karst lands into the Special Interest Area LUD. As noted in response to a previous comment summary, Chapter 3 of the Final Proposed Forest Plan states that Special Interest Areas would be classified as unsuitable for timber production. The EIS includes a discussion of cumulative effects, including the effects of previous and proposed timber harvest and road construction activities on karst lands by alternative. This discussion has been expanded in the Final EIS. Site-specific activities, such as specific timber harvests, are beyond the scope of this document and are instead addressed at the local level under separate NEPA processes.

Comment: One comment expressed concern about the following statement under Karst in Table 2-18 (Summary Effects Matrix) of the Draft EIS: "The relative effects on karst resources are proportional to the amount of karst lands in the mapped suitable forest land base." The comment asserted that timber harvest would have no significant impact on karst and that construction would have very minimal impacts on karst.

Response: The Draft EIS states: "Potential effects on karst lands from planned timber harvesting, associated road construction, and quarry development may occur; however, with careful implementation of the current or proposed standards and guidelines (as modified through ongoing monitoring and adaptive management), and site-specific mitigation measures (designed and implemented at the project level), the Forest expects to mitigate the effects of any proposed activity. Site-specific mitigation measures include protection of the high vulnerability karst areas and features, partial cutting, reduced harvest unit size, use of logging systems that achieve at least partial suspension, reductions in rate of harvest, and other changes in logging practices."

This text in Table 2-18 has been clarified in the Final EIS.

Comment: One comment noted that the Tongass does not have a catchment area management strategy for autogenic recharge areas and asked what steps were in process to develop this strategy.

Response: The Proposed Forest Plan provides the direction necessary to protect and manage autogenic recharge areas and other specific needs associated with karst and cave resources.

Comment: Based on the Federal Cave Resource Protection Act, one comment requested that the word "feasible" be changed to "practical" in the sentence: "Maintain, to the extent feasible, the natural karst processes and the productivity of the karst landscape while providing for other land uses where appropriate."

Response: The proposed change from feasible to practical has been incorporated in two places in the Proposed Forest Plan, as suggested.

Comment: One comment requested more specific guidance regarding when, and how many, dye trace studies are needed to credibly delineate recharge areas during karst vulnerability mapping.

Response: The Proposed Forest Plan adequately addresses the need for design criteria for dye trace studies to delineate recharge areas during karst vulnerability. It is also reasonable to assume the proper skill level and expertise will be used in all karst-related work including dye trace studies.

Comment: One comment stated that the Draft EIS lacks important information to assess impacts of the alternatives on karst resources, including: miles of road on karst lands, acres of previously harvested karst lands, how well harvested karst lands have regenerated, how well roads on karst lands have been maintained, and the current road maintenance backlog.

Response: The Draft EIS states: "GIS queries show that a total of 95,479 acres (21 percent) of the karst lands managed by the Tongass National Forest have experienced timber harvest." The Draft EIS also explains, "In some portions of the Tongass National Forest, 70 to 80 percent of the commercial forest land within specific karst blocks has been harvested. It is estimated that about 50 percent of the karst lands below 1,400 feet in elevation and on slopes less than 60 percent in the Thorne Bay Ranger District have had timber harvest (based on the GIS database)." Additional information has been added to the Final EIS, including miles of road on karst lands, and a discussion of how well harvested karst lands have regenerated and how well roads have been maintained.

Comment: One comment requested that section D.1 on page 4-22 of the Proposed Forest Plan refer to section D.2.c. This reference would clarify the proposed management of a high vulnerability feature within a low vulnerability area and the applicable karst feature buffers that would apply.

Response: This change has been made to the Proposed Forest Plan, as suggested.

Comment: One comment expressed concern over the designation of "minor" resurgences with almost no connectivity between the open atmosphere and the underground system as moderate (as opposed to high) vulnerability karst lands. The comment mentioned observations of karst systems with resurgent springs with no surface connectivity but that may merit high vulnerability status. The comment expressed doubt that sufficient field reconnaissance would be possible to accurately characterize high vulnerability areas.

Response: The Proposed Forest Plan states that resurgences can be classified as moderate or high vulnerability depending on size, habitat, and level of atmospheric connectivity between the resurgence and the underground karst system. Minor resurgences which seep out of the ground between gravels with almost no connectivity between the open atmosphere and the underground system will be classified moderate vulnerability. This designation will be made by a qualified karst management specialist, who would also design appropriate protection measures for moderate vulnerability resurgences and springs on a case-by-case basis.

Comment: One comment strongly objected to the wording in the Proposed Forest Plan that indicated that the karst lands on the Tongass National Forest were considered open to mineral development. The Proposed Forest Plan states: "It is not the intent of these standards and guidelines to restrict any lands from mineral development, though that may be appropriate if a specific project or area is allocated to the "Special Interest Area" Land Use Designation." The comment paraphrased the 1988 Federal Cave Resources Protection Act requirement that the agency responsible for land management in karst areas must protect those caves and features.

Response: The Federal Cave Resources Protection Act of 1988 states that NFS lands will be managed in a manner which, to the extent practical, protects and maintains significant cave resources in accordance with the policies outlined in the Forest Service Directive System and the management direction contained in the individual forest plans. The Proposed Forest Plan states that the impacts of any proposed mineral development within the karst landscape would be analyzed through the environmental analysis that would be triggered once a Plan of Operation was received.

Comment: One comment expressed concern that the Forest Service will continue to hold cave location information confidential and not distribute location information per the 1988 Federal Cave Resources Protection Act. The comment encouraged continued collaboration with caving organizations, including collaboration to define appropriate uses, discuss cave classifications, consider potential cave developments, and solicit volunteers.

Another comment commended the Forest Service for the extensive rewriting of the Forest Plan, noting that management of karst and cave resources was better defined and more clearly described than in the previous Forest Plan. They anticipate future collaboration and volunteer work with the Tongass.

Response: The Forest Service intends to continue to "foster communication, cooperation, and exchange of information between land managers, those who utilize caves, and the public", per Section 4 (c)(2) of the 1988 Federal Cave Resources Protection Act. The Forest Service also intends to continue to implement 36CFR 290.4 and Section 5 of the Federal Cave Resources Protection Act, which requires that it maintain the confidentiality of information concerning the nature and location of significant caves.

Comment: One comment expressed concern about the change in non-harvest buffers related to insurgent streams in moderate vulnerability karst lands between the previous Tongass Plan Implementation Team clarifications and the Proposed Forest Plan. The Tongass Plan Implementation Team clarifications suggested that non-harvest buffers extend from the edge of a sinking or losing stream and cover 100 feet plus 2 tree lengths within no less than 1 mile upstream or to the stream's source. The Proposed Forest Plan indicates that the 100-foot no-harvest buffer would extend only 0.25-mile upstream. The comment stated that this change is significant and should be reassessed and justified to the public.

Response: The Final Proposed Forest Plan provides for protection of karst and cave resources and promotes adaptive management principles achieving this. Additional buffers could be implemented where recommended by a qualified karst manager to ensure compliance with the Karst and Cave Resource Standards and Guidelines.

Comment: One comment noted that the reference to harvest on 72 percent slopes had been moved from the karst appendix (Appendix H) to the Soil and Water section of the Proposed Forest Plan. Given the potential soil loss, hydrologic change, and mass wasting impacts related to timber harvest, roads, and other development activities on steep karst lands, the comment requested that no harvest on steep slopes be the standard and not under the discretion of the District Ranger on a case-by-case basis.

Response: The Proposed Forest Plan states:

> "At the forest plan level, slope gradients of 72 percent or more are removed from the tentatively suitable timber base due to high risk of soil mass movement and accelerated erosion of Class IV channel systems. At the project planning level, the Forest Supervisor or District Ranger may approve timber harvest on slopes of 72 percent or more on a case-by-case basis, based on the results of an

onsite analysis of slope and Class IV channel stability and an assessment of potential impacts of accelerated erosion on downslope and downstream fish habitat, other beneficial uses of water, and other resources. It is anticipated that harvest of these areas will be a small percentage of the total harvest unit."

Proposed timber harvest on slopes greater than 72 percent would undergo an onsite analysis and an assessment of potential effects on downslope resources, including karst.

Comment: A number of comments noted that the Tongass should make sure that karst lands are not transferred to entities with fewer measures to ensure karst protection. They note that if karst lands are transferred, the transfer should include special considerations requiring management practices that are as protective or more protective of karst lands. Karst managers would need to work with land transfer experts to ensure that karst lands continue to receive at least the level of protection that the Forest Service currently provides. One comment noted that many of the proposed land exchanges and adjustments with Sealaska contain valuable karst lands. The comment notes that the Draft EIS does not discuss how the Forest Service will treat land exchange or adjustment requests that involve karst lands.

Response: While Appendix C discusses several proposed land exchanges, this does not mean that they are likely to occur or would occur exactly as depicted. Land exchanges are discretionary, voluntary real estate transactions between federal and non-federal parties. The Forest Service is not required to enter into a land exchange when presented with a proposal. Any exchange would require NEPA analysis, most likely an EIS, which would include public involvement and would disclose any adverse effects to karst and cave resources, as well as to other resources. The Draft EIS discloses that the Sealaska proposal presented to the Forest Service does not provide any assurances that important resources on the lands Sealaska proposes to acquire would be protected to the same degree as under national forest management. Specifically, the proposal does not include assurances that karst and cave resources would be protected.

The cumulative effects section of the Draft EIS has been expanded to include a discussion of the potential effects of future land exchanges on karst resources.

Comment: One comment supported the new Geologic Special Interest Areas. The comment noted that while legislated protections would be stronger and more protective of karst wilderness areas, the Special Interest Areas are an excellent first step in providing permanent protection for the "best of the best" karst lands. Continued collaboration was suggested to increase the protection of Special Interest Areas.

Response: The Forest Service considered a range of alternatives that included differing degrees of proposed timber harvest and road construction activities. The Draft EIS evaluated the potential effects of those alternatives on karst resources and disclosed the findings of the Karst Review Panel, which found that implementation of the Karst and Cave Standards and Guidelines from the current Forest Plan had ensured a high level of protection for karst resources overall (Griffiths et al. 2002). As noted in one of the preceding responses, the Forest Service intends to continue collaboration with those who use caves and the public.

Heritage and Sacred Sites

Comment: One comment requested that the Final EIS clarify the types of traditional use that are permitted in Conservation System Units, including designated Wilderness. The definition of traditional activities in the Region 10 Forest Service Manual (1/27/99) includes recreational pursuits. The comment authors stated that they strongly disagree with the inclusion of recreation in this definition and requested that the Forest Service adopt and implement a definition similar to that employed by the National Park Service, which defines "traditional" as an activity that occurred when ANILCA was passed and involves the consumptive use of one or more natural resources of Old Denali Park, such as hunting, trapping, fishing, berry picking, or similar activities.

Response: Traditional uses are allowed in designated wilderness as authorized by ANILCA. Updating Regional manuals and handbook definitions is beyond the scope of this Amendment.

Comment: Some respondents asked that protection of Native sacred sites be of paramount importance. They felt that working together was critical for any protection measures to succeed. One comment suggested that the Forest Service employ a tribal liaison to insure that sites are protected.

Response: We agree that protection of these sites is very important. All alternatives, except Alternative 5 (No Action), include updated heritage direction for sacred site identification and management. These changes include strong direction for communicating and working with tribal governments.

Comment: Some respondents felt that the Forest Service should seek National Historic Landmark designation, or otherwise protect, certain historic sites. Sites mentioned included the World War II site at Hunter Bay, the Russian Colonial sites at Salmon Lake, and the site near the falls of Redoubt Lake.

Response: We will share this information with our Heritage Program Manager but landmark designation is outside the scope of the Forest Plan Amendment.

Comment: One respondent felt that the Forest Service listens more to other agencies and organizations than it does to tribal governments indicating a bias.

Response: The Forest Service does not believe this to be the case. We continue to consult and communicate with tribal governments, as well as other agencies and organizations.

Comment: Some respondents expressed concern about timber harvest and new road and trail development and the potential impacts on sacred and traditional hunting, gathering and fishing sites. They wanted to be informed if new development was being considered.

Response: New development or other site-specific projects would only occur after project level analysis that includes public involvement and tribal consultation.

Comment: One respondent stated that the Forest Service needs to not only guard against future adverse impacts to native allotments but also should restore allotment lands damaged by timber harvest and road building.

Response: Native allotments are private land and beyond the scope of this Amendment.

Comment: One tribal corporation felt that the Proposed Forest Plan should have additional requirements related to sacred sites, greater specificity of disclosure, no confidentiality requirements, and a requirement to provide an annual report in person to the board of directors.

Response: The Proposed Forest Plan is consistent with updated Forest Service direction on management of sacred sites and consultation.

Lands

Comment: One comment stated that Sealaska Corporation's remaining entitlement acreage is underestimated in Appendix C and that Section 205 of the Alaska Land Transfer Acceleration Act increased the minimum additional acreage to be allocated to Sealaska. Sealaska estimates that between 65,000 and 85,000 acres is required to complete Sealaska's Alaska Native Claims Settlement Act (ANCSA) entitlement, not 64,000 acres as the Forest Service states.

Response: We recognize that the actual final acreage to be conveyed may be unknown at this time. Based on the best information available, both the Forest Service and the USDI Bureau of Land Management (BLM) agree that approximately 64,000 acres of ANCSA entitlement remain to be conveyed to Sealaska Corporation. This includes about 20,000 acres of unconveyed lands remaining from a 1988 AFN/BLM Agreement and approximately 44,000 acres of 14(h)(8) lands resulting from the 2004 Alaska Land Transfer Acceleration Act, PL 108-452. (Using exact figures, this totals 63,622.10 acres. In addition, Sealaska may be entitled to several additional acres in selected but unconveyed 14(h)(1) sites. It is unlikely that the total would exceed 63,650 acres.)

Prior to passage of PL 108-452 in 2004, BLM and the Forest Service estimated Sealaska's remaining entitlement as being between 59,000 acres and 64,000 acres. The 2004 legislation helped verify the current estimate of 64,000 acres.

Comment: One comment stated that Appendix C underestimates the public advantages of releasing the 327,000 acres of land that are withdrawn for Sealaska selections and conveyances. This large acreage remains encumbered and restricted from commercial timber production, investment, and active management while it remains withdrawn.

Response: Those lands that are withdrawn, but not selected by Native Corporations and also those lands that are selected, but not conveyed continue to be managed by the Forest Service, with certain requirements. The actual effects or public advantages of removing the encumbrances are difficult to quantify.

On lands withdrawn, but not selected by a Native Corporation, the requirements of 43 CFR, Section 2650.1(a) apply: "Prior to the Secretary's making contracts or issuing leases, permits, rights-of ways, or easements, the views of the concerned regions or villages shall be obtained and considered …" In addition, all proceeds collected from contracts (including timber sales), leases, permits, rights-of-way, or easements on lands withdrawn for Native selection are deposited in an escrow account managed by the Bureau of Indian Affairs. Road development and habitat enhancement projects may still be authorized on these lands.

On lands that have been selected, but not conveyed, Forest Service policy is to authorize no contracts, special use permits, mineral materials permits, easements, right-of-way or other third party interests without the consent of the affected native corporation, unless specific authorization is received from the Regional Forester.

Lands that are withdrawn, but not selected, are managed by the Forest Service subject to certain restrictions but they are not encumbered to the extent that the actual selected lands are.

Comment: One comment stated that Appendix C overestimates the effect on Tongass timber harvest from the completion of Sealaska's entitlement through land exchanges and adjustments, and understates the corresponding gain in available land and timber from acres transferred to the Tongass National Forest. These effects are portrayed as much larger than a potential transfer of a similar amount of acres to "unrecognized Southeast Alaska communities."

Response: This discussion was specific to the exchange proposal as submitted by Sealaska. The effects discussion was based on an actual analysis of the exchange proposal effects. Lands transferred to the Tongass (based on the proposal) would not be available for timber production but rather, were chiefly valuable for recreation and scenic values. These impacts differ to those identified for the "unrecognized Southeast Alaska communities" proposal because that analysis was hypothetical. There are no actual parcels that can be identified and analyzed. The Sealaska exchange analysis was based on actual parcels identified by Sealaska for their timber values.

Comment: One comment stated that Appendix C ignores the positive aspects of timber lands transferred to Sealaska and the corresponding positive impact to the Southeast Alaska forest industry and economy. Lands transferred to Sealaska would still be available to support the timber industry in Southeast Alaska.

Response: As virtually all timber from Sealaska lands has historically been exported in unprocessed form, it seems reasonable to assume that timber harvest from any transferred lands would support logging and transportation-related jobs, but would be unlikely to support local or regional sawmills or smaller value-added woodworking operations.

Comment: One comment stated that Appendix C mischaracterizes the change in other land allocations and resources attributed to the completion of Sealaska's entitlement by overestimating the acreage to be conveyed and by ignoring the effects of releasing the 327,000 acres of lands withdrawn and encumbered for Sealaska selections and conveyances and the benefits associated with Roadless and other lands valued for wildlife habitat, recreation, subsistence, scenery and other public uses that would be transferred to the National Forest.

Response: The discussion in Appendix C of the Draft EIS is very specific to the land exchange proposal submitted by Sealaska Corporation. The purpose of discussing the proposed exchange in Appendix C was to give a general estimate of the effects of completing the proposed exchange. It was not intended to provide a detailed accounting of the effects. As stated in Appendix C, it would be difficult to determine the actual acreage that might be transferred without an appraisal and very unlikely that all of the lands proposed for exchange would actually be transferred. Therefore, we cannot provide a full accounting of the possible effects. While there would be a benefit to some resources from acquiring the areas Sealaska proposes to exchange to the NFS, there would be a corresponding loss of these values on the 95,000 acres Sealaska wishes to acquire.

As for ignoring the benefits of releasing the 327,000 acres of encumbered land, we estimate that approximately 171,000 acres are encumbered by Sealaska selections, not 327,000 acres. We also estimate that approximately 64,000 acres of these selected lands would actually be conveyed to Sealaska Corporation, considerably less than the 95,000 acres Sealaska proposes to acquire. As noted in an earlier response in this section, the management restrictions on lands withdrawn but not selected are less than the comment suggests.

Comment: One comment stated that the adjustment to suitable timber land base shown on page 3-226 of the Draft EIS is an underestimate if the Forest Service used the 171,000 acre figure rather than the entire 327,000 acres encumbered within the Sealaska withdrawal areas. The effects to the timber program of resolving entitlement would be positive because the encumbrance on the remaining 327,000 acres would be removed and these acres could be managed for timber.

Response: As noted in the response to the preceding comment, the Forest Service believes that 171,000 acres is correct and the management restrictions that apply to withdrawn but not selected lands are less restrictive than the comment author states.

Comment: One comment stated that Appendix C erroneously suggests that heritage, karst and cave, and subsistence resources and uses could be adversely affected by conveyances to Sealaska because of differences in legal requirements applicable to Native Corporations compared to NFS lands. The comment notes that this suggestion ignores Sealaska's established leadership in heritage resource protection and in land stewardship.

Response: This discussion was specific to the land exchange proposal submitted by Sealaska Corporation. There were no assurances in the proposal or in discussions with Sealaska that resources on lands to be exchanged to Sealaska would be protected to the same degree as under current NFS management. The legal requirements for resource protection on NFS lands are different from those on private land. Information about the resource values on lands for potential exchange to the United States by Sealaska has been added to the Final EIS.

Comment: One comment stated that Appendix C does not recognize that Section 22(f) of ANCSA was included to provide for the adjustment of Native Corporation land conveyances and that legislative adjustments to ANCSA will continue until entitlements are resolved to meet the statute's original promise.

Response: Section 22(f) of ANCSA allows land exchanges with Village Corporations, Regional Corporations, individuals, or the State for the purpose of effecting land consolidations or to facilitate the management or development of the land. However, land exchanges are discretionary, voluntary real estate transactions between the federal and non-federal parties. The Forest Service is not required to enter into a land exchange when presented with a proposal. This is clarified both in the *Lands* section of the Final EIS and in Appendix C.

Comment: One comment stated that Appendix C is incorrect in stating that Sealaska is not currently authorized to receive lands outside the ANCSA withdrawal areas under ANCSA since ANCSA (Section 22[f]) clearly authorizes Sealaska to acquire lands outside the withdrawal areas through exchange. In addition the Appendix incorrectly indicates that exchanges generally must be for equal appraised market value. Both ANCSA and ANILCA contain authority for exchanges found to be in the public interest to take place for other than equal value.

Response: The Forest Service disagrees with the statement that Sealaska is currently authorized to receive lands outside the ANCSA withdrawal areas because of Section 22(f) of ANCSA. As noted in the preceding response, Section 22(f) of ANCSA allows for land exchanges with Native Corporations. Hypothetically, Sealaska could receive land outside of the withdrawal areas through a land exchange. Land exchanges are discretionary and voluntary. Currently, there is no binding land exchange agreement in effect between the Forest Service and Sealaska Corporation.

Generally, land exchanges are on an equal value basis and cash payments can be used to equalize land values up to 25 percent of the appraised value of the federal land. It is also correct that both ANCSA in Section 22(f) and ANILCA in Section 1302(h) provide that exchanges shall be based on equal value and contain provisions for cash equalization, except that exchanges can be made for other than equal value when the parties agree, and the Secretary of Agriculture determines that it is in the public interest.

Comment: One comment stated that Appendix C treats Sealaska's land entitlements and adjustment proposal as a negative encumbrance that the Forest Service will address grudgingly

and fails to recognize that completing conveyances of land to Sealaska in a sustainable configuration is an entitlement under ANCSA.

Response: The Forest Service recognizes Sealaska Corporation's right to receive its full entitlement under ANCSA and will continue to work with the BLM in processing conveyance documents for selected lands. Appendix C has been reviewed and edited in response to these concerns.

Comment: One comment stated that many of the "defects" in Appendix C also appear in the Draft EIS. The cumulative effects sections in the Draft EIS overestimates the potential adverse effects and underestimates the benefits of timber harvest on Sealaska and other Native Corporation lands by not adequately recognizing the protective BMPs that Sealaska and other owners apply.

Response: While the Forest Service agrees that the BMPs are beneficial, management on NFS lands provides a higher degree of resource protection and these differences were considered in the effects analyses included in the Draft EIS.

Comment: One comment stated that the statement on page 3-223 of the Draft EIS that a revision of the Forest Plan would be required to accommodate an exchange with Sealaska is erroneous. They noted that the Forest Plan provides for land exchanges and other adjustments.

Response: The Proposed Forest Plan does provide for land exchanges and other types of land adjustments. The referenced statement has been clarified to indicate that implementation of the Sealaska land exchange proposal would likely require a Forest Plan Amendment or Revision, based on the magnitude of the resulting changes in LUDs.

Comment: One comment stated that Appendix C did not adequately depict the real effects of the identified potential land exchanges.

Response: The purpose of Appendix C was to show that a number of Congressional bills for land conveyance and land exchanges have been proposed and that any of the proposals to convey land to the State or to Native Corporations, if enacted, could have a major impact on the mix of goods and services that the Tongass provides.

Many of the proposed land exchanges are unlikely to occur or occur exactly as depicted. Land exchanges are discretionary, voluntary real estate transactions between the federal and non-federal parties. The Forest Service is not required to enter into a land exchange when presented with a proposal. Before an exchange could occur a detailed environmental analysis, including public involvement, would have to be done. Due to the magnitude of these potential exchanges and their potential impact on the mix of goods and services, a Forest Plan Amendment would also likely be needed. We have updated Appendix C for the Final EIS and improved the analysis based on the comments received. Please keep in mind that Appendix C was not intended to be a full disclosure of site-specific environmental effects. That will come later as described above.

Comment: One comment stated that the 1995 Greens Creek Land Exchange included a 25 percent royalty paid to counties. Since there are no counties in Southeast Alaska, if there are any associated royalties, the City of Angoon should receive a share.

Response: This issue is beyond the scope of this Forest Plan Amendment.

Comment: One comment stated that the Forest Service should support hydroelectric power development in Angoon, where it is needed for economic development and to support local lifestyles.

Response: A hydroelectric project is currently being analyzed in an EIS. The Draft EIS was issued in April 2007 and the Forest is working on the Final EIS. This is a separate process from this Forest Plan Amendment and will continue regardless of which alternative is selected.

Comment: One comment stated that many of the provisions in the Plan Amendment are inconsistent with ANILCA (Off-Highway Vehicle [OHV] use restrictions, limits on the type of public recreation allowed in the wilderness, and limits on group size, restrictions on fish and wildlife management projects in Wild and Scenic River corridors, Research Natural Areas, and Experimental Forests).

Response: The travel management standard was revised in the Proposed Forest Plan to ensure that the plan did not make any travel management decisions. These decisions are made through local travel management plans. However, the Forest Service does have the authority to restrict access and use for overall sound management of public lands and to meet other laws and objectives. We believe that the proposed alternatives are compatible with ANILCA. ANILCA recognizes the need to be consistent with other laws such as the wilderness protection measures found in the Wilderness Act, the multiple use mandate found in the Multiple Use Sustained Yield Act, as well as the National Forest Management Act and TTRA. These laws give the Secretary of Agriculture considerable flexibility to provide public benefits and provide for sound management of public lands.

Consistent with Section 810 of ANILCA, the Final Proposed Forest Plan has been evaluated for potential effects on subsistence uses and needs. A cumulative effects analysis of resource developments on subsistence resources is included in the *Subsistence* section of the Final EIS. Two actions included in Section 810 were completed for the Draft EIS: (1) giving notice to the appropriate State agency, local committees and regional councils; and, (2) giving notice of, and holding, “a hearing in the vicinity of the area involved.” Because the area is the entire Tongass National Forest, such hearings were held in 23 communities throughout Southeast Alaska for the Draft EIS.

The plan does not authorize any land-disturbing activities. The continuation of subsistence opportunities, and reasonable steps to minimize effects on subsistence resources, are provided for, in each alternative, by the Forest-wide standards and guidelines for subsistence, as well as related standards and guidelines for riparian areas, fish, and wildlife. Many important subsistence areas were assigned LUDs that exclude timber harvesting. In addition, the beach and estuary fringe Forest-wide standards and guidelines apply to all beach fringe and estuarine areas not under more restrictive designations. Adverse impacts to subsistence uses and resources are minimized though these measures. Potential site-specific effects on subsistence uses and reasonable ways to minimize these effects will be considered and analyzed during project-level planning.

Minerals

Comment: A number of comments stated support for the mineral industry and noted that the industry history in Southeast Alaska included the creation of family wage jobs, as well as the provision of other economic benefits to communities. Comments also noted that mining occurs where economic deposits are found and expressed concern regarding reasonable access and cost of entry due to more restrictive LUDs. Some comments requested that the Forest Service devote resources to identifying and better understanding mineral resources on the Forest. Others were concerned about access to patented mining claims in Inventoried Roadless Areas.

Response: The Forest-wide standards and guidelines for Minerals and Geology support mineral development. The Forest Service also engages in minerals and geology-related research, with the extent of this research dependent on available funding. Mineral Resources, including the laws and regulations that provide for access to valuable mineral deposits, are discussed in the *Minerals* section of the Final EIS.

For all seven alternatives, 25 percent of the acreage of identified mineral resources is in areas that have been withdrawn. Alternatives 7 and 4 have the fewest acres of identified mineral resources in LUD allocations potentially causing higher costs for their exploration and development, and Alternative 1 by far the most. The other four alternatives fall between these two in a fairly close grouping near the middle of the range. None of the alternatives would prohibit reasonable access to patented mining claims.

Comment: Several comments suggested that compliance of the Proposed Forest Plan with the Mining and Mineral Policy Act of 1970 should be evaluated. This act, along with the General Mining Law of 1872, Federal Land Policy and Management Act of 1976, and the National Materials and Minerals Policy Research Act of 1980 were cited by several respondents in support of mineral development.

Response: The Proposed Forest Plan and the minerals analysis presented in the Draft and Final EIS documents are consistent with the Mining and Mineral Policy Act of 1970. The *Minerals* section of the Draft and Final EIS documents specifically states that the Forest Service: "recognizes that minerals are fundamental to the Nation's well being and, as policy, encourages the exploration and development of the mineral resources it manages. The Secretary of Agriculture has provided regulations (36 CFR 228) to ensure surface resource protection, while encouraging the orderly development of mineral resources on NFS lands."

Mineral Resources, including the laws and regulations that provide for access to valuable mineral deposits, are discussed in the *Minerals* section in the Draft and Final EIS documents.

Comment: Several comments were opposed to mineral exploration and development on Duke Island and suggested the area be withdrawn from mineral entry.

Response: No new withdrawals are proposed under any of the proposed alternatives. Future exploration and development on and around Duke Island would be subject to regulation by 36 CFR 228. For projects requiring a federal action (such as approval of a mining plan of operations), impacts to surface resources would be analyzed and disclosed on a site-specific basis, as required under NEPA.

Comment: One comment objected to the term "hardrock" when referring to locatable minerals and pointed out that many locatable minerals are recovered by placer mining.

Response: The term "hardrock minerals" is commonly used synonymously with locatable minerals. The comment is correct that locatable minerals are found in, and recovered from, placer deposits. The text in the Final EIS has been edited to make this clear.

Comment: One comment expressed concern related to the permitting delays of a specific project, and the process in general, as a result of public appeals.

Response: Project specific analysis, public disclosure, and response to public concerns are required of all projects as required by law. The regulations under which operating plans are processed would not be changed by any of the alternatives considered in this analysis and are beyond the scope of this analysis.

Comment: One comment suggested changing a reference to the U.S. Bureau of Mines, as it was abolished in 1996.

Response: The text in the Final EIS has been updated to reflect this.

Comment: Some comments disagreed with the *Minerals* cumulative effects finding that: "Other than mineral resources that are currently under development (specifically, the Kensington deposit), the Forest Service does not have sufficient information to identify any specific mineral development as reasonably foreseeable." They pointed out that exploration has been ongoing throughout the Tongass for years. They specifically noted the Niblack property, near Ketchikan.

Response: The Forest acknowledges that exploration is ongoing in varying degrees throughout the Tongass. As the likely development of such prospects is dependent on several factors, including the findings of exploration programs, metal prices, and private funding, it is not possible for the Forest to determine which projects are reasonably foreseeable at this time.

Comment: Some comments either opposed mining or expressed concern over potential impacts, such as water quality degradation or acid mine drainage.

Response: All existing and future exploration and development on the Forest are subject to regulation under 36 CFR 228 for the protection of surface resources. For projects requiring a federal action (such as approval of a mining plan of operations), site-specific impacts to surface resources, including wildlife and cultural resources, would be analyzed and disclosed as required by NEPA. Specific projects already analyzed and approved under NEPA are outside of the scope of this document.

Recreation, Tourism and Scenery

Comment: Several comments noted that restrictions on OHV use on inactive logging roads primarily deny local residents looking for local access and have a negative effect on local economies. Commercial operators, in contrast, are allowed wilderness access. Closing logging roads to OHV access to protect wildlife seems disingenuous when the same wildlife are regularly viewed from aircraft.

Another comment noted that all roads on the Tongass are currently open for OHV use and there has been an exponential increase in OHV use of roads on Kuiu, Baranof, and Chichagof islands where there are extensive road systems. The comment author notes that illegal OHV use of closed roads is increasing, as are detrimental effects to the environment. Others requested that OHV access be allowed only where specifically permitted.

Response: Each Ranger District will work with the state and local governments, tribes, and the public, as required by NEPA in developing their access and travel management plans. The Standard in the Final Proposed Forest Plan has been updated to state: "Each ranger district will designate the roads, trails, and areas open to motor vehicle use on a motor vehicle use map. All operations must be in accordance with those designations."

The revised Forest-wide Recreation and Tourism Standards and Guidelines also include the following directive:

3. Provide a diversity of OHV recreational opportunities across the forest where consistent with the criteria in FSM 2355 and 36 CFR 212, which include:
   a) The use is consistent with established land management and resource objectives.
   b) The use is consistent with the capability and suitability of the resource.
   c) There is demonstrated demand which cannot be better satisfied elsewhere.

More information is provided in Chapter 4 of the Final Proposed Tongass Forest Plan in the section that addresses Recreation and Tourism.

Comment: A number of people at the public hearing in Juneau commented that there is presently nowhere in the vicinity of their community where they are legally allowed to ride OHVs or snowmobiles. They requested that there be areas designated on the Forest for OHV use. Comments noted that there are more than 100 hiking trails and no authorized OHV trails/roads. One person commented that where there are potential conflicts between motorized and non-motorized uses, different uses should be authorized at different times. Others noted that the Forest Service should plan for balanced use between motorized and non-motorized uses. Others commented that hiking trails in the Juneau are fully used by hikers, bikers, runners, mountain climbers, and other non-motorized users and requested that OHV use not be permitted on the existing trail system in this area. Concern was also expressed about the impact OHV use would have on fragile soils and ecosystems along the existing trails.

Response: The Proposed Forest Plan is programmatic, meaning that it provides forest-wide management direction. Management direction with respect to OHV use is provided in the Forest-wide Recreation and Tourism Standards and Guidelines in the Final Proposed Forest Plan (Chapter 4). Site-specific activities, such as the designation of trails for OHV use, are beyond the scope of this document and are instead addressed at the local level. The issue of OHV use and access is addressed in the access and travel management plan that will be prepared for the Juneau Ranger District.

Comment: A number of comments expressed concern about resource damage caused by OHV use and requested that the Forest Service ensure that OHV use does not negatively impact wetland and habitat values. Potential negative impacts include fish habitat damage, the introduction of invasive species, alteration of successional pathways, and degradation of wetland vegetation, soils, and hydrology.

Response: As noted in response to the first comment in this section, each District is analyzing how to provide reasonable access for subsistence and other uses in their access and travel management plans and accompanying NEPA documents. See the earlier response and the Final Proposed Forest Plan for further information.

Comment: A number of comments requested that the Forest Service maintain and fix the existing cabins on the Tongass and also consider opening new cabins. In addition to this general request, comments were also submitted with respect to specific cabins that comment authors were particularly concerned about. These included the Karta River, Kook Lake, Smugglers Cove, and Helm Bay cabins.

Response: The Proposed Forest Plan provides broad strategic direction for overall management of the Forest. The Forest-wide Recreation and Tourism Standards and Guidelines in the existing and Proposed Forest Plans, for example, direct the Forest Service to identify opportunities to enhance existing, and provide additional, recreation opportunities, including those related to public recreation cabins. The Proposed Forest Plan also identifies where cabins and other types of recreation and tourism-related development can take place on a Forest-wide basis based on LUD classifications. Cabins are considered minor developments in the existing and Proposed Forest Plans. Minor developments are considered compatible with the Semi-Remote Recreation, Recreational River, Scenic Viewshed, and Scenic River LUDs and may be allowed in 10 other LUDs based on a case-by-case evaluation. Site-specific projects or activities related to specific existing or proposed cabins are addressed at the project level. More information is provided in Section 4 of the Final Proposed Tongass Forest Plan in the section that addresses Recreation and Tourism. Cabin maintenance and construction depends on funding from Congress or other sources.

Comment: Several comments requested that the Forest Service do a better job of maintaining and marking existing trails and consider creating new trails for local residents, as well as visitors, particularly in areas surrounding communities where the majority of existing recreation opportunities require a boat to access. Some respondents identified trails that they were particularly concerned about. These included the existing Beaver Lake Trail and the potential for a new trail from Skagway to White Pass City.

Another comment noted that existing logging roads could be used to provide mountain biking and hiking opportunities in the vicinity of communities. The same comment author expressed concern that the road providing access to a favorite hiking trail was not adequately maintained.

Response: As noted in response to similar requests with respect to public cabins (see the preceding comment and response), the Final Proposed Forest Plan provides broad strategic direction for Forest-wide management. Site-specific projects and activities related to trails are addressed at the project level. The revised Forest-wide Recreation and Tourism Standards and Guidelines include a number of directives that pertain to local recreation facilities and planning. Trail maintenance and construction depend on funding.

Comment: One comment identified the following concerns with respect to recreation encounter rates. Are the recreation encounter rates identified in the Proposed Forest Plan meant to guide management activities, with action taken to reduce use if rates are exceeded, or are they meant as guidelines for visitor expectations? Using encounter rates to guide management activities across the board ignores the fact that other factors—such as weather or mosquitoes—may be equally or more important in measuring user satisfaction. Similarly the impact of encounters may vary based on terrain and vegetation.

Response: The recreation encounter rates are identified by ROS class in the Final Proposed Forest Plan in the proposed ROS standards and guidelines in Appendix I. The encounter rates have been updated in the Final Proposed Forest Plan for the Primitive, Semi-Primitive Non-Motorized, and Semi-Primitive Motorized ROS settings. Encounter rates for the other ROS settings (Roaded Natural, Roaded Modified, Rural, and Urban) are unchanged from the current Forest Plan. The main purpose for these updates is to clarify commercial group sizes in these settings. The identified encounter rates are generally intended to guide management activities and may also help guide visitor expectations. Action may be taken on a case-by-case basis if these encounter rates are exceeded. Group size guidelines will be enforced.

Comment: One comment observed that the niche market for eco-tourism is likely to remain unaffected because none of the alternatives would affect Wilderness and LUD II designations and all alternatives continue to set aside vast acreages of remote and semi-remote recreation. The comment also noted that only road-based recreation opportunities are likely to vary by alternative. Other recreation activities are likely to remain unchanged. Opportunities for expanded road-based recreation could occur under Alternative 4 through 7, but are not likely to occur under Alternatives 1 through 3.

Response: The potential impacts of the proposed alternatives on recreation and tourism are evaluated in the *Recreation and Tourism* section of the EIS. The alternatives would result in shifts toward the roaded end of the ROS based on the amount of timber harvest and associated road construction that could occur. Potential road construction would be greatest under Alternatives 4 and 7. However, while there would be a relative increase in new roads, with access provided to presently undeveloped areas, nearly all new roads would be closed following harvest and not available for use by highway or high-clearance vehicles.

Comment: Several comments noted that a survey of Tongass hunting and fishing guides showed that two-thirds of them support a prohibition on logging and new road building in roadless areas. Some comments also noted that:

> **"In the view of some long-term guides operating in the Tongass, we are nearing a "now or never" point in regard to how much habitat can be lost and still be able to sustain populations of fish and game that will allow for future opportunities for hunting and fishing on the Forest."**

Response: The comments did not provide any further information with respect to the cited survey, but this sentiment has been expressed by a number of people providing comments on the Draft EIS. Alternative 1 was modified between the Draft and Final EIS documents to reduce the amount of logging and road building, with all Inventoried Roadless Areas and a number of areas of concern, such as Kuiu Island, removed from the suitable land base. The potential effects of the proposed alternatives on fish and wildlife populations are evaluated in the *Fish* and *Wildlife* sections in the EIS.

Comment: Some felt that the Tongass would be better to emphasis recreation use rather than timber harvest. One comment noted that the Forest Service should manage the land base to meet recreation demand.

Response: The Final EIS shows that recreation is a large and growing use of the Forest. Each alternative allows for this trend to continue. The existing and Proposed Forest Plans provide management direction for the Forest as a whole. The Forest-wide Recreation and Tourism Standards and Guidelines provide recreation and integrated resource planning direction. This includes direction for land managers to identify opportunities to enhance existing, and provide additional, recreation activities, opportunities, and services where desirable to meet local or Forest-wide recreation demands.

The Forest Service uses the ROS system to inventory existing and potential recreation opportunities on the Forest. The *Recreation and Tourism* section in the EIS assesses the potential impacts of the proposed alternatives on recreation and tourism in terms of ROS settings and identified recreation places.

Comment: One respondent stated that local tourism businesses should be permitted to use the forest rather than businesses associated with cruise ships where the same service is being offered. Another comment encouraged the Forest Service to give priority to small businesses offering recreation opportunities on the Tongass because large-scale tourism related to increased cruise ship activity can be very difficult to manage and large scale users tend to drive out smaller business users.

Response: The Proposed Forest Plan provides broad strategic direction for Forest-wide management with respect to Recreation and Tourism and special use permits. Forest-wide direction for public outfitter/guide services is identified in Section 4 of the Final Proposed Forest Plan in the section that addresses Recreation and Tourism. In general, the services of outfitter/guides should facilitate use, enjoyment, understanding, and appreciation of National Forest recreation settings. The Final Proposed Forest Plan direction does not specify that local businesses should be given preference over cruise ship-related activities or that small users should be given preference over large (cruise ship-related) users.

Potential permit holders are evaluated on a case-by-case basis through the special use permitting process, which generally does not allow for a business size preference.

Comment: Concern was expressed that the Wilderness direction was being changed to discourage dispersed recreation use in pristine areas as a way to resolve conflicts in areas of concentrated use.

Response: The intent of this direction is to maintain the solitude found in pristine areas. The first choice for resolving conflicts in areas of concentrated use would be to relocate that use to areas outside the wilderness boundary.

Comment: One comment noted that the Proposed Forest Plan's Recreation and Tourism Standards and Guidelines acknowledge that commercial tourism may conflict with local residents use of the same area, but do not require the Forest Service to consider the off-site impacts of activities permitted on NFS lands. The comment notes that the Forest Plan should provide an adequate framework to protect local residents and nonmotorized recreationists from commercial recreation–related noise. The Recreation and Tourism Standards and Guidelines should clearly state that "one consideration to be weighed by the Forest Service in promoting additional commercial tourism use of the Forest is the impact such increased activity could have on Juneau or other similarly situated communities." The comment also stated that "natural quiet" should be identified as a forest value or resource.

Response: The Forest Service believes that the Final EIS and Final Proposed Forest Plan adequately recognize that noise associated with commercial and other motorized recreation can have detrimental effects on other Forest users, as well as on surrounding communities. Although not explicitly spelled out in the Final Proposed Forest Plan in the way suggested in the comment, the potential noise impacts associated with commercial tourism use are an important element of project-specific evaluations.

Comment: One comment expressed concern about a proposed LUD change that would occur north of Juneau under all of the action alternatives. This change would be from Remote Recreation to Semi-Remote Recreation. The comment noted that this area includes the Herbert Glacier and Eagle Glacier recreation areas, among others. The comment also noted that the rationale for this proposed change is not explained in the Draft EIS and was concerned that the change is proposed to allow an expansion of helicopter landing sites in the area. Any changes to helicopter operations on the Juneau Icefield should be part of a separate action, as they were in 2002.

Response: The snow accumulation zone on the Juneau Icefield has retreated to higher elevations perhaps as a result of climate change. This has rendered a number of minor development sites (e.g. dog sled camps) unsuitable for use as the thinning snow layers expose crevasses during the middle of the operating season. This hazard requires removal of the camps to a more suitable location, generally higher in elevation where there is more snow. The Remote Recreation LUD does not allow development of minor developments, like dog sled camps, while the Semi-Remote Recreation LUD would allow consideration of this type of use.

This change in the LUD boundaries would allow the Forest Service to consider moving minor developments into areas where standards and guidelines for the previous LUD would not have allowed this use. It should be noted that this change in LUD boundaries would not affect the Forest Service's ability to allow an expansion of helicopter landing sites in this area, because glacier landing tours are allowed in both the Remote Recreation LUD and Semi-Remote Recreation LUD under the current and Proposed Forest Plans. This explanation has been added to the *Recreation and Tourism* section of the Final EIS.

The 2002 ROD for the Helicopter Landing Tours on the Juneau Icefield will be reviewed for consistency with this Amendment, but any changes to the 2002 ROD would have to be made in compliance with applicable NEPA regulations and Forest Service policy.

Comment: Some respondents expressed concern regarding the impacts of timber harvest on scenic resources and ultimately on the tourism/visitor industry. They urged that this be a major consideration in the decision making process.

Response: The Final EIS discloses the potential impacts of timber harvesting on scenic resources (see the *Scenery* section). This was a major consideration in the design of alternatives. Even Alternative 7, with the highest amount of timber harvest, was designed to protect key seen areas. The basic scenery management information, including seen and unseen areas from high visitation sites, was updated as part of this analysis.

Comment: One respondent noted that while they had heard stories that tourists on cruise ships do not notice clearcuts, this was not the case with the passengers who traveled on the boats they operate on the Tongass under a special use permit. The respondent noted that they receive lots of comments from customers concerned about clearcuts.

Response: As part of the Forest Plan Amendment process, the Forest Service has updated the Seen Area analysis and Visual Priority Routes and Use Areas for the Tongass (see Appendix F of the Final Proposed Forest Plan). Scenery is emphasized from these areas. Please note that many of the clearcuts visible from ships are on non-NFS lands.

It seems reasonable to assume that timber harvest may be more visible from some locations than others and that some visitors are more sensitive to the visual evidence of clearcut or other harvesting than others are. The potential impacts to Visual Priority Routes and Use Areas are evaluated for each alternative in the *Scenery* section of the EIS. In addition, site-specific visual analysis is conducted at the project-level for all projects.

Roadless Areas and Wilderness

Comment: One respondent felt that the method to map and delineate Inventoried Roadless Areas (pg 3-357 of the Draft EIS) was illogical as it failed to recognize the difference between pristine roadless watersheds and parts of developed watersheds that do not have roads.

Response: The process for defining and mapping Inventoried Roadless Areas has been established for many years and was used in the 2003 SEIS. The Forest Service recognizes the potential difference in value between roadless areas and this is reflected in our alternative development and analysis. There is no policy that would have us not consider areas as roadless just because they happen to be in a watershed that has some level of past management activity.

Comment: Several comments suggested that the Proposed Forest Plan eliminate the roadless area designation.

Response: This is beyond the scope of this Forest Plan Amendment. The identification of roadless areas and their use as an inventory is well established in Forest Service policy. Management of these areas is a significant issue that must be addressed.

Comment: Many respondents asked that roadless areas be protected (from timber harvest, oil and gas development, and road building). Some specified that all roadless areas be protected,

while others were very broad in just saying the Tongass needed to be protected. Some listed specific "special areas" they wanted protected. Many asked for wilderness designation for these areas. One comment stated that the alternatives should include recommendations for additional Wilderness.

Response: Management of Inventoried Roadless Areas was one of the three key issues used to develop alternatives. Alternatives were designed to meet different levels of timber output while limiting entry into roadless areas. In each case, the more sensitive, higher value roadless areas were avoided as much as possible. In addition, Alternative 1 was modified in the Final EIS to ensure that all Inventoried Roadless Areas are outside the land base designated suitable for timber harvest. As the timber output level increases in the other alternatives, roadless areas were added to the suitable land base as necessary, starting with those within logical extensions of the current road system working up to higher valued roadless areas necessary to achieve the higher timber output levels in Alternatives 4 and 7.

Consideration of wilderness designation was outside the scope of this analysis. Recommendations for adding wilderness to the Tongass National Forest were evaluated in the 2003 SEIS (USDA Forest Service 2003). It was concluded that such recommendations were not needed because there was no compelling need for additional wilderness on the Tongass at that time. This decision was reviewed as part of this EIS process to ascertain if that conclusion is still valid today.

Comment: Several respondents felt that the National Roadless Rule should be reinstated to apply to the Tongass.

Response: While the application of a national policy is beyond the scope of this analysis, Alternative 1 has been modified to exclude timber harvest and road building from Inventoried Roadless Areas.

Comment: One respondent felt that the Draft EIS treated Designated Wilderness and Inventoried Roadless Areas as if they were the same, even though they are clearly different.

Response: The Forest Service recognizes the significant difference in management options between Wilderness and roadless areas. Wilderness has its own LUD while roadless areas are allocated to various LUDs depending upon the alternative. While management options are clearly different, these areas are viewed similarly in terms of current wildlife habitat and biodiversity analysis. They both provide unroaded, unmodified habitat that is valuable for some species.

Comment: One comment recommended that 66 Tongass rivers be designated as Wild and Scenic Rivers in accordance with the proposal prepared by the Southeast Alaska Conservation Council and the Tongass Rivers Coalition: Tongass Rivers: the Lifeblood of the Rainforest ("Citizens' Proposal"). The comment noted that these rivers and those proposed as Wild and Scenic in the current plan should have 0.5-mile (rather than 0.25-mile) buffers to protect their outstanding values. The same comment also expressed support for the Wild and Scenic rivers proposed in the 1997 ROD to be designated as such. Where there is conflict between the classifications in the 1997 ROD and the "Citizens' Proposal" the comment author requested that the "Citizens' Proposal" take precedent.

Response: Wild and Scenic River designations are made by Congress and are outside the scope of this Amendment. The 1997 Forest Plan ROD recommended to the Chief of the Forest Service over 30 rivers and lake systems be forwarded to Congress for designation. The current list of recommended river systems is not being considered for change in this Amendment.

Subsistence

Comment: Some respondents stated that hunting and fishing access are provided for all user groups and felt that the implication that roads have negative impacts on hunting is incorrect.

Response: The EIS states that under ANILCA, only rural Alaska residents qualify for subsistence hunting and fishing on federal lands. The Final Proposed Forest Plan directs the Forest to "maintain reasonable access to subsistence resources as required by ANILCA, Section 811 and to address subsistence concerns when developing road management objectives for forest roads" (SUB-1, I). The Final EIS states that road networks provide greater access to areas previously unconnected and can affect subsistence both positively and negatively by providing access, dispersing hunting and fishing pressure, and creating the potential for increased competition.

Comment: Some comments stated that timber harvest near towns has forced subsistence users (i.e., spruce root basket weavers, deer hunters) to move further out. They believe that debris and felled trees in harvest areas have negative effects on hunting.

Response: The EIS looked at the likely effects of the different alternatives on subsistence resources in two parts: effects on subsistence resources and uses important to each rural community and overall, on a Forest-wide basis, based on general considerations of effect in terms of abundance and distribution, access, and competition. The 1997 Forest Plan EIS included discussions of 32 Southeast Alaska communities with a state land-selection base. This EIS provides brief updates of the affected environment section of the community discussions, where applicable. Each community assessment provides potential effects by Community Use Area, Economy, and Subsistence. The Final Proposed Forest Plan contains Forest-wide standards and guidelines; for example, directing the Forest to locate and manage Forest management activities that consider impacts upon rural residents who depend upon subsistence uses of the resources of the NFS lands.

Comment: It is important to some respondents that the Forest Service ensure that fish and wildlife resources do not "reach a point where continued levels of harvest would jeopardize stock to unsustainable levels and result in use-priority restrictions."

Response: With regard to this Proposed Forest Plan, deer is the only subsistence resource that is potentially significantly affected by any of the alternatives. The EIS discusses the potential effects on subsistence by alternative and within the individual community assessment discussions, as appropriate. Different alternatives may result in a significant restriction of the subsistence uses of deer, due to potential effects on abundance and distribution, and on competition. However, the Subsistence, Fish, and Wildlife Forest-wide standards and guidelines are designed to help ensure that fish and wildlife resources do not reach a point where continued levels of harvest would jeopardize stocks to unsustainable levels and result in use-priority restrictions. The Forest Service will seek to maintain abundance and distribution of subsistence resources necessary to meet subsistence user needs. The Forest Service will also continue to consult with the Southeast Alaska Federal Subsistence Board. If, for some reason, population levels drop to where restrictions in use need to occur (i.e., severe winter such as occurred in 2006/07) the Forest Service would follow the regulatory process, working with the Federal Subsistence Board.

Comment: A number of comment stated that the Final EIS should take a closer look at the cumulative effects of past, present, and future logging on deer and other subsistence resources on Prince of Wales Island. Comments also stated that the Forest Service should consider changing LUD assignments in places like Craig or Hydaburg that are surrounded by lots of private and public logging.

Response: The Forest did take a good look at the cumulative effects of past, present, and future management on deer and other subsistence resources on Prince of Wales Island. Specific to Prince of Wales Island, the EIS assessed the potential impacts for Coffman Cove, Craig, Edna Bay, Hollis, Hydaburg, Kasaan, Klawock, Naukati, Point Baker, Port Protection, Thorne Bay and Whale Pass in the Communities subsection of the *Subregional Overview and Communities* section. Summary tables are provided for each community, comparing the acres allocated to types of LUD group by alternative. For example, LUD groups in Coffman Cove's community use area (1,228,786 acres total) would range from: wilderness – 122,719 acres; mostly natural – 758,086 acres, moderate development – 98,294 acres, intensive development 249,686 acres under Alternative 1 to wilderness – 122,719 acres, mostly natural – 218,709 acres, moderate development – 340,708 acres, intensive management – 546,652 acres under Alternative 7. A summary is provided of the potential impacts on subsistence resources by alternative for each of the community use area. If, as time goes on, it looks like a change of LUD is necessary, the Forest would follow its standard amendment process for the Forest Plan.

Comment: Some comments stated that Forest Service roads open up subsistence areas to outside use which often has a negative impact on local users and resource sustainability. They would like the Forest Service to study the effect that building roads adjacent to sensitive subsistence areas has on subsistence resources. Another comment said the Final EIS needs to address the effects of competition on subsistence use.

Response: The Forest has looked at the potential impacts or effects of road building on subsistence resources, areas, and users. The Forest acknowledges in the EIS that road networks provide greater access to areas previously unconnected and can affect subsistence both positively and negatively by providing access, dispersing hunting and fishing pressure, and creating the potential for increased competition. Monitoring and evaluation of wildlife, fish, and subsistence comprise an essential feedback mechanism within an adaptive management framework to keep the Plan dynamic and responsive to changing conditions. Monitoring population trends and their relationship to habitat changes for management indicator species (MIS) (a lot of which are subsistence species), as well as analyzing if the effects of management actions on subsistence users in rural Southeast Alaska communities are consistent with those estimated in the Final Proposed Forest Plan, will provide information to be used to determine whether changes in management direction are needed. Thus, the Forest is studying the effect that building roads adjacent to subsistence areas might have on subsistence resources and will work with the appropriate state agencies, local communities, the Southeast Alaska Federal Subsistence Regional Advisory Council, and State Fish and Game Advisory Committees to analyze potential changes.

The EIS does address competition on subsistence use. Competition for the more abundant wildlife and fisheries resources near rural communities results from a combination of factors. Examples include fish and game regulations, mobility, and the natural distribution of game species across the Tongass, decreases in resource populations because of habitat reductions, decreases in resource populations because of over-harvest, and access provided to rural communities in the form of roads, ferries, and commercial air carriers. Specific assumptions were used to analyze competition in the 1997 Forest Plan Revision Final EIS, which concluded that implementation of Alternative 11 (the selected alternative) would result in a significant possibility of a significant restriction of subsistence use by increasing competition for some subsistence resources by non-rural, as well as rural residents. The possibility of a significant restriction, resulting from a change in competition, would be the same as or less than the possibility under Alternative 11 of the 1997 Forest Plan Final EIS for Alternatives 5 and 6 evaluated in this EIS. There would be a relative reduction in risk under Alternatives 1, 2, and 3, and an increase in risk under Alternative 4 and especially under Alternative 7.

Comment: There was a concern shared by some respondents that the non-subsistence areas associated with the borough of Juneau will grow as their borough boundary grows.

Response: This concern is beyond the scope of this planning effort. However, if the borough of Juneau were to grow, there should not be a change to outlying communities with regard to rural versus non-rural designation. The Federal Subsistence Board will determine if an area or community in Alaska is rural, not the Forest Service. In determining whether a specific area of Alaska is rural, the Board shall use the guidelines provided in 50 CFR Part 100.

Comment: Some respondents from various communities believe the Proposed Forest Plan needs to include a section that better protects specific fish and wildlife stocks for subsistence purposes. They state that these are areas of concern that have developed over the past few years with respect to the State's ability to continue management of 'subsistence resources' and affect the people of these communities on the Tongass.

Response: While many of the areas identified by respondents are specific sites that are important to the subsistence users of particular communities, the Forest-wide standards and guidelines for Subsistence, Wildlife, and Fish are in place to protect fish and wildlife resources for subsistence purposes, across the Forest. The Forest will seek to maintain abundance and distribution of subsistence resources necessary to meet subsistence user needs. Monitoring population trends and their relationship to habitat changes for MIS (a lot of which are subsistence species), as well as analyzing if the effects of management actions on subsistence users in rural Southeast Alaska communities are consistent with those estimated in the Final Proposed Forest Plan, will provide information to be used to determine whether changes in management direction are needed. The Forest will continue to work with the appropriate state agencies, local communities, the Southeast Alaska Federal Subsistence Regional Advisory Council, and State Fish and Game Advisory Committees to analyze if changes need to occur with regard to specific fish populations and management activities. A proposal would then go to the Federal Subsistence Board for a determination.

Comment: Some respondents believe the Proposed Forest Plan needs to plan and provide for deer populations for subsistence and that the current deer models are weak or not applicable to large-scale, landscape-level analysis involving landscape patterns, such as sizes and location and timber stands.

Response: The Forest will seek to maintain abundance and distribution of subsistence resources necessary to meet subsistence user needs. Subsistence use is addressed specifically in Forest-wide standards and guidelines and subsistence resources are covered by the Forest-wide standards and guidelines for fish, wildlife, and riparian areas and biodiversity, among others. Fish and wildlife habitat productivity would be maintained at the highest level possible under all alternatives, consistent with the overall multiple-use goals of the current Forest Plan, with improved protection under the Final Proposed Forest Plan. In addition, each of the Forest LUDs contains direction to follow the Forest-wide standards and guidelines for Subsistence. The potential effects of the alternatives on wildlife productivity are discussed in more detail in the *Wildlife* section of the EIS. The deer model used for the Plan is a tool, used to evaluate the relative differences among alternatives in the context of a risk assessment. The Forest acknowledges that there are weaknesses or limitations in the use of this model when applied at the watershed or project planning level. It is however, the most appropriate tool for analysis over large planning areas such as the entire Tongass National Forest or at the scale of a watershed analysis area (WAA). Specific concerns raised with respect to the deer model are addressed in the Wildlife, Biodiversity and Plants section of this appendix under Deer.

Comment: One comment stated that a decline in old-growth forest wildlife habitat capability due to timber harvest on Native Corporation, Tongass, and other lands does not translate into reduced abundance of deer or other subsistence resources.

Response: The potential effects of the alternatives on wildlife productivity are discussed in more detail in the *Wildlife* section of the EIS. While it's true that after the initial years following logging, there is a rapid increase in deer forage production about 20 to 30 years after harvest, the vigorously growing hemlock and spruce shade out the understory forage during the next 100- to 150-year period. However, as stated in the EIS, it is important to note that forest management on the Tongass has produced more forage than assumed by the deer model, through the management of second growth stands. The Forest is looking at young-growth management (in cooperation with the PNW Research Station) to evaluate the potential benefits of treating pre-commercial stands to increase wildlife habitat and wood production. There are still many uncertainties related to appropriate young-growth treatment designs, specific beneficial effects of such treatments, and the implications for deer. Initial results are looking promising. However, when comparing alternatives for this EIS, Alternative 7 would not include OGR and would have the largest potential long-term effects on the availability of deer for subsistence purposes.

Comment: Some felt that the Draft EIS does not adequately recognize the importance of subsistence use taking place on the Tongass National Forest, does not provide sufficient protection for this use, and does not provide enough information to evaluate the foreseeable effects of proposed timber management and increased levels of tourism and non-subsistence consumptive use.

Response: The Forest does recognize the importance of subsistence use taking place on the Forest. There are specific Forest-wide standards and guidelines related to subsistence. Other Forest-wide standards and guidelines, such as for fish, wildlife, and riparian, provide for species habitat planning and protection, which benefit subsistence species and resources. The Forest will continue to work with the appropriate state agencies, local communities, the Southeast Alaska Federal Subsistence Regional Advisory Council, and State Fish and Game Advisory Committees to analyze if changes need to occur with regard to a specific subsistence resource and any of the Forest's management activities. The *Wildlife* section of the EIS provides an in-depth discussion of the potential impacts to subsistence resources by alternative. In addition, both the *Subsistence* and *Subregional Overview and Communities* sections of the EIS discuss potential impacts to subsistence, looking at many different factors related to Forest management.

Comment: Some believe that the Proposed Forest Plan should include a subsistence land-use designation that would protect the most important subsistence use areas for rural communities. The amended Forest Plan should plan for subsistence not just assess the effects of other plan activities on subsistence.

Response: While it's true that there is not a land-use designation specific to subsistence, subsistence resources are important to the Tongass. We think it is better to manage for subsistence on all NFS lands rather than designate certain lands to a subsistence LUD. There are Forest-wide standards and guidelines set up to protect subsistence resources. Monitoring and evaluation for subsistence is designed to make sure that our actions are not negatively impacting subsistence resources. The Forest will continue to work in accordance with ANILCA Title VIII. In addition, each of the Forest LUDs contains direction to follow the Forest-wide standards and guidelines for subsistence.

Comment: Some respondents stated that the provision for periodic harvest assessments and other studies of subsistence – included in the 1997 Forest Plan – appears to have been dropped from the Proposed Forest Plan.

Response: This provision has not been dropped. The Forest-wide standard for subsistence 1.D states: "evaluate changes in subsistence use patterns and activities in cooperation with appropriate state and federal agencies by conducting periodic surveys of fish and wildlife populations and subsistence harvest and consulting with subsistence user groups."

Comment: One respondent stated that "given the importance to the rural economy of subsistence hunting, we think impacts on subsistence should be heavily weighted when deciding on an alternative.

Response: Potential impacts to subsistence resources are one of many factors that will be taken into consideration by the deciding official when reviewing the various alternatives.

Comment: One respondent stated that the Draft EIS needs to show the relative impacts of the different alternatives. The alternatives with larger amounts of harvest (Alternatives 4 and 7) would result in larger restrictions and that the Draft EIS should also consider the impacts to important subsistence use areas as these impacts would have greater effect than impacts to less important subsistence areas.

Response: The Draft does show the relative impacts of the different alternatives. Deer habitat capability in 2005 and after 100+ years of full implementation under each alternative (expressed as a percent of the 1954 habitat capability) is displayed in table form for each of the 32 individual community assessments in the *Subregional Overview and Communities* section of the EIS,. These tables show that deer habitat capability would be potentially reduced the most under Alternatives 7 and 4, within the development LUDs. These assessments specifically address the potential effects to the WAAs that are most important for subsistence for each community based on past deer harvest patterns.

Comment: A number of respondents commented that the Draft EIS fails to demonstrate that the proposed restrictions on subsistence use are necessary, that the proposed harvest would involve the minimum amount of land necessary, or how adverse impacts to subsistence uses and resources would be minimized. A number of respondents also commented that under ANILCA Section 10 three conditions need to be determined by the head of the federal agency before any significant restriction on subsistence use may be affected.

Response: The EIS is not currently proposing a restriction on subsistence use. It states that, "the 1997 deer analysis was much in line with the earlier...analyses… It indicated that deer habitat capabilities in several portions of the Tongass may not be adequate to sustain the current levels of deer harvests, and that implementation of any Forest Plan alternative could, therefore, be accompanied by a significant possibility of a significant restriction on the abundance and/or distribution of subsistence use of deer." The EIS further states: "Under the alternatives analyzed in this EIS, the possibility of a significant restriction, resulting from a change in abundance or distribution, would be the same as or less than the possibility under Alternative 11 of the 1997 Forest Plan Revision Final EIS for five of the seven alternatives. This risk would, however, likely be higher under Alternatives 4 and 7 because these alternatives anticipate a higher level of timber harvest than the current Forest Plan (Alternative 5, No Action)."

An ANILCA Section 810 evaluation and determination is not required for approval of a Forest Plan Amendment, which is a programmatic level decision that is not a determination whether to "withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition" of National Forest land. This EIS is part of the Forest Plan Amendment process and, therefore, does not require an ANILCA Section 810 evaluation and determination.

Comment: The Tongass National Forest should collaboratively identify local subsistence and community use areas on the Tongass and incorporate these areas into an expanded protected areas strategy.

Response: The EIS looked at the likely effects of the different alternatives on subsistence resources in two parts – effects on subsistence resources and uses important to each rural community and overall or on a Forest-wide basis, based on general considerations of the effects in terms of abundance and distribution, access, and competition. The 1997 Forest Plan EIS included discussions of 32 Southeast Alaska communities with a state land-selection base. This EIS provides brief updates of the affected environment section of the community discussions, where applicable. Each community assessment provides potential effects by Community Use Area, Economy, and Subsistence. Each of the Forest LUDs contains direction to follow the Forest-wide standards and guidelines for subsistence. Additional collaboration will occur at the project- or site-specific level for District projects.

Comment: Alternative 7 is better for subsistence than is portrayed in the Draft EIS. Alternative 7 would improve subsistence because of better access and timber harvest is much better for deer than is indicated in the Draft EIS.

Response: It may be that actively managed young growth is better deer habitat than the old growth based deer model predicts. That is one of the reasons young growth management has more emphasis in this Amendment. However, in the absence of a new scientifically based deer model that incorporates the ability to better account for differential habitat values, we will continue to use the best scientifically defensible information available. Old-growth habitat is still considered to be the highest value habitat for deer because of the quality of food in the understory and the high canopy cover, which results in lower snow depths on the ground during critical winter periods.

Comment: One respondent asked for a return of traditional rights to Hydaburg for the area from Cape Chacon to the Maurelle Islands.

Response: It is not clear what the comment means by “return of traditional rights” but changes to subsistence regulations are outside the scope of this Forest Plan Amendment.

Comment: Some respondents shared their opposition to subsistence regulations and their belief that the federal government does not have any authority over Indigenous tribes or Indigenous people. They talked about their rights as a sovereign nation and their opposition to subsistence rights being given to non-native residents. They feel that Indigenous people should have priority for use of natural resources. Some felt that the Forest Service should compensate tribes for cutting trees or turn over control of resources to tribal governments.

Response: These are complex legal issues that are outside the scope of this Forest Plan Amendment. The Proposed Forest Plan will continue to be consistent with current laws and regulations.

Comment: Some comments stated that the Draft EIS does not take into account the economic value of cultural and other Forest-related tribal activities.

Response: The comment does not provide any context for this statement or identify the specific values that the comment author believes the Draft EIS fails to account for. As a result, it is not possible to provide a specific response to these concerns. Other specific concerns raised with respect to subsistence and heritage values are addressed in the *Subsistence* and *Heritage* sections of this comment response volume.

Comment: One respondent was interested in an area being designated for harvest of 500 year old cedar trees for totem poles and canoes as well as bark for weaving. They also asked for an area for spruce roots for basketry.

Response: These specific needs should be brought to the attention of the local District Ranger who is in the best position to address them at the site-specific level.

Comment: One comment noted that healthy salmon stocks support commercial, subsistence, and recreational fishing activities and have been an important part of the cultural fabric of indigenous people of the Tongass for literally thousands of years, as they are in the present day.

Response: We agree that healthy salmon populations are an important component of the Tongass ecosystem that support many human uses, provide prey for a variety of wildlife species, and act as a source of nutrients for the environment.

Timber

The Timber comment and response subsection is divided into the following categories:

- Harvest Methods
- Old-Growth Timber
- Young-Growth Timber
- Alaska Yellow-Cedar
- Harvest-General
- Spectrum Model Analysis
- Timber Sale Economics
- Timber Supply
- Allowable Sale Quantity
- Tongass Futures Roundtable
- General

Harvest Methods

Comment: One comment noted that the Draft EIS did not appear to present information on how the timber would be harvested under each alternative.

Response: The Regeneration Methods subsection of the *Timber* section discusses harvest methods. Table 3.13-9 in the *Timber* section identifies the projected acres by harvest approach (even-aged, two-aged, uneven-aged) for each alternative.

Comment: Some respondents requested that the Forest Service concentrate harvest in fewer, more-intensively managed areas to avoid entering new watersheds. They noted that applying the conservation strategy forces the harvest to be spread over a larger area. Others suggested that cutting less efficiently but over more acres would be a greener approach.

Response: Concentrating harvest in fewer areas and harvesting these areas more intensively would reduce the area needed for a given harvest level. However, it could also lead to adverse effects on water quality, wildlife, visual quality and other resources in the intensively managed areas. On the other hand, cutting fewer trees per acre would disturb more acres of land for the same volume of timber and would also require more roads.

Table 3.13-9 in the *Timber* section identifies the projected acres by harvest approach (even-aged, two-aged, uneven-aged) for each alternative. All seven proposed alternatives employ a combination of harvest approaches with projected harvest levels more concentrated in some areas than others.

Comment: One respondent believed that trees retained in harvest units should be looked at as an investment in non-timber resources and should not be offset by harvesting larger units, harvesting more units, or harvesting the retention later.

Response: The Forest does view the retained trees in harvest units as important for wildlife and does not plan to harvest them later. However, one consequence of retaining trees in harvest units is a reduction in harvest per acre, which needs to be made up by harvesting more areas in order to meet a given level of demand. This is the trade off between leaving structure in harvest units as opposed to harvesting a smaller area more intensively.

Comment: One respondent stated that: "The change from removing large volumes of timber from concentrated areas using cable yarding systems to scattered small, units has affected sale economics and logging systems capabilities."

Response: Changes to timber sale design and logging systems affect harvest economics as noted in the comment. Logging large units, with no stream buffers to break up the unit, is more economical and more easily accomplished with cable logging systems.

Comment: Several comments stated that harvest should be limited to salvage logging or to previously disturbed areas with low environmental value, such as unused roads. Another comment suggested harvest should be restricted to 40 MMBF per year, the harvest rate between 1909 and 1950.

Response: The overall objective of all seven alternatives is to provide a balance between supplying enough timber to meet demand while protecting the environment. Limiting harvest to salvage logging would not meet projected demand under any of the alternatives. Alternative 1 was revised between the Draft and Final EIS documents and restricts harvest to roaded areas only. This alternative has a projected ASQ of 49 MMBF per year, which is close to the 40 MMBF identified by the comment author.

Comment: Some respondents opposed the use of clearcutting as a common harvest method. They argued that clearcuts are ugly and have negative impacts on fish and wildlife and tourism. Others argued that not clearcutting amounted to high-grading and would not produce healthy young stands.

Response: The alternatives feature a range of potential harvest methods. All alternatives include acres scheduled for even-aged harvest, also known as clearcutting (see Table 3.13-9 in the *Timber* section of the Final EIS). Even-aged harvest can be an effective harvest method in many cases because it provides regeneration of desired species, effective tree disease control, viable harvest economics, compatibility with the use of standard logging systems, and minimizes windthrow problems. The circumstances under which clearcutting is practiced on the Tongass are discussed in the Regeneration Harvest Methods subsection of the *Timber* section of the Final EIS.

Research indicates that stands that regenerate following partial harvest are healthy and provide good habitat. Uneven-aged and selective harvest treatments are established forestry practices that, if done properly, can produce healthy stands; however, the risk of windthrow and dwarf mistletoe infection is higher. This is discussed further in the *Timber* section of the Final EIS.

The potential effects of the alternatives on fish, wildlife, and tourism are evaluated in the *Fish*, *Wildlife*, and *Recreation and Tourism* sections of the Draft and Final EIS documents.

Comment: One respondent stated that there are many reasons for clearcutting besides those listed in the Draft EIS and provided a brochure the Forest Service produced in 1972 in support of this claim. Another comment stated that clearcutting is the only way to harvest on the Tongass because thinning spruce-hemlock stands results in wounded trees.

Response: Timber harvest methods are discussed in the Regeneration Methods subsection of the *Timber* section of the EIS. The brochure from 1972 provides an interesting perspective on the thinking at the time. Much additional information has been acquired on forest management in the last 35 years.

Contemporary professional forestry practices include a wide range of tools, techniques, and treatment methods that are all part of the range of tools available for managing the Tongass. Thinning can result in tree wounds, as noted in the comment; however, research indicates that if done with care, thinning can be successful. This is discussed further in the *Timber* section of the Final EIS.

Comment: One respondent stated that two-aged stands are just clearcuts with a few clumps of trees left in the units or along the boundaries. This, they argue, still results in an even-aged stand.

Response: Timber harvest methods are discussed in the Regeneration Methods subsection of the *Timber* section of the EIS. Harvest methods on the Tongass include three broad groups of methods: even-aged systems, two-aged systems, and uneven-aged systems. Two-aged harvest systems do not result in “clearcuts with few clumps of trees.” The description of two-aged harvest has been revised in the Final EIS and explains that the intent with a two-aged stand is to leave up to 30 percent of the trees in order to create a stand with two age classes. This is often done by specifying a diameter limit, for example, leaving all trees between 9 and 18 inches diameter at breast height (dbh). The reserve trees provide structural diversity and an older aggregation of trees within the otherwise young-growth stand. This system has been used on the Tongass to meet scenery and wildlife objectives.

It is possible that the comment author is confusing two-aged systems with the clearcut with reserves system, which could conceivably be described as “clearcuts with a few clumps of trees left in the units or along the boundaries.” Approximately 10 percent of the trees are left in these units but the intent is an even-aged stand. This is discussed further in the Regeneration Methods subsection of the *Timber* section of the EIS.

Comment: Some comments stated that logging practices should be limited to selective cutting. High quality trees should be used for structural timbers not chips or pulp.

Response: High quality logs are used for lumber not chips or pulp. It is the low-quality logs and the outer portions of the other logs that are used for chips (see Figure 3.13-2 in the *Timber* section in the Final EIS). There are a number of advantages to selective cutting, described here as two-aged and uneven-aged harvest, such as less potential impact on wildlife habitat and scenery. There are also some drawbacks, more acres must be disturbed for a given volume of wood compared to even-aged harvest (clearcuts and clearcuts with reserves), more roads are typically needed, and there are some concerns with respect to windthrow and logging damage to the remaining trees.

Additional information on selective harvest has been added to the *Timber* section of Final EIS. All seven proposed alternatives employ a combination of harvest approaches with projected harvest levels more concentrated in some areas than others.

Comment: One comment stated that: “Eliminating clearcutting would reduce, though not eliminate, the need to deal with low grade utility logs.”

Response: Low grade utility logs would be included in harvest units under all three of the broad groups of harvest methods (even-aged, two-aged, and uneven-aged) proposed under each alternative. Eliminating even-aged systems or clearcutting would not substantially reduce the utility log component of potential timber sales. Selectively logging only the high-quality trees could reduce the amount of utility logs harvested. This practice is often referred to as “high grading” and In the long run this approach may not result in healthy forests if only the best and healthiest trees are removed leaving the rest to reproduce. This type of selective cutting also requires more road building and more frequent entries for an equal amount of volume.

Comment: Concern was expressed that leaving low grade logs in the woods wastes resources and harms wildlife.

Response: Timber sale purchasers are only allowed to leave utility grade logs in the woods. Utility grade logs cannot be sawn into lumber due to rot and other problems. While the Forest tries to utilize low value logs, those left in the woods often provide habitat for many species for extended periods of time. The effects of leaving low value logs in the woods are evaluated for all potentially affected resources, including wildlife, at the project level.

The recently approved Limited Interstate Shipment Policy (March 2007) is expected to increase the utilization of timber harvested on the Tongass and improve the economics of timber sales by providing a market for smaller diameter and low grade material that cannot be processed profitably by sawmills in Southeast Alaska. This is discussed further in the *Economic and Social Environment* section of the Final EIS.

Comment: Concern was expressed that helicopter logging is too expensive to be practical. One comment suggested that helicopter logging can result in "high-grading" because of the high cost of removing lower value material. Others recommended helicopter logging as the best method.

Response: Helicopter logging is generally more expensive than cable logging. Many areas of the Forest are too costly to harvest with a helicopter. Some high-value stands with short yarding distances may be economical, depending on fuel costs and timber values. Helicopter yarding generally has less environmental impact than other methods and is often prescribed as a harvest method to protect resource values by reducing disturbance on the ground.

Comment: One comment expressed concern that the Draft EIS assumes that "timber stands of varying volume will be (logged) proportionate to their occurrence within biogeographic provinces or ecological subsections," but there is nothing in the Proposed Forest Plan that requires this distribution or prevents "high-grading." The comment argues that the Final EIS, therefore, needs to explicitly evaluate the potential effects of "high-grading" in the Environmental Consequences analyses. The comment notes that this practice results in unsustainable harvest levels and has detrimental effects on the environment, including wildlife.

Response: The potential environmental impacts are assessed based on the projected ASQ. Modeling indicates that all of the alternatives would harvest the suitable land base at a sustainable level, as discussed in the *Timber* section of the EIS.

Actual harvest is likely to be lower than the projected ASQ and actual volumes harvested under any of the alternatives may be affected by a range of different factors that are difficult to predict at this point. It is important to remember that the Forest Plan does not authorize any ground disturbing activities or create any environmental consequences. The main function of the Final EIS is to compare and contrast alternatives in a general way using broad projections based on full implementation of each alternative. With that in mind, the ASQ represents the maximum allowable timber harvest under each alternative and allows an appropriate and consistent comparison between alternatives. This essentially represents a worse-case approach that ensures that the potential effects of each alternative are fully accounted for. Also, the OGRs proposed in most watersheds contain high-value forests which have been set aside for wildlife habitat and legacy standards apply to VCUs that have high levels of harvest. This is discussed further in the *Wildlife* section in the EIS.

More detail on the proposed harvest methods is provided in the Regeneration Methods subsection of the *Timber* section of the Final EIS. Table 3.13-9 in the *Timber* section identifies the projected acres by harvest approach (even-aged, two-aged, uneven-aged) for each alternative.

Old-Growth Timber

Comment: Some respondents disagreed with the statement under Key Issue 3 (page 1-7 in the Draft EIS) that big tree old growth has been disproportionately harvested. They assert that big tree old growth is well distributed across the Tongass.

One comment pointed out that pulp companies were not seeking big trees and provided a graph that showed the size distribution of spruce trees harvested by the Ketchikan Pulp Corporation during selected years in the 1980s and 1990s. The comment also noted that the average tree harvested in the 1980s and 1990s was 10 inches in diameter.

Response: The text on page 1-7 in the Draft EIS states that: "Although less than 10 percent of the POG habitats on the Tongass have been converted to second growth, this percentage is much higher for certain types of old growth, such as lowland and big tree old growth." This statement is consistent with our experience on the ground and supported by the GIS analyses conducted in support of this Forest Plan Amendment EIS.

Comment: Some comments pointed out that the amount of old-growth harvest under any of the alternatives is very low and argued that this suggests that claims that the forest had been over-harvested are untrue. Some suggested that we either revise Table 2-16 on page 2-41 of the Draft EIS to show that even under Alternative 7 approximately 76 percent of the POG remains or discuss this in the text.

Response: Low is a relative term. To some, harvesting 20 percent of the old growth is a very high amount, while to others it is very low. Table 2-16 in the Draft EIS summarizes the key components of each alternative with specific reference to the conservation strategy. The amount of POG remaining under each alternative is identified in Table 2-17 on the following page in the Draft EIS.

Comment: Concern was expressed that most—with some citing as much as 96 percent—of the old growth forest has been cut and argued that the remaining old growth should be protected.

Response: This is not correct. Over 90 percent of the old-growth forest that existed on the Tongass 100 years ago still remains. Even under Alternative 7, more than 75 percent would remain after another 100 years of harvest.

Young-Growth Timber

Comment: Support was expressed for the Tongass to transition to a second-growth (young-growth) timber program. Some felt that the alternatives did not adequately develop this concept and the Draft Plan did not display a plan for managing young growth. Some felt that only second growth forest should be cut.

Response: Additional analysis has been done for the Final EIS to examine the potential for a greater reliance on young-growth timber. In general, projections show young growth becoming a major component of timber harvest in about 30 years and being the majority of timber harvested in 60 years. The Final Proposed Forest Plan has been modified to place greater emphasis on moving in this direction more quickly. While there are opportunities to both improve wildlife habitat and produce timber by thinning young stands that have reached commercial size, it will take time for these stands to reach commercial size as most young forests on the Tongass are less than 50 years old.

Comment: Some comments stated that accelerated harvest of young stands may require changing national policy and Tongass regulations to allow stands of young trees to be cut before they reach the culmination of mean annual increment (CMAI) of growth.

Response: It does not appear that CMAI is a constraint to harvesting young-growth stands. The benchmark analysis conducted for this Forest Plan Amendment shows little effect by removing this constraint. Without thinning, stands can be regenerated as young as 70 years of age. They can be commercially thinned as early as 40 years. In any case, changing the National Forest Management Act to permit stands to be harvested before they reach 95 percent of CMAI would require an act of Congress and is beyond the scope of this analysis.

Comment: Some respondents strongly support converting to young-growth management but recognize that it will be many years before stands are old enough. They believe that the rotation age should be 90 years not 160 years for young-growth stands. They believe that providing additional volume may require relaxing standards and guidelines such as selective logging in the beach fringe more than 500 feet from the shore and in riparian areas

Response: Based on Spectrum modeling, the rotation age for young-growth stands on better sites could be 60 years without precommercial thinning and 70 years with precommercial thinning. If commercial thinning is also implemented, the regeneration period is delayed. This is because thinning of either kind reduces the number of trees per acre, which extends the growth period for the remaining trees, which also extends the time it takes for them to reach CMAI. The Forest is strongly considering thinning young stands in the beach buffer and in other areas set aside for wildlife, in order to improve wildlife habitat conditions in these dense stands. Trees cut in these stands in excess of down wood habitat needs would be available to mills (this would contribute to available wood supply but not to ASQ). As noted in the Draft EIS, young-growth stands generally have much higher volumes and lower defect than old-growth stands. We anticipate that the current ASQ could be met entirely from young-growth stands by the latter part of this century.

Comment: One respondent found "The age class information provided is confusing. What is apparent is that no second growth will be available for regeneration for at least 30 years. This makes it even more important to have a standard that prevents high-grading."
Response: The age class information presentation has been revised in the *Timber* section in the Final EIS and the discussion of young-growth management has also been expanded in the Final EIS. There are some stands that could be regenerated in this planning period, though not a great deal of volume would be generated. Concerns with respect to high grading are discussed in the preceding section.

Comment: Several comments expressed support for a 200-year rotation with thinning in Scenic Viewshed and Modified Landscape LUDs because this is the minimum time needed to produce a quality saw log.

Response: Generally, modeling indicates a rotation of approximately 170 years for Scenic Viewshed; however, it may be longer in some areas, depending on site quality and stand management. Areas in the far north of the Tongass may require longer rotation periods to reach commercial size.

Alaska Yellow-Cedar

Comment: One comment expressed concern about the reported loss of 500,000 acres of yellow-cedar on the Tongass, which the comment author believed might be the result of climate change. The comment states that this offers an opportunity to salvage log dead and dying yellow-cedar instead of continuing to log healthy trees.

Another comment stated that no more live cedar should be cut and there should be no more salvage of cedar until studies show that cutting these dead trees is "sound science." Another comment argued that the Tongass mismanages yellow cedar and does not take into account its present ecological troubles. This comment also requested that the Proposed Forest Plan include a special section devoted to the careful management of this species.

Response: The EIS recognizes that the decline and mortality of yellow-cedar is one of the most widespread and important forest health problems in Southeast Alaska (refer to the *Forest Health* section). This decline is associated with wet, poorly drained sites, and research suggests that reduced snow pack in low-elevation areas associated with a warming trend that started in the 1800s has exposed fine surface roots to freezing, which in turn kills trees. As the climate continues to warm, yellow-cedar decline is likely to continue to spread, especially in the south and east. Conversely, yellow-cedar appears to be spreading northward as climate warms, into areas that retain snow longer into the spring.

Salvage logging of yellow-cedar is permitted under the current and Proposed Forest Plans. Harvest of healthy yellow-cedar is also permitted and is expected to occur under all seven alternatives. Cedar has been studied for many years. We are not aware of any studies that show harvesting cedar is more or less problematic than harvesting spruce or hemlock.

Harvest-General

Comment: Many respondents stated their opposition to logging. Some were opposed to all logging, while others were specifically opposed to logging old-growth. Many mentioned wildlife habitat protection as the primary reason while others simply said they wanted to protect the Tongass.

Response: The alternatives feature different levels of potential harvest activity which would likely result in different configurations of a wood products industry in Southeast Alaska. All of the alternatives feature some level of logging to meet the requirements of TTRA to seek to meet market demand for timber. Alternative 1 proposes the least old-growth harvest (approximately 1,180 acres per year) and Alternative 7 the most (approximately 10,000 acres per year). The Final Proposed Forest Plan places greater emphasis on harvesting young growth but a complete transition from old growth to young growth is likely several decades away.

Comment - One comment suggested that we not use the word "harvest" when discussing timber management activities. The comment author argued that the word was part of a marketing campaign to make logging of old growth forest more appealing.

Response: Timber harvest is a broadly accepted term used in a wide range of academic and professional contexts, including forestry texts, research studies, and scientific articles. The term is used to describe all forms of logging, not just logging on old growth forests.

Comment: One comment noted that one of the great things about the Tongass is the natural regeneration that follows timber harvest. Others commented that logged areas are slow to grow back, and need to be thinned, some twice. Another comment stated that trees in Southeast Alaska don't reproduce as fast as trees in other areas and harvest levels need to reflect this.

Response: The spruce-hemlock forests of Southeast Alaska are among the most productive in the world according to Silvicultural Systems for Major Forest Types of the United States (USDA Forest Service, 1983). Most areas on the Tongass regenerate naturally and very little tree planting is necessary. Most young stands need to be thinned to improve growth. Regeneration is generally rapid on the Tongass, with tree growth generally faster in the south than in the north.

Comment: One comment stated that any restrictions on harvesting timber should be based on peer-reviewed science.

Response: Standards and guidelines for timber harvest are based on science and many years of experience managing timber harvest on the Tongass.

Spectrum Model Analysis

Comment: Some respondents felt that the Forest Service failed to identify the benchmarks it uses to determine the range of alternatives. They believe the Forest Service used the benchmarks from the 1997 Plan but did not explain how these were used and did not identify: 1) the costs and benefits associated with the minimum level of management needed; 2) the maximum physical and biological outputs of forest resources and the associated costs and benefits; and 3) the estimates of the PNV of forest resources with established market value.

Response: Benchmark analyses were conducted for the Final EIS to determine the minimum and maximum physical and biological outputs of forest resources, the maximum PNV of the forest resources and the influence of management constraints on outputs of forest resources. These analyses are included in the updated AMS included in the planning record. Accordingly, the desired biological outputs of the Alternatives are set at feasible levels as determined by the analysis. Information about costs and benefits is described in detail in Appendix B of the Tongass National Forest Land Management Plan Final EIS.

Comment: One comment questioned if all withdrawn lands were properly considered in determining suitable lands. As an example, they cited land adjacent to the West Chichagof-Yakobi Island Wilderness that was purchased and should have become part of the Wilderness. The comment author noted that both the 2003 SEIS map and the 2007 Draft EIS map show this area as semi-primitive recreation instead of Wilderness.

Response: The area cited in the comment is part of the Wilderness. The mapping error that identifies this area as semi-primitive recreation has been corrected in the Final EIS. This area was not included in the suitable land base, as maps of the suitable land in the planning record show. Also, as can be seen in the alternative maps included with the Draft EIS, this area was not shown as available for harvest in any of the alternatives.

Comment: One respondent had questions about how the timber was modeled. They wanted more information about how lands identified as suitable were stratified into categories with similar costs and returns; how the level identifiers reflect the costs and returns associated with the location of suitable timber in relation to mills, one of the factors possibly contributing to the 1997 FORPLAN's overestimate of ASQ; how the agency stratified lands in the Spectrum model; how slope stability was factored into any of the 5 analysis areas; how slope stability was considered in the "operability analysis"; and whether this "operability analysis" formed the basis for the operability in Spectrum.

The comment also stated that "slope stability should appear in Spectrum as a stratification layer not as a constraint because slope divides the land into categories with similar management costs

and returns. In addition, the comment stated that the "roaded classification stratification may provide stratification for costs associated with transportation. Please explain to what extent this stratification accounts for costs associated with access limited areas. Access-limited areas are difficult to log because although the timber is operable, the costs associated with accessing and transporting logs to a mill cannot be covered by the value of the timber."

Response: Five unique level identifiers were used to stratify the landscape into Spectrum analysis areas. Slope was not used explicitly as a level identifier; rather it was considered in no fewer than three of the Spectrum modeling processes. First, lands with slopes greater than 72 percent were classified as having "extreme hazard soils" and were removed from the suitable land base (and the model) during the suitability analysis (Appendix A-3). Secondly, the logging systems and transportation analysis (LSTA) that was used to derive the operability level identifier considered slope indirectly through the road building necessary to access a stand. If an area could not be accessed by building a road (due to slopes or other factors), those analysis areas were assumed to require helicopter or cable logging at a higher cost. Finally, the Regulation Class of an analysis area is partially-derived from the slope-driven Visual Absorption Capacity (VAC) classification of the land. Regulation classes with lower VAC have more management restrictions and higher costs. We are confident that cost differences due to slope have been adequately captured in the stratification scheme and suitability analysis of the landscape.

Distances to mills and appropriate transportation costs are accounted for with the VCU level identifier. Analysis areas in VCUs farther from a mill will incur a higher transportation cost. See Appendix B for more information.

Comment: One comment questioned what legal authority allows the Forest Service to build roads with public funds in order to make sales sellable and wanted the EIS to explain: the total projected "pre-roading" and the locations of these needed roads and their purposes; what these purposes are and in what roads analysis this need is documented in; how the contract and management costs were included in Spectrum as direct costs against revenues; and requested that the Forest Service itemize contract management costs incurred for roads built since 2002.

Response: Funds for road building have been "earmarked" in annual appropriations enacted into law. The underlying authority to build roads for National Forest purposes is at 23 United States Code (USC) 205.

Pre-roading is a process whereby roads are constructed into a NEPA cleared project area prior to and separate from a timber sale or other resource activity. The intent of pre-roading is to develop or expand the transportation network without requiring one resource to carry the entire burden of road construction costs. Pre-roading is an administrative decision that requires funding from Congress and is subject to the same environmental laws and regulations (NEPA, NFMA, etc.) as other Federal actions. This practice is best addressed at the project level and is outside the scope of this programmatic EIS. Road contract and management costs have not been included in Spectrum as direct costs against revenues

The Forest Service does not track specific contract management costs on road construction. For budgeting purposes there is an estimated cost of about 10 percent of contract costs for administration of the contracts. Contract administration costs can vary depending on a number of factors, including but not limited to contract size, scope, technical complexity, and logistics.

Comment: One comment asked: "Where is the standard or guideline in the Plan that prevents high grading? Constraining this was clearly modeled in Spectrum but without a companion standard in the Forest Plan, what would prevent this from occurring. If it is the NIC 1 and NIC 2 requirement, is this a standard or a guideline? We are not aware of any language in Section 301 of TTRA that constrains or prevents this. If it is in the Forest Service Handbook (FSH 2409.18), which section prevents this? If it does, we do not consider Forest Service Handbook language a

sufficient protection from high grading considering that the Forest Service can change the handbook without public oversight or input."

Another comment expressed concern that the most valuable logs on the Tongass are being exported without primary processing because it is more profitable to export raw logs than to process them in Southeast Alaska. The comment noted that although cedar only comprises a small share of commercial forestland on the Tongass, it is the most highly valued species, and appears to be driving many Tongass timber projects. Another comment expressed the same concern and noted that the industry has been unable to find a market for anything other than the highest quality saw timber.

Response: The Multiple-Use Sustained-Yield Act requires the Forest Service to manage NFS lands in a sustainable manner. This direction is reflected in the goals and the desired condition for the Timber Production LUD on page 3-127 of the Proposed Forest Plan. Cedar occurs as a minor tree species in most stands. The comment that cedar is driving many Tongass timber sale projects is not supported by historical data.

Comment: One respondent asked how exactly was each constraint defined in Spectrum and were they defined and used in the same way for each alternative?

Response: Constraints, or limitations on management activities to motivate the model to achieve desired conditions, are complex in definition, function and application. Appendix B has been updated to more clearly address these questions. In general, constraints can be classified into four categories:

Stand-level exogenous constraints: These constraints are applied before the Spectrum model is built. They are generally applied by evaluating the entire suite of potential management prescriptions available to a stand and only giving the model a choice between those prescriptions that may make the most sense to apply on the ground. These are derived by the forest silviculturist and other specialists.

Stand-level endogenous constraints: These are typically accounting constraints applied to each stand to ensure that all acres are assigned a management prescription and that no more than the available acres of a stand get assigned to a management prescription. These are part of a standard model formulation.

Forest-level exogenous constraints: The suitability analysis used to identify potentially-manageable acres is an example of this type of constraint; typically a National Forest is not able to manage all acres within the Forest, and unsuitable acres on the Tongass were not included in the Spectrum model.

Forest-level endogenous constraints: Generally, the forest-level endogenous constraints are the ones generically referred to as "Spectrum constraints" or simply "constraints". They are often the most dynamic of the four constraint types, as the other three are usually static by the time the Spectrum model is run. Each Alternative used a unique set of forest-level endogenous constraints, although there were some that were standard and did not need to be modified between alternatives. Appendix B describes these constraints in more detail and how constraints were applied to the different alternatives.

Comment: **One respondent observed that the Spectrum model has an objective function that attempts to maximize present net worth and the present net worth of harvests is embodied in a single coefficient: Dij. They asked that we explain in detail how the grouping of analysis areas affects the value of Dij and how these coefficients were calculated.**

Response: Dij is the discounted objective function coefficient for stand "i" management regime "j" to represent the PNV of that management option. A management regime includes the management prescription associated with the stand as it exists today, as well as any and all prescriptions associated with stands regenerated in the future. Generalizing the landscape into the analysis areas is a standard part of the modeling process necessary to produce a model that can be solved in a reasonable manner.

Calculation of Dij is a standard part of the Spectrum model to account for the appropriate revenues and costs associated with each management option. Appendix B has been updated to better explain the PNV calculation and objective functions used in the model solution process.

Comment: One comment stated that "there is no information on how the management prescriptions were mapped for each alternative, nor on the exact methodology, rules, and sideboards that would allow for replication of the process with a common outcome. Please explain how the management boundaries were determined under each alternative."

Response: Table II-16, page 2-41 and the individual alternative descriptions in Chapter 2 of the Final EIS show that all the alternatives, except Alternative 2, were based on previously developed alternatives in prior analyses.

Comment: One respondent stated: "The requirements of 36 CFR 219.14(c) were not met. Lands that are not cost-efficient should not be suitable. Although Congress decided the Forest Service need not consider economic factors in identifying lands not suitable for timber production, this does not relieve the Forest Service of disclosing the costs and benefits associated with including uneconomical suitable lands in the timber base. The law does not exempt the agency from managing the Tongass on a cost-efficient basis. The Forest Service must disclose the results of the (corrected) Spectrum analysis as it pertains to cost-efficiency. There are three classes of land: 1) lands where agency revenue exceeds agency costs; 2) lands where agency costs exceed agency revenue; and 3) lands where logger costs exceed revenues to the logger. Modeling pond log values has obscured all of the above."

Response: The respondent's assertion that the requirements of 26 CFR 219.14(c) were not met is incorrect. The Spectrum model is designed to evaluate a management strategy for cost efficiency. This is most commonly addressed by an objective function that maximizes the cumulative PNV of all potential management prescriptions on all potentially suitable lands, with the requirement that the desired conditions of the forest are met (36 CFR 219.3 "*Cost efficiency*"). This is exactly the formulation used by the Tongass. One of the many desired conditions of the 2007 Tongass plan is to meet and maintain a timber demand level consistent with the Alternative being analyzed. In doing so, it may be necessary to employ management strategies on some lands where costs of the management activity are greater than the benefits realized for the timber under current market conditions. However, since the alternatives were evaluated using a linear programming optimization model (Spectrum) with an objective function to maximize PNV, the most cost-efficient management scenario is identified for each alternative in accordance with 36 CFR 219.14(c)(3).

The costs and benefits associated with each management prescription identified in the Spectrum model solution, while voluminous, are included in the planning record. Stumpage value varies according to logging system, distance from the mill, road building requirements, quality of the timber, etc. Recognizing all of the potential logger-incurred costs against the pond log value allows for site-specific stumpage values to be calculated internally by the Spectrum model in much more detail than a forest-wide externally-derived stumpage value. Factors contributing to the stumpage value in the model include the positive pond log value (adjusted downward to exclude logger profit and risk) less the logging cost, road building and reconstruction costs, felling and bucking costs, camp/commute costs, Log Transfer Facility costs, and timber hauling costs (raft, barge and/or road). Agency-incurred costs that are evaluated by the Spectrum model but do not contribute to stumpage include sale preparation and administration, precommercial thinning, and planting costs. Agency-incurred costs are included as a part of the cost-efficiency analysis outlined in 36 CFR 219.14(b). See Appendix B for further information on this calculation.

The comment author requested and has been provided with all of the information necessary to calculate stumpage value for any Analysis Area of interest. This information is sufficient to allow the comment author to identify the three classes of land they note in the comment.

Comment: One respondent asked that the Forest develop a map of lands not suitable for timber production to help implementers make sure they are not proposing timber sales in these areas.

Response: Maps of suitable acres for each alternative are included in the planning record. Suitable areas are mapped in a geographic information system (GIS). Lands not identified as "suitable" are considered to be not suitable for the purposes of timber sale planning. Further, field work is conducted as part of each timber sale planning process to determine if the map of the suitable lands in the project area is correct. There are generally features which cannot be detected without a field exam.

Comment: One comment noted that two aspects of MIRF were not accounted for in the Spectrum analysis: the habitat conservation areas (large, medium, and small), which blocks access to timber areas, and the legacy standard which requires that 10 to 30 percent of the timber in all units be left. As a result, the comment suggests that the modeling constraints significantly under estimate the adverse effects of these standards and guidelines.

Response: We believe that the Spectrum model adequately accounts for these factors. See Appendix B to the Final EIS for more information on modeling.

Comment: One comment stated that short-distance helicopter yarding should not be included in the NIC I. They believe that the definition of NIC 1 has been redefined from the 1997 Plan. There are no documents to the comment author's knowledge that "demonstrate that this "new" normal operability category would be economic under most market conditions." As a result, NIC I may have little relevance to an economic timber supply and the comment author states that Appendix B in the Draft EIS needs to be updated to fully describe the modeling process.

Response: This is not a change. NIC I under the current (1997) plan includes short span helicopter (see page 3-280 of the 1997 Final EIS). Appendix B has been revised for this Final EIS to address this and a number of other comments raised during the public comment period on the Draft EIS.

Comment: Analysis of bid price paid for sales of varying sizes from October 1, 2004 to December 31, 2005 showed a range of prices between $13.45 and $85.34 per MBF. This is in sharp contrast to the average pond log value used in Spectrum analysis of $273 per MBF. How was the timber sale revenue estimate ($11.69/MBF) used in the economic efficiency analysis estimated and was this figure used in the Spectrum analysis.

Response: To clarify, the Tongass recognized several unique pond log values in its economic analysis; for old growth this consisted of a value for each of three volume strata in each of the five geographic zones, or 15 unique values. Young growth values vary by the age at which they are harvested. However, as the respondent has pointed out, the actual bid price (stumpage value) of a timber sale has a great deal of variability associated with it. We contend that this variability is directly correlated with the costs associated with the timber removal, i.e., the logging system used, transportation requirements to get it to the mill, etc. Thus, stumpage value is an inherent calculation done by the Spectrum model to generate a unique value for each distinct geographic unit (Analysis Area). For the Final EIS, we have included a more detailed economic analysis for timber value in Appendix B Table B-2.

The $11.69/MBF average stumpage value used in the Draft EIS represents the forest-wide average price paid for timber sales in 2005/2006. This value does not consider the site-specific variability in stumpage values calculated by the Spectrum model and was not used in the Spectrum model analysis. It should be noted that the economic efficiency analysis has been updated in the Final EIS.

Comment: One comment summarized sales data from October 2004 to December 2005 and concluded that the average bid price per MBF was higher for micro sales and small sales, then for

relatively large sales. This, the comment noted, suggests that one of the alternatives in the EIS should have focused on microsales, rather than large sales. "Unfortunately," they note "none of the alternatives in the Draft EIS appear to be based on benchmark analyses that evaluate the option of shifting management resources away from large sales to micro and small sales."

Response: The seven alternatives evaluated in the Final EIS offer a broad range of potential responses to future timber demand. These alternatives do not specify the size of the sales that would be offered under each alternative. The Forest Service would continue to offer small and micro sales under all of the alternatives.

The benchmark analyses conducted show the difference in values between geographic areas, logging systems, stocking levels, maximum management size, and distances to nearest processing facilities. This is consistent with the planning rule that requires landscape stratification by factors that influence economic efficiency. Updated benchmark analyses were conducted according to this stratification.

Comment: One comment asked for more detail concerning the timber policy constraint used in the Spectrum model to ensure that all timber harvest meets sustained yield requirements. The comment asked that we explain the following:

"1. which specific constraints were applied for each alternative and in what sequence;
2. whether planners conducted a Spectrum run that does not maximize timber harvest in the first decade before maximizing present net value;
3. whether planners ask Spectrum to maximize present net value subject to the requirement that it cut the volume of timber in the above run;
4. what discount rate was applied to maximize the present net value run; and
5. whether planners used nondeclining net revenue constraints in any model runs."

Response: Regarding the constraints applied to each alternative, Appendix B has been updated to include more description as well as a table describing which constraints were applied to each Alternative. The nature of the Spectrum model allows for all constraints to be included simultaneously; there is no hierarchical order of importance assigned to the different constraints.

Regarding the timber harvest level in the first decade, the model is constrained to meet a harvest level consistent with the design of the alternative. These levels were derived independently of the maximum potential Decade 1 harvest level, save that to insure the ability to implement the plan, the level must be less than the maximum.

The model scenarios evaluated for each alternative found the maximum PNV of the alternative under the appropriate constraints, including the appropriate timber harvest level, of each Alternative.

The model used a 4 percent annual discount rate.

There is no constraint to consider non-declining revenues from decade to decade. See Appendix B "Solution Process" for more information on the Spectrum model formulation.

Comment: One comment noted that Appendix B in the Draft EIS indicates that the Spectrum analysis did not assign a value for utility logs under Alternatives 1, 2, 3, 5, and 6, but assigned utility logs a positive value under Alternatives 4 and 7 based on the assumption that there would be a market for these logs (MDF, Bioenergy, or similar facilities). Alternatives 3, 5, and 6 should also assign a positive value to utility logs because they assume there would be enough volume to operate a veneer mill. The decision to give no value to utility logs under certain alternatives also ignores the new Region 10 transshipment policy.

Response: For the Final EIS, a utility pond log value of $72 per thousand board foot volume was recognized for Alternatives 4, 5, 6, and 7. This price was based on an analysis of recent prices (see Appendix B for source information). However, we recognize that this positive revenue will rarely, if ever, outweigh the costs associated with its removal from the stand and transportation to the mill. The recently enacted Limited Interstate Shipment Policy (March 2007) allows limited interstate shipment (to the lower 48 U.S. states) of unprocessed Sitka spruce and western hemlock. This could provide a market for small diameter and low-grade material in the future under all alternatives, but the value this would add to utility logs is currently unknown. However, viewed in terms of the Spectrum analyses, utility wood value is not likely to have a large impact on the amount or timber produced or the management schedule of any Alternative.

Comment: One comment stated that the costs described in the Draft EIS Appendix B and used in the Spectrum analysis do not appear to correlate with the costs used to compare the alternatives in the economic efficiency analysis (Table 3.22-29, page 3-460).

Response: Appendix B shows two different types of costs used in Spectrum modeling; those incurred by the timber buyer and those incurred by the Forest Service. Costs incurred by the timber buyer are counted against the pond log value to determine actual stumpage value (see Final EIS Appendix B for further information on this calculation). Stumpage value calculated in the model as a function of pond log value less cost incurred by the timber buyer approximately corresponds to the historic stumpage value shown in Table 3.22-29 of the Draft EIS. The two analyses are discrete in that Spectrum uses stumpage values specific to each land area and Table 3.22-29 shows the historic average stumpage [base rate in the Final EIS] of sold wood. The analyses are similar in that ultimately they both evaluate each Alternative's anticipated revenues to the Forest Service.

Agency-incurred costs are included in the Spectrum model to determine the overall economic value of the harvest schedule associated with each Alternative. Agency-incurred costs in the model and described in Appendix B correspond to the agency-incurred costs shown in Table 3.22-29.

Comment: One comment stated that it is unclear from the documentation exactly what figures were included as revenues in Spectrum. The comment asked the following questions: Were any non-timber benefits modeled in Spectrum? Were any non-timber benefits modeled in Spectrum in determining the suitable land base and the PNV of harvest? If this occurred in either case, please explain why and what those figures were (dollar amounts).

Response: Pond log values that varied by volume class and geographic zone were the only monetary revenues modeled in Spectrum. These values are further described in the "Activities and Outputs" section of Appendix B. Only the costs and benefits described in Appendix B were used to determine the PNV of the Alternatives and Benchmarks analyzed with the Spectrum model. Pond log values were the only revenues used in the "Stage II Suitability Analysis" described in Appendix B.

Comment: One comment stated that mitigation measures to not seem to have been accounted for in the cost calculations and made the following points. The cost of mitigation activities needs to be accounted for in determining timber suitability. If the Forest Service must complete required mitigation measures then these costs should be reflected in either the stratification of analysis units according to a range of conditions or in a range of stumpage prices by mitigation requirements. The cost is especially tied to factors such as slope, proximity to streams, proximity to cultural resources, proximity to threatened and endangered plant and animal habitat, all of which can be stratified. As the mitigation costs are not the same on all sales some grouping of mitigation costs by harvest type or ecological condition or habitat location should be calculated.

Response: Appendix B describes two processes that were used to incorporate the effect of mitigation measures for each alternative. The "Regulation Class Process" describes how Scenic Integrity Objectives, Visual Absorption Capacity, Distance Zone, and LUD were used to identify lands that required varying levels of mitigation for scenery and other considerations. Regulation classes with more harvest restrictions generally have higher harvesting costs.

Secondly, the "Model Implementation Reduction Factors (MIRF)" section describes how the impacts of stream buffers, slope and soil hazards, wildlife concerns, and other factors were considered in the model. MIRF were applied to a stratification by Administration area, volume class, and harvest system.

Timber Sale Economics

Comment: A number of comments supported Alternative 7 with some modifications. They felt that some of the Conservation Strategy Standards and Guidelines lacked a basis in science and should be removed from Alternative 7. These standards and guidelines include: the 1,000-foot beach buffer, OGRs, Class III stream buffers, the Legacy standard, and the Goshawk and Marten standards. Many of these comments argued that these measures are the main reasons that the Tongass has been unable to offer economic timber sales.

Response: These recommendations were considered and evaluated as part of Alternative 7. These measures are all important components of the Forest's conservation strategy, which is an integral part of meeting our multiple use objectives and the legal requirement that we maintain viable wildlife populations. The wildlife assessments completed for the current Forest Plan found that alternatives that did not provide a comprehensive conservation strategy had a higher risk of not maintaining viable populations of some wildlife species. The U.S. Fish and Wildlife Service has indicated that the conservation strategy adopted under the 1997 Plan was a major factor in not listing the Queen Charlotte goshawk as threatened under the ESA. See Appendix D of the Final EIS for more information about the scientific rationale behind the conservation strategy.

Alternative 7 as proposed in the Draft EIS did not have these standards and guidelines except for the Class III riparian standard (see, for example, Table 2-16, page 2-41). Alternative 7 has been modified in the Final EIS and it no longer includes buffers on Class III streams.

Comment: One respondent believed that Forest Service sale design should maximize production while protecting the resources that need protection.

Response: Forest Service timber sale design is intended to meet market demand in an economically efficient manner, while protecting other resources.

Comment: One respondent felt that the timber market is cyclical so sales should be designed so that they are operable in all markets.

Response: This may not always be possible, given the high cost of operation in an island archipelago, spikes in fuel costs, and the location of the Tongass in relation to markets. One of the Proposed Forest Plan's stated goals (page 2-5) is to provide timber in an economically efficient manner.

Comment: A number of respondents stated that logging should not be subsidized with taxpayer dollars. Others stated that subsidies should be factored into the economic analysis of the alternatives. Conversely, one comment stated that subsidized logging was needed to revitalize Alaska's economy.

Response: The issue of whether or not the federal government is subsidizing the timber industry is beyond the scope of this analysis. During low market conditions the cost of planning, preparing and administering timber sales are often higher than the value paid for the timber. This is factored into the economic efficiency analysis presented in the *Economic and Social Environment* section of the EIS. One of the Forest Service's objectives for the Tongass National Forest under TTRA is to promote community stability by seeking to provide a stable supply of timber that meets annual market demand.

Comment: Some respondents felt that timber sales must be economic or it defeats the purpose of offering them. They argue that planning teams should include people with experience in planning economic sales. Some requested that a standard requiring sales to be economic be added to the Proposed Forest Plan. Not having economic sales has lead to the Forest not achieving the ASQ. Others felt that costs would always be too high to compete with other regions.

Response: We agree that timber sale expertise is important. The Forest Service is already prohibited from offering deficit timber sales. The high cost of doing business in Alaska as well as current market conditions contribute to the economics of timber sales. The Tongass will continue to work to make timber sales as economic as possible while protecting other resources. But it is not our responsibility alone. Industry needs to find new markets, develop value-added products, and become more efficient to reduce costs and improve profits.

Comment: Concerns were expressed about the difficulty of having economic harvest units in Scenic Viewshed and Modified Landscape LUDs where partial cutting is often required.

Response: The bulk of the timber harvest under all the alternatives comes from areas classified as Timber Production; these are areas that allow more intensive timber harvest, while still protecting other resources, such as fish and water quality through stream buffers and other standards and guidelines. The proposed Plan Amendment updates the Seen Area analysis and Visual Priority Routes and Use Areas as a step in this process (see Appendix F of the Final Proposed Forest Plan). While we want to foster more economic timber sales we also recognize the importance of maintaining our outstanding visual resources.

Comment: Several comments made the following general argument. The overall goal of the Tongass timber program should be to transition to second-growth timber. Full transition will take at least 50 years and in the interim the Forest Service needs to provide a sufficient, predictable supply of old-growth timber that will sustain the existing industry and have the flexibility to increase this supply if the industry were to expand. This harvest should be concentrated in intensively managed areas and standards and guidelines should be relaxed in these areas to improve timber sale economics, in exchange for more stringent guidelines applied elsewhere.

Response: The Forest Service supports the overall goal to transition to second-growth (young-growth) timber harvest over time; however, it will be decades before there are enough young stands to provide a sufficient timber supply to meet market demand in accordance with TTRA. Table 3.13-9 in the *Timber* section identifies the projected acres by harvest approach (even-aged, two-aged, uneven-aged) for each alternative. All seven proposed alternatives employ a combination of harvest approaches with projected harvest levels more concentrated in some areas than others.

None of the alternatives propose that standards and guidelines be "relaxed" in harvest areas in exchange for "more stringent guidelines" applied elsewhere. Alternative 7 does, however, exclude or relax the components of the conservation strategy—the 1,000-foot beach buffer, the Goshawk and Marten Standards and Guidelines, the 100-foot buffer on Class III streams, and the small, medium and large OGRs—that the timber industry argues result in uneconomic sales.

Comment: One comment stated that some State forests and all private forests can be managed for positive economic returns and argued that the Forest Service should also be able to move in that direction. Another comment stated that the Forest Service should avoid scheduling sales in areas that are uneconomic to harvest.

Response: NFS lands are governed by different laws than state and private forests and this affects the relative costs of harvesting timber. The Forest Service will continue to work to make timber sales as economic as possible while protecting other resources.

Comment: Several comments requested that the Forest Service set aside funds from timber harvest for post harvest treatments and studies.

Response: This program already exists. It is authorized by the Knutzen-Vandenberg Act. The Forest Service may "require any purchaser of National Forest timber to make deposits of money, in addition to the payments for the timber, to cover the cost to the United States of (1) planting...removing undesirable trees or other growth...improving the future productivity of the renewable resources of the forest..." Sale receipts in excess of base rates can be used for this program.

Comment: Some respondents requested that the Forest Service not allow round log exports. Concern was expressed about utility log exports and the recent decision to allow the export of low-grade and smaller logs. This, they argue, creates jobs and encourages investment in other states and countries not Alaska. Concern was also expressed that the Draft EIS and market demand analysis fails to take these log exports into account. One comment was also concerned that no NEPA analysis was prepared for this policy change.

Response: Export of logs is a policy decision and beyond the scope of this analysis. Issues surrounding NEPA for other projects and policy decisions are also beyond the scope of this project.

The limited interstate shipment policy referenced in this comment is not addressed in the Draft EIS because it was not approved until March 14, 2007, more then two months after the Draft EIS was published. The potential implications of this policy are discussed in a number of locations in the *Economic and Social Environment* section of the Final EIS.

People often use the term "export" to refer to the interstate shipment of logs, that is, shipment to other parts of the U.S. The shipment of these logs to other states directly supports employment in the logging and transportation sectors in Southeast Alaska. It also provides a market for low grade logs that currently are often left in the woods because there is no economical processing facility for this material in Southeast Alaska. The new policy, therefore, has the potential to indirectly support logging and sawmill employment because it improves timber sale economics and may allow sales to go forward that would otherwise not be profitable.

Comment: The Morse Report (2000) states cedar will be processed locally because the Seley Corp has a mill designed to process cedar but the Draft EIS says it will be exported.

Response: The text in the *Economic and Social Environment* section of the Final EIS has been revised to clarify that there are some local facilities that are able to process limited amounts of cedar.

Timber Supply

Comment: One comment stated that page 2-23 of the Draft EIS over estimates the amount of harvest from state and private lands under Alternative 4. The same comment author later states that the Brackley et al. (2006a) estimate of 6.8 MMBF per year from state and private lands seems reasonable, with no increase in available timber from state and private lands likely in the future.

Response: The only reference to state and private harvest on page 2-23 of the Draft EIS, or elsewhere in the referenced section, is the statement that "private and state lands also contribute to satisfying market demand". The amount is not quantified. The Brackley et al. estimate of 6.8 MMBF is referenced in the Draft and Final EIS documents. It may be noted that this estimate applies only to state lands and does not include projected future harvest on private lands in Southeast Alaska.

The analysis presented in the Draft and Final EIS documents evaluates how well the NIC I component of the ASQ available under each alternative would meet various demand-related benchmarks. This analysis focuses on Tongass timber, which is assumed for the purposes of analysis to be the only source of timber in the region.

Comment: A number of comments requested that the Forest Service provide sufficient economic timber to supply an integrated timber industry, which would support local employment and contribute to the regional economy. Some comments stressed the need for local mills that could process low-quality logs so they would not need to be exported.

Response: The EIS evaluates a range of alternatives. Alternatives 3 through 7 would provide sufficient volume to supply an integrated timber industry based on the demand projections developed by Brackley et al. (2006a). Alternatives 3, 5, and 6 would provide sufficient volume to support a Medium Integrated Industry (Brackley et al.'s Scenario 3). Alternatives 4 and 7 would provide sufficient volume to support a High Integrated Industry (Scenario 4). Timber demand is evaluated in detail in the *Economic and Social Environment* section of the Draft and Final EIS documents. Both the Medium and High integrated industry scenarios require some form of demand stimulus that would create demand for lower grade logs. Brackley et al. suggested that this might take the form of a medium density fiberboard (MDF) plant or a biomass facility established in the region.

Comment: One comment stated that development of an integrated industry would require an integrated land management policy across state, federal, trust, and private lands. The comment author offered a series of recommendations that included placing an emphasis on the most value and family wage jobs per board foot for the least volume harvested, providing incentives for local mills through tax breaks, and restricting the export of unprocessed logs, among others.

The same comment author pointed out that imported wood is used for many projects in Alaska and wanted the state to fund a state log grading agency. The comment also noted that more investment is needed to develop the local wood manufacturing industry.

Response: While the Forest coordinates management with other land owners where possible, state and private land managers often have different goals. The State of Alaska is a Cooperating Agency in this analysis effort. Although the Forest Service supports the restoration of an integrated timber industry, developing incentives and tax breaks is beyond the scope of this analysis, as is the log export policy for non-NFS landowners. Funding for state agencies is also beyond the scope of this analysis.

Alternatives 3, 4, 5, 6 and 7 are designed to provide a stable timber supply that would be sufficient to support a Medium or High integrated industry. This is discussed further in the *Economic and Social Environment* section of the EIS. The Forest Service also supports a number of initiatives and pilot programs, including the non-profit Ketchikan Wood Technology Center.

Comment: One comment suggested that the timber industry should be responsible for providing their own timber (such as fast-growing eucalyptus for pulp and bamboo) and the Forest Service should provide an incentive for this transition by charging high prices for any timber it does supply. Another comment suggested other plants or recycled material be used.

Response: The Forest Service has no control over what is grown on private lands. It may, however, be noted that neither eucalyptus nor bamboo are native to Southeast Alaska. The Tongass is required to seek to meet market demand under TTRA. Timber sales designed to meet this demand are offered using a competitive bid process, with prices determined by the interaction of supply and demand. In general, it seems reasonable to assume that recycled materials have the potential to replace some products that currently come from new lumber.

Comment: One comment pointed out that the Ketchikan Veneer Mill recently completed a successful test run of their equipment using local logs and project that the facility will initially need 2.1 MMBF of veneer-quality logs per month to operate, with this amount increasing to 3.65 MMBF per month after six months. The comment author notes that a commitment from the Forest Service is required before operations can proceed further.

Response: The Forest's goal is seek to meet the market demand for timber as required by TTRA. The projected demand identified in this comment would result in annual demand of 43.8 MMBF, approximately 13.8 MMBF higher than the installed production capacity estimated for this facility by the Juneau Economic Development Council (2007). The timber demand analysis subsection in the *Economic and Social Environment* section of the Final EIS evaluates the ability of the proposed alternatives to meet projected demand based on the PNW study (Brackley et al. 2006a) and a series of other measures, including installed capacity.

Comments: Many comments expressed support for local mills that either produce value added products or products required to serve local markets. Comments recommended that the Tongass provide enough wood to support value added mills. A number of comments stated that timber sales should be designed for small operators and spread across the forest to accommodate local operators without impacting other existing public uses. One comment expressed support for the Forest Service's recent decision to offer sales targeted at small operators.

Response: The Forest Service seeks to provide wood for mills that produce value added products and/or serve local markets as part of its requirement under TTRA to seek to meet the demand for Tongass wood. Many comments express support for some form of value added industry, but do not clearly define what they mean by value-added. The larger existing mills on the Tongass, which are not very large by most standards, produce value added products and support local employment. The demand associated with these mills is also part of the market demand that the Tongass must seek to meet under TTRA. The Final EIS identifies potential market demand for the planning cycle and identifies areas of the forest that need to be withdrawn from commercial timber production in order to protect wildlife and other resources.

The alternatives feature different levels of potential harvest activity that would likely be associated with different configurations of a wood products industry in Southeast Alaska. Projected harvest levels evaluated in the Final EIS range from 49 MMBF under Alternative 1 to 421 MMBF under Alternative 7 in the first decade following implementation.

Comment: One comment asked for specific information in the Final EIS on how each alternative would affect small mills in the Thorne Bay area.

Response: It is difficult to predict how any specific small mill would be affected by an alternative, beyond assuming that if demand is met then there will be enough wood to support small mills as well as larger mills. However, wood is sold through a competitive bidding process and there is no guarantee that a specific mill will succeed in meeting its needs in a competitive market.

Allowable Sale Quantity

Comment: One comment stated that: "if it is true that the lack of shelf stock is keeping industry from expanding then the agency has the authority to create additional shelf stock without raising ASQ. ASQ constricts the sale of timber not preparation of sales. If demand does increase, the agency can raise ASQ. Right now there is no reason to do so."

Response: While it is true that merely planning timber sales does not affect the ASQ, shelf stock that could not be sold without violating the ASQ would be of limited value. The Final EIS evaluates seven alternatives in detail. Three of those alternatives have a lower ASQ than the current plan, two are the same as the current plan, and two are higher.

Comment: Some respondents felt that the current ASQ seemed sufficient, but noted that the Forest Service should remain flexible in case demand rises.

Response: The Forest Service reviews demand on a regular basis and can amend or revise the Forest Plan as needed to meet its obligations under TTRA.

Comment: Some respondents believe that the Forest Service should act quickly to make timber available and to add timber to the "pipeline".

Response: The provision of timber is a priority under the current plan and would continue to be so under the amended Forest Plan at levels determined in the new plan and as funding and personnel allow.

Comment: Several comments stated that the ASQ is too high under the higher volume alternatives because: "Brackley et al.'s timber demand projections were used to model harvest and determine the ASQ."

One comment stated that TTRA requires the Forest Service to seek to provide "<u>a</u> supply of timber" (singular) that meets "<u>the</u> market demand" (singular) for timber from the Tongass (emphasis added in the comment), not the multiple demand amounts evaluated in the Draft EIS.

Response: The demand levels used to help develop a range of alternatives were developed by specialists at the PNW Research Station (Brackley et al. 2006a) and represent the only peer-reviewed demand estimate available. Specific concerns identified with respect to the Brackley et al. study are discussed in the *Economic and Social Environment* section of this Comments and Responses volume, under Timber Demand. Additional information on the Brackley et al. analysis is provided in an addendum report that addresses questions and concerns raised with respect to the original analysis (Brackley and Haynes, in press).

The Forest Service considered the Brackley et al. analysis and other studies of timber demand to create a broad range of alternatives. Implementation of the selected alternative will provide one supply of timber that will meet the market demand for timber from the forest in accordance with TTRA.

Comment: One comment asked for a 10 year timber sale schedule and stated that the National Forest Management Act and its implementing regulations require the Forest to publish a 10-year harvest schedule. Another comment requested that the Forest Service prepare a detailed timber harvest schedule to ramp up to the timber under contract level of 1,080 MMBF (3 years worth of timber at 360 MMBF per year).

Response: The requirement to identify a "planned timber sale program" in NFMA Section 1604(f)(2) is accomplished by the information provided in the Final EIS which displays the projected ASQ volume by Forest Plan alternative. The requirement does not mandate a compilation of individual proposed actions. The Forest Service currently prepares 5 year sale schedules to implement the Forest Plan and will continue to do so as part of the implementation process under the amended Forest Plan. The Forest Service would like to increase the volume under contract and the shelf volume (prepared but unsold sales) to help provide more stability to the timber industry. The amount of new volume to be offered to meet the Forest's general goal of having 2 to 3 years of unharvested timber under contract will depend on the selected alternative.

Comment: One comment stated that: "The Draft EIS states that it is unlikely that all acres modeled and scheduled for harvest will actually be cut. This is likely to be true as long as the federal bureaucracy controls the timber supply. This is another reason to keep the ASQ high."

Another comment stated that lawsuits by environmental groups have tied up the "few economically viable timber sales" offered on the Tongass in recent years actively leading to the "current situation." This comment argues that the Tongass should plan to offer sale volumes in excess of market demand—the comment author suggests twice the market demand volume may be necessary—to ensure that sufficient volume "make(s) it past the environmental appeals process and to the market."

Response: When crews review the areas scheduled for harvest by the model, they are likely to find some areas do not have sufficient volume to be considered commercial forest land, some areas will prove too costly to road or too uneconomic to log. This is likely to be the case regardless of who manages the land. In addition, because of the protections needed to maintain habitat for wildlife and protect viewsheds that are important to the tourist industry, additional falldown in harvest volume is anticipated and built into the model.

The ability of the alternatives to meet potential demand is assessed against a series of measures in the *Economic and Social Environment* section of the Draft and Final EIS documents. These measures include the four scenarios identified in the projections developed by Brackley et al. (2006a), current production levels, installed and active production capacity, and the minimum estimated volumes required to support various processing facilities. The comparison between the four scenarios presented in Brackley et al. and the alternatives is based on the total ASQ volume. The comparisons between the alternatives and the other measures are based on the NIC I component only, which includes lands that can be harvested with normal logging systems.

The Forest Service hopes that regional stakeholders can reach consensus and avoid lawsuits in the future and supports the efforts such as the Tongass Futures Roundtable.

Comment: Concern was expressed that the ASQ is a very poor indicator of how well each alternative would supply timber to the local industry. Actual production is historically well below the established ASQ.

Response: It is true that ASQ is a ceiling and not a guarantee of actual production. But it remains a viable measure of the potential of each alternative to supply timber to local markets. The actual amount of timber that might be sold and harvested in each alternative is always speculative as it is dependent upon numerous factors such as timber demand, volume under contract, lumber prices, Forest Service budgets and appeals and litigation.

Comment: Several comments stated that the Spectrum model analysis overstates the likely economic sale volume by more than 30 percent. This has two effects on the analyses presented in the Draft EIS. First, the ASQ volumes overestimate the amount of economic timber that would be available under each alternative. Second, this overstatement results in an overestimate of potential environmental impacts in all cases where the ASQ is used as part of the analysis. The ability of the alternatives to meet the four demand scenarios identified in Brackley et al. (2006a) and the potential environmental impacts of the alternatives should be assessed using a new category, the "Programmed Sale Quantity" (PSQ), which should be based on less than 70 percent of the ASQ.

Response: As stated in a number of locations in the Draft and Final EIS documents, the ASQ is a ceiling; not a future sale level projection or target and it does not reflect all of the factors that may influence future sale levels. Actual harvest is likely to be lower.

The ability of the alternatives to meet potential demand is assessed against a series of measures in the *Economic and Social Environment* section in the EIS. These measures include the four scenarios identified in the projections developed by Brackley et al. (2006a), current production levels, installed and active production capacity, and the minimum estimated volumes required to support various processing facilities. The comparison between the four scenarios presented in Brackley et al. and the alternatives is based on the total ASQ volume. The comparisons between the alternatives and the other measures are based on the NIC I component only. The use of NIC 1 volume in the Final EIS generally corresponds to the suggestion to use the more economic component of the ASQ for evaluation purposes.

The potential environmental impacts are assessed based on the projected ASQ. Actual harvest is likely to be lower and actual volumes harvested under any of the alternatives may be affected by a range of different factors that are difficult to predict at this point. It is important to remember that the Forest Plan does not authorize any ground disturbing activities or create any environmental consequences. The main function of the Final EIS is to compare and contrast alternatives in a general way using broad projections based on full implementation of each alternative. With that in mind, the ASQ represents the maximum allowable timber harvest under each alternative and allows an appropriate and consistent comparison between alternatives.

Comment: Concern has been expressed that the ASQ would restrict movement toward the planning cycle demand of 360 MMBF per year if it was lower than the planning cycle demand.

Response: The ASQ is a decadal ceiling and should not be confused with the average or annual sale quantity. The ASQ is the maximum amount of timber that can be sold from regulated or scheduled timber lands during each decade over the life of the Forest Plan and is typically presented as an annual average. Annual harvest is not, however, constrained to this annual average, provided that the cumulative annual harvest volume does not exceed the decadal ceiling. This may result in annual harvests that exceed the average annual ASQ for a number of years. For example, if during the first part of the decade only half of the average annual volume was sold, that volume could be made up by selling more than the average during the remainder of the decade. With the current timber harvest levels low relative to the ASQ and planning cycle demand, such decadal flexibility should allow sufficient volume to respond to increases in industry growth and demand for timber.

The Forest Service also has established procedures (Forest Service Handbook 2409.13) for analyzing departure from the established ASQ ceiling to determine whether or not it is possible to better meet multiple use objectives. Those procedures include several criteria or conditions in which evaluation of departure from the ASQ would be needed. One of the set of conditions listed is when implementation of the ASQ could have a substantial adverse impact in the economic area in which the forest is located. For example, if the level of harvest has increased and the cumulative amount of timber sale volume is approaching the decadal ceiling, there may not be sufficient new sale volume to support market demand. If this were likely to be too disruptive to the local economy, departure procedures could be triggered to sell more than the ASQ decadal ceiling. This volume could be made up in the next decadal ceiling or forest amendment processes, including public involvement, would be used to adjust the ASQ accordingly.

Comment: Is this statement in the Draft EIS true: "additional volume can be produced from, for example, wildlife habitat enhancement in young-growth forests..."

Response: Many OGRs contain old clear cuts. Thinning the young stands that have grown in these areas can enhance development of large trees. Any commercial-size wood removed from these areas would not count toward ASQ. This statement has, however, been deleted from the Final EIS because it was easy to misinterpret.

Tongass Futures Roundtable

Comment: A number of comments mentioned the need to find consensus on the lands available for timber harvest. Some mentioned the Tongass Futures Roundtable and expressed support for this group and its identified goals. As noted in the comments, one of the group's goals is to develop a 24- to 36-month supply of timber to bridge the period needed for a consensus approach among stakeholders to agree on which watersheds should be protected and which should be available for timber harvest.

Response: The Forest Service supports the goals and objectives of the Tongass Futures Roundtable and appreciates the work that this group is doing to work toward consensus on Tongass issues.

Comment: One comment expressed concern that the Tongass Futures Roundtable might have too much influence on the ROD. They felt that there was no way one group could represent all interests.

Response: As stated above, the Forest Service supports the efforts of the Roundtable to bring various interest groups together to discuss Tongass issues, but we recognize that this one group does not speak for everyone. It should be noted that as of the date of this publication the Tongass Futures Roundtable has not brought forward any specific recommendations beyond some very general goal statements. The rationale for the decision for this project will be discussed in the accompanying ROD.

General

Comment: Some respondents believe that Alternative 7 was not fairly treated in the Draft EIS. In particular they felt that the negative effects of timber harvest were overstated. A related comment was the impression that the Draft EIS has a "logging is bad" bias.

Response: As the Final EIS notes, timber harvest provides jobs and resources that people need, such as lumber for housing and also benefits species that are associated with early seral conditions. However, timber harvest, and the associated road construction, does increase the risk of negative effects on wildlife, old growth forests, streams, and other resources and the EIS attempts to depict this fairly. As Alternative 7 has the highest level of timber harvest, it also has the highest risk of possible negative effects.

Comment: Concern was expressed that Sealaska cannot be expected to continue harvesting at the same level it has been during the next decade if it does not get it's ANCSA entitlement in that period.

Response: The EIS assumes for the purposes of analysis that Private (Native Corporation) and State harvests would be 109 MMBF per year for the first decade following Forest Plan implementation under all of the alternatives (Brackley et al. 2006a). Private land management is not part of the scope of this analysis except to the extent that it informs the cumulative effects analysis for potentially affected resources. Specific questions and comments related to ANCSA and Sealaska are addressed in the Lands section of this comment and response appendix.

Comment: One comment noted the following concerns with respect to the tables presented in the Timber section of the Draft EIS:

- **Tables 3.13-1, 3.13-2, and 3.13-3 identify different numbers of total suitable acres**
- **The acres presented for items 7 and 8 in Table 3.13-8 are different under Alternative 1 than under the other alternatives**
- **The total suitable acres identified for Alternative 1 in Table 3.13-8 are slightly lower (6 acres) than those presented in Table 3.22-31**
- **Table 3.13-10 and the text on page 3-260 of the Draft EIS do not appear to match**
- **Table 3.13-14 is supposed to show age class distribution for suitable timberlands, but instead shows total timberlands**
- **Total timberlands identified in Table 3.13-14 do not match the totals for lines 13 and 14 in Table 3.13-8.**

Response: The suitable acre numbers have been updated in the Final EIS and are presented consistently throughout the document. The other identified typographical errors and inconsistencies have also been corrected in the Final EIS.

Comment: One comment stated that: "Using US Forest Service GIS data, there are over 1.8 million acres of commercial timber with an estimated 29 billion board feet of timber. This is enough to produce an annual sale volume of 365 MMBF over an 80-year rotation. Second growth will help augment this amount, easing the transition to second-growth management. Lowering the rotation age to 70 years would require less old-growth harvest."

Response: While this may be correct, not all commercial forest land is available for harvest due to the need to consider other resources and uses.

Comment: Several comments questioned why the acres in development LUDs and the ASQ for Alternative 1 in the Draft EIS do not match those for Alternative 8 in the 2003 SEIS. The number of acres increased from 1.1 million to 1.2 million, but the ASQ dropped from 96 MMBF to 52 MMBF. Concern was also expressed that the ASQ for Alternative 5 (No Action) in the Draft EIS is 267 MMBF compared to 259 MMBF for the same alternative in the 2003 SEIS.

Another comment pointed out that the statement in the Draft EIS that approximately 767,000 acres have been harvested in Southeast Alaska conflicts with the PNW Research Station General Technical Report (GTR) 386 from 2006, which states that over 1 million acres had been cut at that time.

Response: Alternative 1 in the Draft EIS included some roadless area, while Alternative 8 in the SEIS did not. Also, the ASQ under Alternative 1 was limited to the amount needed to reflect recent timber harvest levels on the Tongass. The alternative was not designed to maximize production from the roaded area. Page 3-442 of the Draft EIS mentions that this alternative has the potential to produce more timber volume. For the Final EIS we eliminated all roadless areas from the suitable land base in Alternative 1, thereby reducing the number of suitable acres while keeping the ASQ the same. We left nearly the entire roaded area in Alternative 1 even though not all of these acres would be needed to harvest at the lowest demand level.

Regarding the no action alternatives, the SEIS used an excel spreadsheet to estimate ASQ based on the old FORPLAN runs. The Draft EIS used the new Spectrum model. This accounts for the differences in the two no action alternatives. In hindsight, it appears that the no action alternative in the SEIS could produce the 267 MMBF estimated in 1997 but the excel spreadsheet estimate used in the 2003 SEIS was reasonably close (less than 3 percent difference).

Recent estimates of the amount of harvest are more accurate due to improvements in GIS technology.

Comment: Some concern was expressed about blowdown, especially in light of prediction of increased storm events due to global warming. Comments were particularly concerned about blowdown along the margins of harvest units and in the 100-foot wide stream buffers. A number of comments recommended that the Forest Service conduct research on blowdown and windthrow patterns and use this information in harvest planning.

Response: Blowdown can be a serious problem, especially in areas that are subject to catastrophic wind events. Buffers on streams require more than the 100-foot buffers on each side of the stream. Standards require a reasonable assurance of a windfirm buffer. The width of each buffer depends on the windthrow risk of the area. We will continue to monitor and acquire more information about blowdown in Southeast Alaska. In addition, the Forest Service supports research on windthrow through the PNW Research Station.

Comment: Some disagreed with the statement in the Draft EIS that alternatives with more road building and harvest are likely to result in more blowdown if climate change results in more storms, as some predict.

Response: Windthrow associated with roads and harvest units is well documented, as is the increase in storm events in the last few decades. While, to date, the increase in storm events has not resulted in a documented increase in windthrow, the potential should not be ignored when planning harvest units.

Comment: One comment stated that "because of the risk of blowdown, logging prescriptions tend to not leave strips of unharvested old growth between units. Instead new units are placed adjacent to old units, which leads to mega-units much larger than the maximum 100 acres. The Plan needs to include standards that prohibit this practice."

Response: The average opening in recent years has been approximately 11 acres. A new unit is not placed next to an old one until the trees in the existing harvest unit are established (4.5 feet tall, and free to grow), as required by existing regulations. In some cases (especially in areas subject to catastrophic windstorms) adjacent units may only be 10 or 20 years apart because the risk of blowdown results in not leaving an area of old growth between units. This has some positive and negative effects. On the one hand, concentrating harvest in a smaller area reduces fragmentation and allows wider travel corridors to be maintained. Also, it reduces the problem of blowdown, assuming the new unit is placed correctly in regards to the wind. On the other hand, it can lead to larger areas of young-growth forest, which can reduce the usefulness of portions of the area to some wildlife species, including generalist species that like edge habitat.

Comment: Several comments pointed out that the north half of the Tongass has a very different ecosystem from the south half of the Forest and should be looked at differently when it comes to timber harvest. The north part of the Forest is slower growing and there are only a few small mills to support. Some also noted that communities in the south are dependent on timber harvest while those in the north are more dependent on recreation and tourism.

Response: The seven alternatives considered in detail in the Final EIS provide a wide range of options for management of the Forest**.** Most alternatives recognize that the south part of the Forest has more accessible and economically viable timber stands and this is reflected in how the timber LUD is allocated. Modeling assumptions in the Spectrum model also reflect higher growth rates and timber volumes and lower logging costs in the south part of the Forest. The decision maker also has the option of making a decision that could further recognize the differences between the north and south halves of the Forest. The regional economy is discussed in detail in the *Subregional Overview and Communities* section of the Final EIS.

Comment: One respondent stated that they understand pine is being replanted on the Tongass and requested that the Forest Service at least plant native species.

Response: Very little pine, if any, is planted on the Tongass. Only native tree species (using local seed sources) are planted. Most regeneration is from natural seeding from trees adjacent or within the harvest unit. This is discussed on page 3-245 of the Draft EIS. While the Tongass does contain one native pine species, the Forest Service is not aware of it ever having been planted for timber production.

Comment: One respondent requested that the Forest Service supervise all timber sales on NFS lands and not privatize this task. The comment also stated that helicopter loggers should be required to clean up areas they use.

Response: Forest Service directly oversees all timber sales on the Tongass National Forest. All timber sale contracts specify the cleanup required.

Comment: One comment expressed concern about the scaling practices used by the Forest Service and suggested that corrupt scaling practices may have resulted in larger harvest areas. The comment also questioned whether the Forest Service has an accurate picture of the harvested areas on the Forest.

Response: The comment provides no detail about the alleged “corrupt” scaling practices employed by the Forest Service and, therefore, it is not possible to provide a detailed response other than to say that the Forest Service is not aware of any “corruption” in the way it scales logs. The Forest Service conducted a detailed analysis of the Tongass National Forest as part of this overall Forest Plan amendment process. This included mapping productive forest land on the Tongass based on existing NEPA analyses, aerial photographs, LiDAR, LANDSAT, and GIS data, and local knowledge.

Comment: One comment stated that logging slash should be removed and noted slash is burned or chipped in Washington and Oregon.

Response: Leaving woody debris (logging slash) on site retains important wildlife habitat components and nutrients. Burning slash would release carbon into the atmosphere and would be out of place in an environment that does not normally have fire. Chipping slash would be costly and would not result in any meaningful benefit since fire risk is very low in Southeast Alaska. Slash is treated in Oregon and Washington in areas where fire risks require fuel treatment but many areas no longer burn (or chip) slash because fire risks are low. This is the case, for example, in most areas west of the Cascades in Washington.

Comment: One comment opposed all logging until surveys of wildlife, rainfall, tree growth, and soils have been completed. Another comment recommended that a watershed analysis be completed prior to every timber sale.

Response: Site-specific analyses required prior to timber harvest include wildlife surveys and vegetation surveys, including tree growth sampling to validate the growth potential of each site where harvest is being considered. Soil surveys have been completed for the Forest and these surveys are ground-truthed for individual project areas as part of the analysis prior to approving timber harvest. Watershed analyses are completed prior to a timber sale when the existing level of disturbance indicates the need.

Comment: The Forest Service should use all tools available for managing timber, such as the size-density model and the Marxan Model.

Response: The size-density model is a potentially useful tool that the Forest is currently developing and it was used in the analysis presented in the EIS. The Forest is also looking at the Marxan Model and other tools.

Comment: One comment requested that the Forest Service restore the timber volume class designations 1-7 in the Proposed Forest Plan. The comment stated that the system used to replace these classes is much less precise.

Response: Volume classes 5, 6, and 7 were combined because there is no significant difference between them. This is discussed on page 3-244 of the Draft EIS.

Comment: Several comments stated that local industry has done a poor job of managing their lands. Extensive harvest on private lands has adversely affected subsistence, wildlife, and streams and other resources.

Response: The Forest Service has no control over management of non-NFS lands. The impacts of management practices on adjacent lands are evaluated in the Cumulative Effects discussions presented for each resource, as appropriate.

Comment: Some comments stated that they have confidence in the Forest Service to manage public forest resources. One comment expressed support for the Forest Service, but suggested that the Forest Service also consider private sustainable forestry projects, such as the Pioneer Forest in Missouri.

Response: Thank you for the expression of confidence. The Forest Service continues to conduct research and develop new management approaches and strategies. The management of private lands is outside the Forest Service's jurisdiction, but innovations in other areas may be applicable to land management on the Tongass.

Comment: One comment recommended that Congress establish a dedicated timber reserve on the Tongass.

Response: Congressional actions are beyond the scope of this Forest Plan amendment process.

Transportation and Utilities

The Transportation and Utilities comment and response subsection is divided into the following categories:

- Roads
- Transportation and Utility Corridors
- Energy and Utilities

Roads

Comment: Some respondents expressed concern about the large backlog of maintenance work that needs to be completed and thought that roads should be the focus of restoration. They believe that the EIS should include transportation alternatives that look at various reasons to deconstruct existing roads and limit new road construction, such as protecting wildlife habitat, saving maintenance money, and protecting watersheds and fish.

Response: The Forest is working through the Roads Analysis Process and Travel Management planning to identify the roads that will be needed in the future and those that should be closed, as well as to identify and correct road problems, including fish passage. Both of these processes include extensive public participation. The Draft EIS did not include alternatives for managing the existing road system because this issue is being dealt with at the local level. The issue identification process for this EIS is discussed in the *Public Issues* section of Chapter 1 of the EIS. Using the Roads Analysis Process and Travel Management planning, the Forest has already decommissioned approximately 100 miles of roads and placed into storage a significant portion of the road system. The Forest used the roads analysis process to identify maintenance needs and prioritize funding to deal with the most serious problems first.

Comment: Concern was expressed about the use of road storage. One comment stated that storage can be a valuable tool that is a vast improvement over past abandonment practices, but, at its worse, storage can fail to prevent erosion and resource damage. They note that repeatedly opening and closing roads harms wildlife and introduces "pulses of sediment" into watersheds. Another comment noted that storing roads has limited effectiveness.

Response: Roads are placed into storage when there is a long-term need for the road but the road will not be needed in the near-term. In the past, these roads were left open and often revegetated naturally, which in effect closed them to vehicle use. However, culverts sometimes plugged and this has led to roads washing out. There have also been other erosion problems and fish passage problems with many of these roads. Placing roads in storage restores natural drainage where needed and corrects erosion problems. Roads may remain in storage for one or several decades. The intent is not to repeatedly open and close them, as the comment implies. These roads quickly revegetate reducing the fragmentation that roads can cause. Alder often dominates old roadbeds, which adds nitrogen to the soil and helps forbs and other understory vegetation grow. As noted in the Final EIS, recent research indicates that areas with alder provide high-value forage areas for deer. It is true that when they are reopened, some sediment may be released but there is much less disturbance than would be the case with new construction. We believe that road storage is a valuable strategy for managing the road system.

Comment: Concern was expressed about the long-term impacts of temporary roads, especially sediment produced in the first 5 years. Others suggested that the Forest Service consider the use of lower impact temporary roads instead of "spec" roads.

Response: We agree that temporary roads can cause sediment problems and that these roads should be constructed correctly and closed as soon as practical following completion of the project that they were constructed for. This was not always done in the past. The Forest generally proposes lower impact temporary roads in areas where long-term access is not needed.

Comment: Some believe that the Plan Amendment is not consistent with ANILCA provisions of off-highway use as all areas will be closed to OHV use unless designated open. ANILCA requires that all areas be open for subsistence use, subject to reasonable regulation.

Response: The Plan Amendment will have no effect on this issue. Each Ranger District on the Tongass is analyzing how to provide reasonable access for subsistence and other uses in their Travel Management Plans and accompanying NEPA documents. The Draft EIS simply discussed what the National OHV rule states and the process for determining which areas and roads would be designated open. Each District will work with the state and local governments, tribes, and the public, as required by NEPA. The standard in the Final Proposed Forest Plan has been updated to state: "Each ranger district will designate the roads, trails, and areas open to motor vehicle use on a motor vehicle use map. All operations must be in accordance with those designations."

Comment: One comment stated that the conservation community may support some extensions of the road system into the margins of adjacent roadless areas on a case-by-case basis as long as connectivity is maintained.

Response: All alternatives except the revised Alternative 1 allow the extension of existing road systems and new road construction in roadless areas. Alternatives 2 and 3 would restrict these road extensions to lower value roadless areas. Refer to the alternative descriptions in Chapter 2.

Comment: One comment requested that the Forest Service require all roads to be constructed above grade and prohibit road-related alterations to natural surface water or ground water.

Response: The Forest has many different site-specific situations where it is best to construct roads either "above grade" or "below grade". The design and standards of roads are site specific and should be addressed and commented on during the planning phase at the project level under NEPA. The Forest will continue to coordinate management actions with the Alaska Department of Environmental Coordination (ADEC) and ADF&G in the implementation of existing BMPs and development of new BMPs.

Comment: Some comments expressed the desire for road access to the forest. Others noted the importance of roads originally built for timber harvest that connect communities.

Response: All alternatives include retaining existing roads and construction of new roads as needed for each alternative. The Draft EIS (page 3-229) acknowledges that the existing transportation system that connects communities was originally constructed largely in support of timber harvesting.

Comment: One respondent thought it would be more helpful for the Final EIS to display average road density in the individual VCUs with past harvest or proposed new harvest by alternative, and not include VCUs with no development in the average density calculation because this skews the average.

Response: The EIS displays existing and projected future road densities in many ways other than simple averages. In the *Fish* section, Table 3.6-8 presents average road densities for NFS lands, for non-NFS lands, and for all lands combined, under existing conditions and under each of the alternatives. As the comment implies, these averages are Forest-wide so they include areas with and without development. Since there are almost 950 VCUs on the Tongass, it would take many pages to present this information by VCU. Table 3.6-9 was developed (in lieu of presenting a catalogue of VCU road densities in a multi-page table) in order to provide summary information on the number of VCUs on the Tongass that have different road densities by placing each VCU into road density categories and then calculating the percentage in these categories. Each VCU was placed into one of six road density categories, ranging from 0 miles per square mile to >4 miles per square mile. This was done for existing conditions and for future conditions under each alternative (after 100+ years). It was also done for NFS lands only and for NFS and non-NFS lands combined. If the reader wants to determine the exact number of VCUs in each category, the total numbers of VCUs used in the calculations are presented in footnotes at the bottom of the table and can be multiplied by the percentages in the table to calculate actual numbers of VCUs.

In addition, Table 3.10-10 at the end of the *Wildlife* section in the EIS presents the same information by WAA for both NFS lands and NFS lands combined with non-NFS lands. Further, it also presents the same information for open roads (those that are maintained as open for vehicle traffic).

Transportation and Utility Corridors

Comment: **Some respondents felt that the Final Proposed Forest Plan should include all 34 road and utility corridors in the State's Southeast Alaska Transportation Plan. They noted that the draft plan does not include 8 of the 34 corridors. They felt that the regional intertie system will allow communities to switch from diesel to low-cost, environmental friendly energy and surplus energy could be exported. They requested that the Plan state that hydropower and other renewable energy development is a legitimate, authorized use on the National Forest.**

Response: One of the stated goals of the Proposed Forest Plan (page 3-143) is: "To provide for, and/or facilitate the development of, existing and future major public Transportation and Utility Systems." The EIS specifically mentions those corridors specified in the MOU that the Forest Service and the State of Alaska recently signed. Most of these corridors are included in a separate LUD that overrides underlying LUDs. Those not included in the Proposed Forest Plan represent alternatives to these corridors or appear to be unlikely to be developed during the life of the Forest Plan. The Forest will consider all proposals recommended by the State, as well as any reasonable alternative corridors, during project-level NEPA analysis. Some additional corridors were added to the Final EIS after further discussion with the State of Alaska.

Comment: One comment stated that given that many of the roads and utility corridors authorized by Public Law 109-59 would take priority over all underlying LUDs, including many that do not normally allow road construction, it is critically important to fully analyze the cumulative effects, along with existing roads, roads proposed under each alternative, roads on non-NFS lands, and proposed energy infrastructure under Public Law 109-59. One comment stated that: "the Draft EIS fails to analyze the adverse effects of including a road right-of-way across North Baranof. This road would cross two large Inventoried Roadless Areas and harm wildlife, soils, water, fish, and subsistence. The majority of the road would go through OGRs and the beach buffer. It would cross 5 major watersheds, 2 of which are listed as impaired due to sediment. The proposed road corridor across Baranof crosses a fault line and the engineering reports indicate it will be closed weeks to months each year due to avalanches."

Response: This Forest Plan Amendment would not approve any of these road and utility corridors. It is only ensuring that the option to construct a road or power line is maintained. When a road or power line is proposed, it will be analyzed under NEPA, along with reasonable alternatives, including No Action (i.e., not building the road), along with the cumulative effects of that project and other foreseeable projects. As of this time, the North Baranof road mentioned in the comment is one of many roads that have been discussed, but it is not being actively analyzed. Additional information has been added to the Final EIS to examine the cumulative effects of those roads believed most likely to be constructed during the life of the amended Forest Plan.

Comment: Some respondents wanted road and utility corridors north from Angoon to Greens Creek, south to Hood Bay, and north to a patented coal mine.

Response: These routes are not listed by the State in their travel management plan. But when a project is proposed and examined in detail, other alternatives such as this could be considered. The Forest Service is unlikely to support major corridors through designated wilderness and such an action would require Congressional approval.

Comment: One respondent asked that we run the utility corridor a little further along Takatz Lake as the lake is a potential hydropower source for Sitka.

Response: This option could be considered as an alternative to the State proposal if this project were to move forward to the analysis phase.

Energy and Utilities

Comment: Some felt that the amended Forest Plan should recognize and address the prohibitive cost of regulations contained in the present Forest Service Handbook that limit or prevent efficient development, production, and distribution of energy resources. Identified constraints included stream buffers and scenery protections, required appraisals and acquisition of timber in proposed corridors. One comment also noted that, due to the high administration costs, small projects should be exempted from regulation.

Response: Utility development is an important use of the National Forest; however, laws and regulations governing the use of NFS lands apply to all projects.

Comment: Some respondents felt that the amended Forest Plan should identify existing and potential hydroelectric resources and federally recognized watersheds, reserves, or permit areas. Areas of identified concern included the Soule River and North Fork River valley and drainage and the Thayer Creek Hydro Reserve

Response: As noted earlier, the Final Proposed Forest Plan supports development of hydroelectric resources. Each project needs to be evaluated individually on its own merits. As noted in the Transportation and Utilities section, the Thayer Creek hydroelectric facility and transmission line are authorized by Congress and are currently being analyzed in a separate EIS.

Comment: Some comments stated that the Forest Service failed to adequately address energy development opportunities and that the Plan should prioritize the energy resources on the Forest. One comment believed that ANILCA provided the legal mechanism to implement less expensive corridors.

Response: Potential and ongoing energy developments are discussed in the Draft and Final EIS documents. Sufficient guidance under allowable uses as defined by the LUDs is contained within the Plan itself and procedures and permit processes are in place for such development. As noted in the Final Proposed Forest Plan, the corridors within the Transportation and Utility LUD take precedence over underlying LUD standards and guidelines.

Wetlands

Comment: Concern was expressed that the Proposed Forest Plan that accompanied the Draft EIS proposed to eliminate protections for forested wetlands covering more than 100,000 acres without disclosing the effects of this change.

Response: We assume that this comment refers to the organic soils discussed in Appendix B (Information Needs) in the 1997 Plan: Maybeso, Kaikli, Karheen, and Kitkun Soil Series. Additional information on the timber productivity and response to harvest on these soils was listed as a need. The 1997 ROD stated that information related to the effects of timber harvest on these soils was incomplete and harvest was to be avoided on these soils until the ongoing research study of these issues was complete, at which point the decision would be reevaluated (or earlier if monitoring information warranted). In 2000 the Forest issued a report on this study and the Forest Supervisor issued a decision stating that these soils were suitable for timber production. The Plan Amendment does not propose any change to the existing standards and guidelines for these soils.

Wildlife, Biodiversity and Plants

The Wildlife, Biodiversity and Plants comment and response subsection is divided into the following categories:

- General
- Conservation Strategy
- Old-Growth Mapping
- Legacy and Goshawk/Marten Standards and Guidelines
- Population Viability
- Management Indicator Species
- Wildlife Cumulative Effects
- Restoration and Young-Growth Management
- Threatened, Endangered and Sensitive Species
- Endemic Species
- Birds-General
- Marbled Murrelet
- Goshawk
- Marten
- Wolf
- Deer
- Elk
- Brown Bear and Black Bear
- Plants

General

Comment: The Draft EIS contains an inadequate discussion of the effects of climate change on Tongass fish and wildlife and should include a full analysis of climate change impacts on forest species and habitat distribution, including how climate change will alter the amount and distribution of old-growth.

Response: A discussion of the impacts to wildlife species from climate change has been expanded in the Final EIS text. Climate change is described in general terms due to the many unknowns surrounding its anticipated effects, though specific examples are brought forward. Discussion of potential changes in the amount and distribution of old-growth is also provided in the *Timber* and *Biodiversity* sections of the Final EIS. Also see comments and responses in the Climate and Air section of this appendix.

Comment: Timber harvest can result in the loss of habitat for deer and bear which are important to the lives of the local human population.

Response: Effects to deer and bear habitat are discussed in the *Wildlife* section of the Final EIS; effects to subsistence and subsistence resources is discussed in the *Subsistence* section and by community in the *Subregional Overview and Communities* section of the Final EIS. Note that timber harvest affects deer and bear habitats, but rarely would result in a complete loss of habitat.

Comment: A number of comments were received suggesting topics for future research. Topics included studies of Kuiu Island marten to assess implications of forest management practices and possible mitigation measures, marbled murrelet habitat associations, and how different structural and compositional attributes of old-growth forest affect wildlife species.

Response: Appendix B of the Final Proposed Forest Plan addresses information needs including processes for prioritization and updating such programs. This framework is an ongoing process and our intent is to develop a Web-based tool to better facilitate sharing information among the many state and federal agencies, academia, and other entities involved in the study and research of Tongass National Forest topics.

Comment: Habitat changes associated with forest harvest are temporary, with rapid recovery for such variables as amounts of edge and cover for hiding and dispersal; the plan contains limited recognition of these relationships or their contribution to habitat quality.

Response: Temporary is a relative term. For some species, such as black-tailed deer, recently harvested units provide suitable habitat in the years immediately following timber harvest due to increased forage production. However, these stands provide relatively low value after about age 25 and until about age 75 years or beyond, when forests are in the stem exclusion stage of stand development, which is characterized by small, dense trees with little understory vegetation. For some other species, harvested units provide little value until they regain old-growth characteristics either because of specific structural elements (e.g., large woody debris) found in these stands, or because of the presence of prey populations that are dependent on old-growth. Once stands transition out of the stem exclusion stage, they begin to provide the components of good quality wildlife habitat, including larger trees, small canopy gaps, snags and downed logs. This can begin to occur as early as age 50, however, the literature suggests that stands do not begin to take on the characteristics of old growth until they reach at least 150 years of age (Alaback 1982). As discussed in the *Timber* and *Wildlife* sections of the Final EIS, active management of young-growth stands may reduce this time to some extent.

Comment: Growing recreation and other resource needs on the Tongass require better identification of the value of non-forested resources (e.g., high elevation, beach fringe, and wetlands). For example, Aleutian tern, arctic tern, and black oyster-catcher use areas should be identified and protected from disturbance. Special protection should also be given to watersheds that encompass beach meadows, a rare habitat type in Southeast Alaska, and peri-glacial habitats.

Response: Beach and Estuary Standards and Guidelines are provided in the 2007 Forest Plan as well as in all of the 2008 Final EIS alternatives. In the 2007 Forest Plan and the 2008 alternatives (except for Alternative 7, which has a reduced Beach and Estuary buffer of 500 feet, a 1,000-foot buffer provides a high degree of protection for shoreline and marine habitats. These standards and guidelines emphasize the protection and maintenance of the ecological integrity of shoreline and shoreline forest habitats for shorebirds, other marine-associated species, and the many upland species that make high use of these habitats. In addition, the Riparian Standards and Guidelines address the protection of streamsides, lakes, and ponds, wetlands, other non-forested habitats, and floodplain/glacial outwash habitats. The Final EIS shows that recreation is a large and growing use of the Forest. However, this analysis effort is being conducted in primarily in response to the August 2005 Ninth Circuit Court of Appeals Court Decision, which directed the Forest to take a second look at timber demand, the alternatives considered in response to timber demand, and cumulative effects. Therefore, the scope of the analysis focuses primarily on forested habitats that are likely to be affected by timber harvest and associated activities.

Comment: One comment stated: "We are very disturbed about discussions we are hearing about between the timber industry, the Forest Service, and others regarding the need for "intensive" timber management within the matrix lands. These conversations are happening outside the public arena in violation of NEPA, and appear to be based on the desire to increase timber economics rather than scientifically based publicly reviewed decisions. We consider the use of adaptive management to increase timber economics an extreme abuse of power and in clear violation of the numerous laws and public trust responsibilities the agency has." Another commenter was concerned about the Forest Service's move toward "intensive management" because the result of multiple entries into previously harvested units has often resulted in the creation of "creeping mega-cuts" which destroy wildlife corridors.

Response: The Forest Service meets with, and discusses ideas with, a wide range of stakeholders, including the State, local governments, industry groups, and environmental groups. The Forest is interested in developing economic timber sales and is willing to listen to ideas on how best to develop economic sales, while maintaining consistency with the Plan's goals and objectives, meeting the Plan's standards and guidelines, and being compliant with all laws and regulations. Modifications to certain standards and guidelines are being considered in some alternatives, but none of the alternatives include "intensive" timber management.

The "creeping mega-cuts" that the commenter refers to are a characteristic of logging that took place primarily in the 1960s through the 1980's, as well as more recently on some private lands. The adoption of the 1997 Plan created many "checks and balances" that result in avoidance of this situation on NFS lands. Adjacency requirements and watershed protection standards limit the size of clearcuts under all alternatives, and Class I, II, and III stream buffers, old-growth retention requirements, and many other standards and guidelines also limit opening size and total harvest acres per watershed. Even under Alternative 7, which includes the most intensive harvest among the alternatives, about 62 percent ((1.3 million of the 2.1 million acres) of the old growth within the matrix (development LUDs) would not be harvested, even after 100 or more years of harvesting at the maximum rate allowed by the alternative (see Table 3.9-12 in the *Biodiversity* section). This is in addition to the 2.8 million acres of old growth protected by reserves (non-development LUDs) under Alternative 7.

Comment: Fish and wildlife belong to the states and therefore identification of management objectives should be done by the State of Alaska and not the Forest Service.

Response: The Forest Service is responsible for setting management objectives for fish and wildlife habitats on NFS lands, including ensuring adequate habitat is maintained on the Tongass National Forest to sustain viable and well-distributed populations, as required under the NFMA. The Forest Service does work closely with the State of Alaska on joint matters related to management of fish and wildlife.

Comment: Roadless areas are crucial to the protection of the Nation's wildlife, fisheries, and water resources.

Response: We generally agree with this statement. However, what is more important is how the lands within roadless areas are managed through time. It is a primary purpose of forest planning to determine how best to balance the multiple-use objectives for all NFS lands, including those which are roadless. Over 90 percent of the Tongass is considered roadless; thus roadless areas are not a rare commodity on the Tongass, in contrast with roadless areas found in the national forests located in the lower 48 states.

Comment: Section II.H of the Wildlife Planning Standards and Guidelines do not require action until risk to long-term persistence is determined to exist. Also, the standards and guidelines assume that species abundances are known, but this is rarely the case on the Tongass, and the standard and guideline does not consider distribution.

Response: These standards and guidelines require evaluation of that species for designation as a Regional sensitive species by the Regional Forester, should a significant population or habitat decline occur. This does not preclude action being taken prior to that point. Additionally, they require coordination with state and other federal agencies where species concerns may be addressed well before they reach sensitive-species designation status.

Comment: We must preserve the ecological diversity of the forest, fauna, and salmon.

Response: The Forest Service agrees and strives to provide multiple resource uses while maintaining biological diversity.

Comment: To the extent possible, implementation of conservation measures should be flexible enough to enable tailoring them to site-specific conditions and facilitate design of economically feasible timber sales. Measures may vary from area to area to reflect different species concentrations and sensitivities, and to concentrate timber harvesting in intensively managed areas rather than dispersing harvest throughout the forest. Intensive timber management which minimizes the area affected by timber harvesting will have the least impact on conservation values and the best chance for broad public support.

Response: Standards and guidelines presented in the Forest Plan are purposefully general in some instances in order to allow site-specific conditions to influence their application. See also the comments and responses in the Timber section of this appendix.

Comment: As part of the The Nature Conservancy (TNC)-Audubon Alaska (Audubon) conservation assessment biological values and risks for focal resources (e.g., large trees, salmon habitat, deer habitat) were evaluated within each biogeographic province. An index of relative biological value, defined as the percent contribution of each biogeographic province to the total distribution of habitat values for each species or ecological system. Given that this suite of focal resource targets represents a range of terrestrial, freshwater, and nearshore marine ecosystems, this index provides a reasonably robust ranking of biological values associated with coastal forest ecosystems. Several comments suggested that the Forest Service incorporate the major elements of the conservation assessment and strategy, developed by Audubon and TNC (Albert and Schoen 2007), into the Final Proposed Forest Plan. This design is intended to provide watershed-scale protection to the highest ecological value intact watersheds in each biogeographic province on the Tongass and also maintain core areas of ecological value in a selection of the highest value modified watersheds. Rather than distributing timber harvest and road building across the entire forest, this design works to aggregate these activities in fewer watersheds. Comments from TNC and Audubon note that subsistence and community use areas were not incorporated into the design and that the conservation design should be fine tuned to incorporate these resources.

Response: Information from the TNC-Audubon conservation assessment has been incorporated into the Final EIS as appropriate to strengthen the biodiversity analysis, and in the modification of alternatives. The *Biodiversity* section also provides more extensive quantification of the existing levels of large-tree POG, high-volume POG, karst POG, and intact watersheds by biogeographic province; it also makes projections for these measures into the future under each alternative, on NFS lands and cumulatively, for all of Southeast Alaska. The alternatives considered in the Final EIS were not designed around the Albert and Schoen (2007) report, but Alternatives 1, 2, and 3 take into account some of the considerations raised in that report. The *Biodiversity* section cites Albert and Schoen (2007) throughout the subsection that describes the forest-wide distribution of old-growth; however, while the Audubon and TNC assessment provides a summary of recent literature related to individual wildlife species, the *Wildlife* section incorporates information from individual studies, citing them directly.

Comment: The original 21 biogeographic provinces were based largely on topographic features and generalized information about biotic communities in Southeast Alaska, rather than scientific research. This Amendment incorrectly states that the original biogeographic provinces were based on conclusions drawn about similar species comparisons. Alternative biogeographic provinces have been proposed that do rely on peer-reviewed scientific research.

Response: The respondent appears to have drawn an incomplete conclusion from how biogeographic provinces are described in the EIS. The description summarizes that they are generally characterized by similar wildlife species composition, similar distribution of wildlife species, geologic and water barriers resulting from glaciation and other events, and generally similar climatic conditions and physiographic characteristics. It is recognized that these provinces are a broad land classification. It is useful to continue using the same classification for comparison with the 1997 Final EIS and it is very similar to the provinces used in the TNC-Audubon conservation assessment.

Comment: The Biodiversity section focuses on timber and forest management and addresses biodiversity from an ecosystem-level perspective. It should address species and genetic biodiversity.

Response: As stated in the *Biodiversity* section, conserving biodiversity is about maintaining genetic, species, community or ecosystem, and landscape levels of biological organization. As the respondent noted, the *Biodiversity* section addresses conservation of species and other elements of biodiversity by using a broader "coarse filter," or ecosystem/landscape based strategy for conserving biological diversity. Finer scales of biodiversity (i.e., individual species and genetics) are addressed in the *Wildlife*, *Plant*, and *Fish* sections of the Final EIS.

Comment: In the Biodiversity section, the first paragraph of the Old-growth Conservation Strategy subsection of the Affected Environment states "Approximately 78.5 percent, or 13.2 million acres, of the Tongass is in Wilderness or mostly natural settings…" These statistics mislead rather than contribute to the discussion of the conservation strategy because the focus of the strategy is on old-growth and very little old-growth occurs under these designations. This statement does not belong here at all.

Similarly, the next paragraph states "approximately 85 percent of the old-growth existing in 1954…" This statement presents statistics for the broadest of forestland categories, old-growth, by including both POG and non-POG. The real threat is to POG and therefore this statistic should include only POG.

Response: Although these portions of the *Biodiversity* section have been revised in the Final EIS, it is appropriate to discuss both the percentage of all lands and the percentage of POG within reserves. Secondly, old-growth percentages that are discussed do represent only POG – all of the percentages given for old growth in the effects analysis are for POG or a subset of POG (e.g., large-tree POG).

Comment: The sections of the Draft EIS that discuss biodiversity and wildlife are largely devoid of any analysis and clearly do not meet the hard-look standard required by NEPA.

Response: The *Biodiversity* and *Wildlife* sections in the EIS take into account the best scientific information available. Extensive quantification of effects using GIS analysis, habitat modeling, and forest management modeling, an inventory of harvest and road development on all lands of Southeast Alaska, along with future development projections, and the application of expert wildlife viability panels. Nevertheless, the analysis presented in the Draft EIS was expanded substantially for the Final EIS and we believe these analyses are adequate.

Comment: For the discussion of forest "composition, structure, and function" the introductory section of the Draft EIS Biodiversity section refers the reader to sections of the 1997 Final EIS. This is confusing because much of that information has been updated on the following pages of the Draft EIS.

Response: It is true that much information with respect to biodiversity has been updated since 1997. The definitions of composition, structure, and function, however, have not changed from those given in the 1997 Final EIS, which is appropriately incorporated by reference because it includes further information on these components of biodiversity that might be of interest to the reader. What has changed, however, is how we take these ecosystem components into account. For example, the Size Density Model (SDM) is now available for use in the biodiversity analysis. Thus, the discussion in the *Biodiversity* section referenced in the comment differs from that in the 1997 Final EIS.

Comment: In contrast to parts of the world where significant logging has occurred, the Tongass can be an example of how sustainable logging can be conducted on public land, not only for Southeast Alaska, but for the world.

Response: We agree. The Tongass strives to manage a timber program that is sustainable, while providing for sustainability of multiple other resources.

Comment: The Draft EIS is incorrect in stating that logging will be concentrated in four biogeographic provinces; this is not true because all alternatives allow intensive logging under Timber Management as well as less intensive but still consequential logging in the Modified Landscape LUD.

Response: The majority of harvest would remain "concentrated" in these four biogeographic provinces. However, under some alternatives, logging and road construction would be more extensive in areas outside of these provinces. Alternative 1 would not enter any inventoried roadless areas whereas Alternative 7 proposes to harvest the most timber from roadless areas. The commenter also appears to be confusing biogeographic provinces with LUDs.

Comment: Increased predation occurs in logged area because there are so many more small mammals in those areas. This is good for raptors, etc. The Forest Service even issued an alert in the 1960s because they were alarmed at the dramatic increase in mice in clearcuts. The mice were allegedly eating too many of the tree seeds.

Response: It is true that timber harvest can benefit some species while adversely affecting others.

Comment: One respondent was very disappointed to see that National Monument Lands, which are fully protected from timber harvest, had relatively low value to wildlife and felt that the Forest Service depicted the alternative maps deceivingly. Another respondent made a similar comment about the inclusion of low value habitat in Wilderness and LUD II designations.

Response: The wildlife values depicted across the Tongass, including those within National Monuments, are reasonable. A National Monument is an area of land that is set aside to preserve some feature of it that makes the land important. This may include anything from scientific or historical interests to scenic beauty and wildlife protection. There are two National Monuments on the Tongass: Misty Fiords and

Admiralty Island. National Monument Lands are created by presidential proclamation, not by the Forest Service, thus the alternative maps depict these areas as they have been designated. Although Misty Fiords contains large expanses of non-forested lands, Admiralty National Monument represents one of the highest value habitat areas in all of Southeast Alaska. It contains the second highest acreage of POG among all provinces in Southeast Alaska (598,000 acres). The vast majority of Admiralty Island remains intact and, as a result of the abundance of POG in this province, including high-volume and large-tree POG, it represents a massive reserve and reservoir for biological diversity in Southeast Alaska. In addition, Wildernesses and LUD II areas are highly variable in terms of their wildlife habitat values and availability of POG. The Karta Wilderness and the Nutkwa LUD II area on Prince of Wales Island contain very high fish and wildlife habitat values and extensive areas of POG.

Comment: The Tongass manages one of the largest island archipelagos in the world and nowhere is this important point emphasized in the Proposed Forest Plan or Draft EIS, particularly in the description of the forest in Chapter 2.

Response: The point that the Tongass is an island archipelago is discussed in the *Biodiversity* and *Wildlife* sections of the EIS. The extensiveness of the island archipelago is also described in the description of the forest in Chapter 1.

Comment: There is very little young-growth on the Tongass. Converting a small portion of the old-growth to young-growth will actually add to biodiversity (i.e., broader more balanced distribution of forest age classes).

Response: At a landscape-scale, old-growth forests on the Tongass are highly diverse, typically including heterogeneous stands of productive forests within a mosaic of unproductive forests and non-forested areas comprised of shrub and herbaceous plant communities. They are also diverse at the stand-level, possessing structural attributes that provide habitats for a variety of species such as live old-growth trees, dead standing trees (snags), fallen trees/ logs, and an overstory consisting of multiple canopy layers; they also have smaller understory trees, canopy gaps, and patchy understories. Timber harvest reduces this diversity by creating a more uniform stand of young-trees. Old-growth forests can also provide ecological functions that are lacking, or less developed, in younger stands. There are opportunities to manage the more than 400,000 acres of young stands on the Tongass to increase biodiversity, which are described in the *Timber*, *Biodiversity*, and *Wildlife* sections of the Final EIS.

Comment: The Tongass National Forest should work with private and state forest managers in developing unified definitions and inventories for old-growth forest types, and accurately monitor their abundance and rates of change.

Response: The Forest Service routinely collaborates with other agencies and private landowners.

Comment: The Draft EIS does not disclose the sources and reasons for its assumptions that POG originally comprised 50 percent of all non-NFS lands and that 25 and 50 percent of the remaining private and state-owned lands, respectively, will be logged.
Response: The quantification of POG on non-NFS lands has been refined and is more accurately depicted in the Final EIS. Appendix E has been added to the Final EIS which provides a catalogue of past harvest, detailing the acres of harvest by owner by biogeographic province and by decade or period (where known), in addition to detailed information provided by the State on past harvest. An expanded cumulative effects discussion has been added to the *Biodiversity* section on future harvest on non-NSF lands.

Comment: One comment expressed concern that slash from helicopter logging could hinder wildlife movement.

Response: Silvicultural prescriptions routinely consider slash disposal requirements in light of resource issues which are tracked at the project level.

Conservation Strategy

Comment: Some respondents believe that Alternatives 1,2, 3 and 6 have better biological locations for the small OGRs, which were identified during the 2006-2007 interagency review effort and meet the 1997 Forest Plan Appendix K criteria, and believe that one of those alternatives should be selected.

Response: We agree that the changes made to old-growth reserves in these alternatives are an improvement from a biological point of view.

Comment: To help prevent the need to list the goshawk and wolf under the ESA several respondents recommended that the Forest Service select the preferred biological locations for the 48 other small OGRs as indicated by the interagency Small Old-growth Reserve Work Group (particularly if interagency review cannot be completed in time for the Final EIS) and maintain the existing elements of the conservation strategy, including the forest-wide network of OGRs, the 1000-foot beach and estuary fringe, and the existing Goshawk Foraging Habitat Standards and Guidelines; it was noted that the old-growth reserve system was cited by the Fish and Wildlife Service as reasons that these species did not warrant listing. Some respondents expressed concern that eliminating these measures would open the possibility that any decisions made by the Fish and Wildlife Service could be remanded.

Response: Alternatives that eliminate major elements of the conservation strategy are ranked as having a lower relative likelihood of sustaining well distributed goshawk and wolf populations. A detailed discussion of the existing and proposed changes to the Goshawk Standards and Guidelines is provided in Appendix D of the Final EIS. The USFWS published a new finding on the goshawk in November 2007, after the release of the Draft EIS. They found that the best available information on biological vulnerability and threats to the goshawk does not support listing the Alaska population segment as threatened or endangered at this time. This conclusion was based on conservation measures that were included in the 1997 Forest Plan. Conclusions from this finding have been considered in the goshawk subsection in the Final EIS.

Comment: The Draft EIS fails to disclose or consider findings and relevant data from recent literature or the 2006 Conservation Strategy Review workshop regarding endemics.

Response: .The discussion of endemism has been updated to include the most current literature on endemics, including information presented at the 2006 Conservation Strategy Review workshop.

Comment: A number of comments were received on the adequacy and necessity of the conservation strategy. Several respondents commented that the forest-wide conservation strategy adopted in the 1997 Forest Plan is an improvement over previous plans but is flawed. Some felt that it is overly protective and its value and effectiveness should be peer-reviewed. Respondents with this opinion viewed the conservation strategy as simply a way to give other agencies a "veto voice" in management of the forest, or felt that congressionally designated reserves or other protections (e.g., buffer and retention requirements and state BMPs) were adequate protection for plants animals, and landscape connectivity, making other reserves and species-specific standards and guidelines unnecessary. Other respondents felt it was a more

than adequate strategy to support well-distributed, viable wildlife populations. Finally, other respondents felt that the conservation strategy was not protective enough, stating that the Draft EIS does not provide science-based rationale for concluding that the conservation strategy continues to be valid. Several of these respondents suggested that the Forest should base management efforts on an island-centered model given that the Forest covers one of the largest island archipelagos in the world. These respondents felt the Draft EIS fails under NEPA to disclose the uncertainties behind the strategy.

Response: Although many uncertainties remain regarding managing wildlife on the Tongass and the effectiveness of the Tongass conservation strategy, the underpinnings of the strategy continue to be a valid model for conserving biodiversity on the Tongass. The conservation strategy was developed as an interagency effort and was peer-reviewed by independent scientists and natural resource managers using their expertise and best available science. The *Wildlife* section of the Final EIS discloses the existing uncertainties surrounding the conservation strategy. Appendix D of the Final EIS provides a summary of a review conducted by Haufler (2006) on the developments in the field of conservation science produced since 1996, which includes an evaluation of the Tongass conservation strategy.

Comment: The conservation measures proposed to provide for viability of wildlife species on the Tongass are inadequate (i.e., insufficient reserves, inadequate connectivity, too much fragmentation), as concluded by a joint statement issued by peer review committee members (Kiester and Eckhardt 1994). Any claim made in the EIS that well-distributed, viable populations are reasonably assured over the long-term under any of the alternatives is not borne out by scientific opinion

Response: Appendix D of the Final EIS summarizes the development of the conservation strategy and peer reviews conducted to date. It provides the rationale behind the reserve-based strategy and describes major steps leading to its development, including the pioneering work of the Interagency Viable Population Committee (VPOP; Suring et al. 1993) which designed an initial landscape conservation strategy they felt was capable of assuring the maintenance well-distributed wildlife populations across the Tongass. The joint statement, referred to in the above comment (Kiester and Eckhardt 1994), stemmed from an independent review of the VPOP strategy conducted by the Forest Service Pacific Northwest Research Station (PNW). This joint statement did identify several weaknesses in the strategy, as stated by the respondent. Importantly, however Kiester and Eckhardt (1994, p.3) noted that the PNW Review only considered the network of mapped VPOP large and medium HCA's and Congressionally protected areas such as Wilderness, Monuments and Legislated LUD II areas. The VPOP reserve network was not examined in the context of the entire Forest Plan or a fully articulated planning alternative containing the strategy. The scientists were unable to consider other LUDs that effectively function as reserves and conserve the old-growth ecosystem—a very important component incorporated into the development of the old-growth habitat conservation strategy in the Proposed Forest Plan and the analysis in the EIS. Please see Appendix D of the Final EIS for further discussion of the Forest Service response to the PNW review (Suring et al. 1994) and the progression from this response to the development of the final 1997 conservation strategy.

Comment: Appendix N of the 1997 EIS should be updated and this information should be incorporated into the Final EIS.

Response: Appendix D of the Final EIS serves as an update to Appendix N of the 1997 EIS and includes additional background information used to support the wildlife analysis.

Comment: Assumptions that timber harvest impacts on wildlife require restriction such as beach buffers, riparian buffers, and OGRs are simplistic because some harvest methods (e.g., selective cuts, small clear-cuts) can be conducted in these areas with minimal negative impacts.

Response: The reserve system serves two important functions in that it provides a means for protecting old-growth habitat as well as maintaining landscape connectivity. Though timber harvest can be done in a way to reduce effects to wildlife and may improve habitat quality for some species, any level of timber harvest increases the amount of habitat fragmentation which breaks large blocks of habitat into smaller parcels resulting in smaller and more isolated residual habitat patches. Open spaces left by timber harvest can act as travel barriers for some species, thus limiting interaction between subpopulations, and increase the risk of predation for other species that venture across them. For species that are sensitive to human activity or have restricted mobility, even small areas of timber harvest may create barriers to their ability to move across the landscape. A detailed discussion of fragmentation and its effects is included in the *Biodiversity* and *Wildlife* sections of the EIS.

Comment: Logging in the beach fringe causes obstructions for wildlife moving through; a reduced beach buffer would avoid this situation.

Response: Heavy log concentrations, such as that left as slash from selective logging, can obstruct the movement of larger wildlife species (i.e., deer), but benefit other species by providing places to forage, hide, seek shelter, and den. The beach fringe is classified as unsuitable for timber harvest, though a limited amount of timber harvest not counting toward the ASQ may occur (e.g., timber sold as part of a salvage sale, specialty wood products, for habitat restoration, for customary and traditional uses, etc.) Reducing the beach fringe would not reduce the amount of downed wood left from these uses, but would be more likely to increase the amount of slash by expanding the area in which timber harvest can occur.

Comment: Some commenters thought that the ecological rationale for expanding the beach buffer to 1,000 feet is not clear. Others felt that the 1,000-foot beach fringe buffer standard and guideline should be retained to support viable, well-distributed wildlife populations.

Response: The beach buffer provided under the current Forest Plan is 1,000 feet and would remain that size under Alternatives 1, 2, 3, 4, 5, and 6. None of the alternatives propose to expand it. Under Alternative 7 the beach buffer would be reduced to 500 feet. Rationale for this reduction is provided in Appendix D. The 1,000-foot buffer requirement was based on the recognized importance of the beach fringe zone as indicated by high habitat capability model ratings for a variety of species (bald eagle, marten, river otter, brown bears, black bears, and deer), observations of nesting bald eagles and radio-tagged goshawks, its high value for landscape connectivity, as well as the available scientific literature. The importance of the beach buffer to wildlife is discussed in the description of the affected environment in the *Wildlife* section.

Comment: Retaining the Tongass Conservation Strategy in its entirety will provide the Forest Service with a tool with which it can build ecosystem resilience on the Tongass and manage natural resources effectively in the face of climate change.

Response: We agree that a system of OGRs, various buffer requirements, and non-development LUDs are a means for maintaining a level of biodiversity capable of adapting to the effects of changing environmental conditions. A statement expressing this has been added to the discussion of cumulative effects in the *Wildlife* section of the EIS.

Comment: Several respondents suggested that a finer-scale analysis of landscape connectivity should be conducted at the level of ecological subsections to identify additional corridors and included in a Supplemental Draft EIS. Several respondents identified additional landscape pinch-

points or areas where landscape connectivity is an issue and suggested that these areas be addressed in the Final EIS; others requested that areas that could become pinch-points in the future due to future timber harvest be evaluated. Other respondents were not clear how the initial set of pinch-points were selected.

Response: We recognize that there are a number of additional pinch-points on the Tongass that were not addressed specifically in the Draft EIS. We provided a detailed evaluation of those pinch-points that were located in areas where a substantial amount of timber harvest has occurred and is likely to occur in the future. As noted in the *Wildlife* section, timber harvest could affect "ecological pinchpoints" or areas where habitat conditions, rather than landscape features, facilitate movement across the landscape. The detailed level of analysis required to assess effects to these areas is necessarily done at the project level when site-specific conditions and project-specific details can be taken into account.

Comment: Several respondents identified minimizing habitat fragmentation as an important issue in developing the Final EIS and Final Proposed Forest Plan.

Response: Habitat fragmentation is discussed in detail in the *Wildlife* and *Biodiversity* sections of the EIS. Alternatives that would result in the least habitat fragmentation (i.e., those with the smallest amount of timber harvest and road development) were rated as having the lowest level of effects to wildlife populations.

Comment: The timber industry requires about a quarter of the old-growth on the Tongass, which would leave the remaining old-growth for the conservation strategy; therefore the Forest should eliminate protective measures such as the Marten and Goshawk Standards and Guidelines, the old-growth reserve system, and Class III stream buffers, and should reduce the beach buffer.

Response: Providing an appropriate juxtaposition of habitats and ensuring connectivity across the landscape (both structural through buffers and reserves and functional through management of matrix lands) is essential to providing a functional landscape capable of supporting viable and well-distributed wildlife populations. Timber harvest on the Tongass has been disproportionate, focusing on forest stands at lower elevations, with the largest trees, and concentrated in certain biogeographic provinces. These areas are generally the most productive for wildlife and, therefore, timber harvest has disproportionately affected wildlife and habitat in these areas. Thus, simply allowing a quarter of the remaining old-growth to be harvested without consideration of the spatial distribution of harvest or provision for the protection of important elements within the old-growth ecosystem (i.e., legacy trees or specific forest structural stages) would result in further disproportionate effects.

Comment: The Forest Service should explicitly list the concerns and issues identified by scientists during the 2006 Tongass Conservation Strategy Review workshop and identify how each was addressed. Many issues appear to not have been incorporated in the Draft EIS or the Proposed Forest Plan.

Response: The NFMA planning regulations provide direction to conduct an evaluation of the Forest Plan after 5 years of implementation (36 CFR 219.12(g)), including a review of the effectiveness of the Plan's old-growth conservation strategy to conserve biodiversity and prevent the need to list species under the ESA. The 2006 Conservation Strategy Review workshop represented the first step in the evaluation process, with the purpose of identifying considerations to be addressed in the overall review of the strategy. A report documenting the workshop, found in the project record, represents the second step. It is one of several documents responding to the Forest Plan review that serve to provide issues and information for use in current Forest Plan Amendment process and in managing resources under the Forest Plan.

Subsequent steps will include an assessment of each consideration identified herein, based on workshop information, peer-reviewed scientific literature, the recent *Review of Conservation Science Produced Since 1997 and Its Relationship to the Tongass National Forest Land and Resources Management Plan* (Haufler 2007), as well as input from various state and federal agencies. These assessments will culminate in a determination of how each consideration will be dealt with. Some considerations have been addressed in time for incorporation in this Forest Plan Amendment Draft EIS, others in time for incorporation in the Final EIS, and others, which might require additional interagency consultation, the formation of specialized workgroups, and more detailed development, will be implemented after the Final EIS. These long term considerations could lead to conservation strategy-related adjustments to the amended Forest Plan through additional amendments or identified as information needs. This effort will be summarized in a forthcoming Conservation Strategy Review Proceedings Assessment Report, which will include a matrix of the consolidated consideration that will identify how individual considerations will be addressed. Additional scientific information presented at the workshop has been included in the Final EIS.

Comment: The Conservation Strategy and Landscape Connectivity discussion in Chapter 2 of the Draft EIS incorrectly characterizes Alternative 7 as having a poor distribution of high-quality old-growth, given that over 80 percent of the commercial old-growth and over 75 percent of the productive old-growth remain and are well scattered across the forest and the wide distribution of non-development LUDS, minimum development LUDS, and buffer requirements.

Response: The conclusion about Alternative 7 was based on what potential results would be over the long-term. Alternative 7 would have extensive areas consisting of development LUDs with no reserves and a reduced beach fringe for connectivity. Although there would be extensive old growth left within the development LUDs as a result of standards and guidelines, the lack of larger patches of old growth, as are found in reserves, is the major reason for the conclusion.

Comment: The forest-wide mapping of small OGRs could impact resources other than wildlife and should be fully analyzed in the Final EIS. Project-level adjustments to OGRs should continue to be allowed.

Response: Forest-wide small old-growth reserve mapping efforts provided an opportunity to conduct a landscape-scale review of the small OGRs. This effort was proposed primarily to develop a consistent and more efficient method of review, and to more accurately define the location of small OGRs to enhance the Proposed Forest Plan conservation strategy rather than complete the review on a project-by-project basis. The review process involved the incorporation of a biological consensus recommendation for each old-growth reserve under review, determined through interagency analysis, and was followed by another review that took into account other resource considerations, including timber and timber sale economics. Project level adjustments will be considered if significant new information becomes available.

Comment: The conservation strategy does not quantitatively assess the additional amount of productive old-growth reserved by restrictions to harvest on high hazard soils and karst lands.

Response: Standards and guidelines preclude or significantly limit timber harvest in areas of high hazard soils, steep slopes (greater than 72 percent), high vulnerability karst terrain, visually sensitive travel routes and use areas, and timber stands that are technically not feasible to harvest. The timber deferred from harvest by these standards and guidelines is determined at the project level, usually as a result of on the ground inspection during project implementation. Although it cannot be precisely determined at the forest planning level, the acreage of POG that is set-aside due to oversteepened slopes, other areas of very high mass movement potential, and karst , based on digital elevation modeling, soils mapping, and geologic mapping. In addition, estimates of the amount of additional restrictions that are implemented during a project are included in the Model Implementation Reduction

Factor. These combined reductions are used in all POG predictions and in calculations of the ASQ in the Spectrum model (see page 3-261 to 263 in the Draft EIS). These quantifications are used for describing and testing of the matrix part of the conservation strategy. The degree of old growth retained within the matrix through time, through OGRs, stream buffers, and implementation of standards and guidelines for karst, steep slopes and other resource concerns was considered and is a very important component of the overall strategy.

Comment: One comment indicated that the Draft EIS does not provide information necessary to evaluate the proposed conservation strategy and does not document the basis for the strategy, thereby violating NEPA. Some respondents requested an extension of the public comment period until the scientific rationale behind the conservation strategy is presented. The Final EIS should include additional discussion for the scientific basis for changes to the conservation strategy.

Response: The Draft EIS described the framework for the Tongass conservation strategy in detail in the Old-Growth Forest Conservation Strategy subsection of the description of the affected environment in the *Wildlife* section. The basis for the conservation strategy and overview of its development was provided in the introduction to the Environmental Consequences portion of the *Wildlife* section, followed by a description of what changes to the strategy are proposed under each of the alternatives. An analysis of effects of changes to that strategy is provided in general under the Old-Growth Forest Conservation Strategy subsection and under individual species where appropriate (i.e., goshawks and marten). The conservation strategy was also described and discussed in the *Biodiversity* section of the Draft EIS. Appendix D of the Final EIS elaborates on the information related to the conservation strategy provided in the Draft EIS and provides additional discussion of the history and background of the strategy and the scientific rationale behind changes. This appendix also provides a comparison between existing and proposed plan components.

Comment: The 2006 conservation strategy review did not allow public participation, either during or after presentations, and no final report has been prepared to date incorporating interagency review. Scientists comprising the panel of experts did not constitute an independent review body and members of the original 1997 panel were not asked to participate even though many continue to be leading experts in their field; in contrast there was a high level of participation of Forest Service employees without biological expertise.

Response: The purpose of the 2006 Conservation Strategy Review workshop was to 1) facilitate robust discussion among members of an interagency Workgroup and scientific and technical experts regarding new information attained since 1997 that may be relevant to the conservation strategy; and 2) generate and discuss science-informed “considerations” relative to the strategy. Scientists considered to be experts in their fields of study were invited to participate and were charged with the task of conducting an independent review of new scientific or other relevant information since 1997, presenting a summary of key findings regarding what the new information meant relative to the Tongass conservation strategy, and providing “considerations” for the workshop record and the Workgroup to discuss regarding the strategy. These presentations were followed by a discussion between the 6-member interagency Workgroup and the presenters, and other collaborating scientists. The Workgroup could call on other subject matter experts for input as necessary. Sometimes this included experts in resource fields other than biology who provided valuable insight into problems encountered when implementing Conservation Strategy Standards and Guidelines. A final report summarizing the workshop proceedings, including a written record of all discussion attributing comments to individual scientists and listing all considerations, is in the project record. The purpose of this report, and the workshop itself, extends beyond this Forest Plan Amendment and is intended to assist the Forest Supervisor in considering the need for adjustments to the Forest Plan Monitoring Program, Forest Plan standards and guidelines, and aspects of the conservation strategy. The results will also guide future investments in research and management studies by the Tongass National Forest and its interagency partners. Relevant new science presented during the workshop has been incorporated into the Final EIS and some considerations have been addressed as part of this effort.

The workshop was open to the public and consequently the audience included other subject matter experts, not participating in the presentations, and members of the public at large. During specific topic sessions, the audience was invited to submit written considerations for the workshop record. The same form that was being used by presenters and the Workgroup to describe considerations was provided for the audience's use. All considerations submitted by audience members were included in the workshop record. The public was also welcomed to submit considerations relevant to the conservation strategy review workshop via the project website which included PowerPoint presentations from the workshop, through April 21, 2006.

Comment: Project-level review of small OGRs that do not meet criteria in Appendix K of the 1997 Forest Plan should follow the format used by the 2006-2007 Interagency Small Old-growth Reserve Work Group (Hansen et al. 2006), including using a standardized review protocol, documenting changes made to OGRs, identifying how the proposed changes meet Appendix K criteria, assessing the effects of roads in and adjacent to OGRs, and documenting implementation of Tongass Plan Implementation Team clarification "Conveyance on Overselected Lands and the Old-growth Habitat Land Use Designation;" these items should be included in Appendix K of the Forest Plan.

Response: Appendix K has been revised in the Final Proposed Forest Plan to incorporate the format used during the 2006-2007 interagency review.

Comment: A forest-wide review of medium OGRs is warranted, comparable to that conducted for small OGRs by the Interagency Small Old-growth Reserve Work Group.

Response: There is little indication that such a review is warranted. Appendix D of the Final EIS provides a summary of a review conducted by Haufler (2007) on the developments in the field of conservation science produced since 1996. The author concluded that "the conservation strategies used in the plan are still valid at the present." New information and knowledge relative to conservation biology will continue to evolve. The amended Forest Plan, including the conservation strategy will be reviewed again in 5 years and if a more intense review to components of the strategy are warranted it can be done.

Comment: Many wildlife species live and travel through young-growth timber just as well as they do in old-growth, maintaining connectivity between OGRs; therefore Conservation Strategy Standards and Guidelines are unnecessary as roads provide travel corridors for wildlife whether closed or left open.

Response: Old-growth forest provides key habitat components for many species that are not available in young-growth (i.e., large trees, snags, downed trees, full canopy cover, and an open understory). These habitat components provide essential denning, nesting, foraging, perching, and hiding opportunities for a variety of species. Though roads may be used as travel corridors for some species, many species are extremely sensitive to activity along open roads and avoid areas near roads. Timber harvest and roads, whether closed or open, increase habitat fragmentation which breaks larger sections of forested habitat into smaller, isolated patches and reduces the effectiveness of interior habitat. Openings created by timber harvest and roads can also become travel barriers, particularly for species that are less mobile or have very limited gap-crossing abilities. Roads also increase human access and thus the susceptibility of wildlife to hunting (illegal and legal) and other disturbance. Therefore, maintaining well-connected old-growth forest across the landscape is key to maintaining well-distributed wildlife populations on the Tongass.

Comment: The Tongass conservation strategy is overly costly and is the primary reason the Forest Service has not been able to prepare economic timber sales and has resulted in the loss of hundreds of jobs. Alternatives 1, 2, 3, and 6 cannot be implemented because they include the conservation strategy that increases harvest costs.

Response: The conservation strategy is the primary means by which the Forest Service meets its multiple use objectives as required under the NFMA. It is designed to maintain viable, well-distributed wildlife populations while enabling an active timber sale program. We are not aware of evidence that the conservation strategy has resulted in the loss of hundreds of jobs.

Comment: The statement in the Draft EIS that "because of the reduction or elimination of the old-growth reserve system under Alternatives 4 and 7, respectively, these alternatives could have a low or moderate likelihood of maintaining viable, well-distributed wildlife populations" is incorrect.

Response: It is true that Alternatives 4 and 7 would have a reduced likelihood of maintaining viable, well-distributed wildlife populations relative to Alternative 5 which harvests less timber, involves less road building, and incorporates more protective conservation measures. This statement has been clarified in the Final EIS text**.**

Comment: One comment stated that the Proposed Forest Plan is focused on protecting old-growth blocks at the watershed scale, which will ultimately lead to reduced habitat diversity, increase fragmentation, increase road impacts and human access, and will generally lead to the erosion of ecosystem integrity within the watershed.

Response: During the planning process prior to the 1997 Forest Plan, small OGRs received varying levels of review but were placed within each VCU; roughly equivalent to a watershed) in an effort to ensure that the protection of old-growth habitat was well-distributed across the Forest. The 1998 Tongass Plan Implementation Team clarifications provided for further, project level evaluation and adjustment of these reserves. Initially these reviews were conducted in association with individual timber sales, focusing on specific VCUs, covered by the project area. However, more recently reviews have taken a broader focus and have been completed for all OGRs on an island or other logical geographic scale. Most recently, in 2006 and 2007 a forest-wide review of small OGRs was conducted which had the objective of enabling large-scale, landscape issues to be considered in the placement and configuration protected blocks of old-growth.

Comment: In addition to reserve lands mentioned in the Proposed Forest Plan, a number of additional reserve lands are present in Southeast Alaska and adjacent British Columbia that also provide habitat for a number of wildlife species addressed by the Forest Plan.

Response: The Forest Service agrees with this statement.

Comment: The Draft EIS recognizes that matrix lands play a vital role in providing functional connectivity across the landscape but fails to take a hard look at the impact of the alternatives. There are no alternative methods for matrix land management. Some respondents contend that because management of the matrix is important for maintaining viable populations of wide-ranging species, the matrix itself needs to be defined in terms of its role in the conservation strategy. They quoted various participants at the 2006 Conservation Strategy Review workshop who emphasized the importance of matrix lands in meeting habitat, prey, and connectivity requirements. They also felt that the Legacy Standards and Guidelines need to convey the role of matrix lands in the conservation strategy.

Response: Forest Plan standards and guidelines are the framework for matrix land management on the Tongass. Changes to standards and guidelines proposed under the alternatives are discussed under the corresponding sections in the Final EIS. Appendix D provides additional discussion of the rationale behind proposed modifications to or replacement of Wildlife Standards and Guidelines. We recognize the habitat and connectivity values of matrix lands; hence the numbers of standards and guidelines applicable to lands considered for timber harvest can contribute to longer term old growth within those lands. The sum of those ensures the functionality of the entire ecosystem from the reserves and between the reserves in the matrix. The reserves help us meet the requirement for species well distributed across the Forest; standards and guidelines applied to matrix lands help ensure we will not likely approach minimum habitat needs through time.

Comment: Some respondents felt that the Draft EIS and Proposed Forest Plan fail to take a hard look at landscape linkages and wildlife corridors and protect these areas, especially given that the ecological value of many of these areas has been reduced by historic (e.g., timber harvest) and current activities (e.g., recreation). Some felt that the Draft EIS does not cite any scientific evidence or peer-reviewed study to support the contention of the Forest Service that protected corridors (i.e., beach, riparian, estuarine buffers) will function to provide connectivity in heavily logged or roaded landscapes. Others felt that it seemed as though the Draft EIS and the Forest Pan assume these provisions will remain in pristine condition and function as corridors. One respondent commented that they would like to see patches of old growth modified so that they are associated with natural corridors for wildlife and stream protection.

Response: It is true that the effectiveness of conservation strategy reserves and buffers in relation to their size, landscape pattern, and geographic distribution has yet to be scientifically tested. A statement to this effect has been added to the Final EIS text. Landscape connectivity was an integral feature of the original VPOP landscape conservation strategy (Suring et al. 1993), one of the precursors to the current conservation strategy. VPOP reviewed the available literature and concluded that there was limited empirical support for corridors but that this should not preclude their inclusion in landscape conservation planning. They reasoned that landscape habitat connectivity was an important component of conservation planning to facilitate animal dispersal and movement, whether specifically designed as corridors or through overall management of a habitat matrix. Appendix D of the Final EIS provides a detailed review of steps leading up to the development of the conservation strategy.

Comment: The fact that roads contribute to habitat fragmentation should have been considered in the Draft EIS. Please consider additional road restoration and closures.

Response: Road-related habitat fragmentation is described throughout the *Wildlife* section of the Final EIS. A transportation objective under the Final Proposed Forest Plan is to manage and maintain roads to protect water, soil, fish, and wildlife resources. Decisions related to the restoration or closures of specific roads are made at the project level.

Comment: Several respondents feel that the Landscape Connectivity Standards and Guidelines are incomplete and lack a definition for connectivity, directives on critical aspects of connectivity (e.g., no requirement for corridor designation and no minimum corridor width or means for determining necessary width). Some suggested that the standards and guidelines should also mandate a procedure for connectivity analyses and evaluation of long-term population viability. One respondent thought there seemed to be an emphasis on connectivity within medium and large OGRs rather than between reserves, and no measurable means to ensure connectivity is provided. Several respondents pointed out that there is no requirement for connectivity between small OGRs and that connectivity is not being preserved on the ground; suggestions were made to designate physical corridors to provide direct connectivity between small OGRs and to develop standards and guidelines requiring connectivity between small OGRs.

Response: Connectivity between reserves was a consideration in the design of the Conservation Strategy and was also considered during the small old-growth reserve updates for this Plan. The Landscape Connectivity Standards and Guidelines are to be implemented during the environmental analysis for projects proposing to harvest timber, construct roads, or otherwise significantly alter vegetative cover. These standards and guidelines are purposefully general because decisions regarding connectivity are made most appropriately at the project level, when site-specific information can be incorporated. The intent of these standards and guidelines are to provide project teams with some flexibility for addressing this issue. As noted in the comment, these standards and guidelines are intended only for connectivity between medium and large OGRs. Corridors between small OGRs are not necessary because the intent of the small reserves is to provide old growth representation at the VCU or watershed scale. Connectivity throughout the matrix is an important part of the conservation strategy and is basically provided through time by a combination of Beach Fringe, Riparian Buffers, other standards and guidelines (e. g, unstable soils, low site soils, karst, etc), retention from Legacy, unscheduled timber, and other project-level retention, including patches that are not accessible due to logging system considerations.

Comment: A number of comments were received regarding proposed changes to small OGRs. Some respondents felt that changes were driven by timber production at the expense of conservation of wildlife habitat and were under the impression that the Forest Supervisor promised project-level reviews to fix inadequacies in proposed reserve design. These respondents requested discussion of the impacts of these changes on the conservation strategy. Concern was expressed that the Forest Service was in violation of NEPA by not making update maps of the proposed changes available to the public, involving the public in the decision-making process, or disclosing the objective of the review. Specific recommendations for individual reserves were also given, including use of the GIS database developed by The Nature Conservancy and Audubon Alaska. Several respondents voiced support for the original interagency review team's proposal.

Response: As part of the current Forest Plan Amendment process, the Forest worked with the State of Alaska and the USFWS to complete a more comprehensive small old-growth reserve mapping effort. The objective of the interagency team review was to develop a consensus biological recommendation on small reserve locations that is consistent with Forest Plan criteria, eliminating the need to conduct further project-level reviews in most cases. This process was conducted in 2006 and 2007 and included the development of a biological recommendation, a refinement of that proposal with Forest Service Ranger District staff, and a further refinement by the Forest Supervisor. This refinement process was conducted in order to consider multiple-use objectives in addition to pure biological ones. The result was an overall increase in Old-growth LUD acreage compared to the current plan. Appendix D of the Final EIS also includes a discussion of how these updates were made and related results.

Comment: The current strategy for designing OGRs is flawed in that it does not take into account individual island variation.

Response: Criteria for designing OGRs are provided in Appendix K of the Final Proposed Forest Plan and Appendix D of the Final EIS. The process for evaluating small OGRs on the project level is actually very location-specific in that it requires that Appendix K criteria be met on a site by site basis, taking into account local knowledge of species and habitats and thus variation among individual islands. Note that significant effort has been made during this amendment process to evaluate and adjust all of the small OGRs. Only a small number should require adjustment at the project level now.

Comment: Through the designation of small, medium, and large OGRs there is an inordinate level of emphasis placed on productive old-growth forest. This ignores the habitat value of managed forests, as well as non-productive and low-volume forests, and the fact that when harvest changes the seral stage of a forest there are "winners and losers" with respect to habitat

suitability. There will be a higher level of wildlife diversity associated with habitats found in a forest of a variety of development stages and therefore reserves should incorporate more than just productive old-growth.

Response: There are a variety of factors that go into the designation of OGRs in terms of their placement and configuration, productive old-growth habitat being one of them. Reserves provide connectivity between high and low elevation areas and between Old-Growth LUDS and other non-development LUDS, protect areas of high value winter range, and nesting habitat for goshawks and murrelets The naturally fragmented landscape of the Tongass means that many reserve incorporate forest stages other than old-growth, either created naturally through blow down or past timber harvest.

Comment: Some respondents feel that the coarse-filter component of the conservation strategy fails to recognize the MIS and Sensitive species addressed by the Proposed Forest Plan, whereas others feel that the conservation strategy fails to take into account logging on adjacent non-federal lands. Both groups of respondents suggested that the level of protection afforded by the Proposed Forest Plan should be increased or decreased accordingly.

Response: The conservation strategy was designed to provide a range of habitats within the boundaries of the Tongass National Forest in part to account for conditions or predicted conditions on adjacent or nearby non-NFS lands.

Comment: Several comments were received expressing support for maintaining some or all elements of the conservations strategy. Some respondents felt that the system of large, medium, and small OGRs, along with beach and riparian buffers, must remain the cornerstone of the conservation strategy because it provides a safety net for conservation of viable fish and wildlife populations.

Response: The array of alternatives evaluated in the Final EIS is designed to address a full range of roadless development and timber supply/demand levels. Alternatives that reduce or remove elements of the conservation strategy do so to increase the amount of harvestable timber, which increases the risk to maintaining viable populations of wildlife.

Comment: Comments were received that encouraged the Forest Service to review any remaining small OGRs (OGRs) not finalized during the forest-wide interagency review effort with an eye to timber operability as well as fish and wildlife conservation. The newly proposed locations and sizes for the reserves that were reviewed appeared better than they were previously. However, of particular concern is that project-level reviews have removed 5,100 acres of POG from the suitable land base from 1998 to 2005 (USDA 2005). This steady erosion of the timber base presents an obstacle to maintaining a viable timber industry in Southeast Alaska. Therefore the commenters indicated they supported the joint effort to finalize locations of small OGR across the Tongass and encouraged this collaboration past this planning effort and further urged that the transfer of POG from the suitable land base to small OGR be kept to a minimum to meet criteria in Appendix K.

Response: We agree that the OGRs revised during the 2006-2007 Interagency Review, with subsequent review by the Forest Plan Adjustment Interdisciplinary Team (IDT) and Forest Supervisor, are in better locations. The Forest-wide review of small OGRs was done primarily to develop a consistent and more efficient method of review and to more accurately define the location of small OGRs to enhance the Forest Plan conservation strategy, achieving consistency with criteria in Appendix K of the Forest Plan. Concerns identified as a result of the Forest Plan Maintenance Program were also addressed in this review, one of which was that total acres added to OGRs are reducing suitable acres. The net result of the review was an increase of 39,000 acres in the Old-Growth Habitat LUD (effective under Alternatives 1, 2, 3, and 6). In addition to this expansion, some areas containing Old-Growth Habitat LUD were converted to other non-development LUDs (e.g., Special Interest Area and Semi-Remote

Recreation) and remain a part of the old-growth reserve network. Appendix D of the Final EIS addresses changes in the Old-Growth Habitat LUD and other non-development LUDs resulting from this review.

Comment: Alternative 4 proposes to apply the Old-Growth Habitat LUD in four biogeographic provinces and maintain 33 percent of old-growth in the remaining provinces. It is detrimental to wildlife because it does not specify the distribution of the 33 percent retention requirement, potentially resulting in widely spaced single trees of little value to species dependent on large contiguous blocks of habitat, and disregards scientific information indicating the importance of other biogeographic provinces (Kuiu Island, Admiralty, and the mainland provinces) which contain endemic mammal populations.

Response: It is true that under Alternative 4 all VCUs (with minor exceptions) outside of the four biogeographic provinces where OGRs are required would be required to retain 33 percent of their old-growth with no requirement to consider spacing, location, size, shape, or composition in the design of the retained acres, as is the case under Alternatives 1, 2, 3, 5, and 6, where the direction provided in Appendix K of the current Forest Plan (Old-Growth Habitat Reserve Criteria) applies. The EIS discusses the effects of Alternative 4 on wildlife, including endemic mammals.

Comment: **The biodiversity analysis should also look at changes in connectivity redundancy, corridor width, and corridor effectiveness.**

Response: Corridor redundancy is addressed by the Legacy Standards and Guidelines (see Appendix D for discussion of the rationale for its development) and was also a consideration during the 2006-2007 Forest-wide interagency small old-growth reserve review (i.e., OGRs overlapping the beach fringe). Effects of proposed changes in corridor width are discussed in the *Wildlife* section of the Final EIS. There still remains uncertainty regarding the effectiveness of various elements of the conservation strategy, including connectivity requirements. This is addressed in the *Biodiversity* and *Wildlife* sections of the Final EIS.

Comment: Characteristics and outcomes that an effective conservation strategy should have were listed in the Draft EIS. This list should include: 1) it should anticipate and allow for losses of particular habitats to stochastic events (including catastrophes) on a landscape scale and, as may be appropriate for finer species, at a finer scale; (2) it should anticipate and make allowances for natural habitat losses, considering also the effects of climate change; and (3) other statements from the joint statements by the peer reviewers of the 1997 Forest Plan.

Response: The conservation strategy was developed primarily to maintain viable, well distributed old-growth associated wildlife populations. The objectives are to contribute to habitat capability of fish and wildlife resources to support sustainable human subsistence and recreational uses; maintain biodiversity and ecological processes in old growth habitats; and to restore previously harvested stands to old growth forest condition at an accelerated rate. Catastrophic events at a landscape scale would be difficult to predict and nearly impossible to plan for across the landscape. Similarly, predicting climate change effects to Southeast Alaska forests is problematic. The relatively large and comprehensive conservation strategy is expected to be resilient enough to accommodate such uncertainty. This coupled with the relatively small portion of the Tongass that is considered available for management of timber into the future deems the risk and uncertainty within acceptable limits. Additionally, the ongoing monitoring and study by state and federal agencies, academia and others along with periodic reviews of the Forest Plan provide ample opportunities to respond to such risk and uncertainty in a responsible manner into the future.

Comment: Concerns raised about the inadequacy of the old-growth reserve system (e.g., reserves not large enough to support intended number of female marten, encompass an entire wolf pack home range, or a sufficient number of female brown bears on Baranof and Chichagof islands) were not addressed in the Draft EIS.

Response: Each of these concerns emphasizes the importance of matrix management. Matrix management and the uncertainties related to the adequacy of the reserve system are discussed in the *Wildlife* section of the Final EIS. In addition, several alternatives include increases to the reserve system (Alternatives 1, 2, 3, and 6).

Comment: One respondent offered the following detailed comment: The Forest-wide old-growth reserve review erroneously excluded acreage of private lands in calculating mapped reserves. It is impossible to properly design OGRs without taking into account the cumulative impacts of logging and development of all lands within the VCU. In discussing the basic criteria for allocating small OGRs, the Proposed Forest Plan defines such reserves as "a contiguous landscape of at least 16 percent of the area of each VCU." If the intent of the Forest Plan is to create these reserves based only on Forest Service land it would clearly state so.

Response: Prior to the 2006-2007 Interagency small old-growth reserve review, there was no specific protocol describing how to complete or implement project-level interagency reviews. As a result, small old-growth reserve reviews have occurred in a variety of ways and with varying degrees of quality. One of the aspects of the review process that make it difficult to complete is that some of the Forest Plan criteria are subject to interpretation, such as the 16 percent area requirement. Some project level reviews have taken all land ownerships into account, others have not. The revised Appendix K of the Final Proposed Forest Plan clarifies that this should include only NFS lands.

Comment: The adverse effects of fragmentation, increased forest edge, small mammal isolation, and increased predation in harvest areas are greatly exaggerated and not founded in science.

Response: Additional citations of peer-reviewed literature have been added to the discussions of these topics in the Final EIS.

Comment: The Old-growth Habitat LUD allows activities that are not consistent with habitat reserves (i.e., allows roads to access adjacent timber lands if no other feasible option exists, salvage logging, and OHV use) and needs to be updated. This high likelihood of road construction through OGRs represents a failure of the old-growth reserve system and the viability strategy of the current Forest Plan and shows why legal protection of wilderness is necessary. Stronger wording should also be included in Appendix K criteria for designating small OGRs to ensure that they represent big-tree stands, and that no roading or OHV use is allowed. The Appendix K criteria for small OGRs should also be revised to require at least 800 acres of POG, rather than the minimum of 400 acres, because the 400-acre minimum is almost always chosen.

Response: The conservation strategy is one developed through an interagency approach along with the best available science information at that time. Through a series of science review panels and many other efforts it was deemed to provide for a moderate to high likelihood of achieving its objectives. The 2006 review of the conservation strategy brought forward new science and much other information relative to the strategy since 1997. The review also brought together many of the foremost experts on subjects relative to the conservation strategy and its implementation. That effort, which included a paper reviewing published research on conservations strategy design (Haufler 2006), resulted in the Forest Service being able to conclude the conservation strategy and its basic design is still valid. In addition, we believe that the limited activities allowed in the Old-growth reserve standard and guidelines are consistent with the conservation strategy. Further, Chapter 6 of the Plan describes a monitoring plan for old growth that will ensure activities, over time, are consistent with the intent of this strategy.

Comment: There are a number of medium and large reserves throughout the Forest that fail to meet the minimum criteria in Appendix K for total acres and acres of productive old-growth habitat. Please identify all medium and large OGRs and display these criteria to identify the reserves that do not meet them. Then please give rationale as to why medium and large reserves not meeting these criteria were not adjusted.

Response: As stated in Appendix K of the Final Proposed Forest Plan, large and medium OGRs were designed based on the most restrictive requirements of species with large home ranges and for which there were viability and distribution concerns. They were designed to provide for source populations of species, specifically brown bear, marten, northern goshawk, and wolf, and to provide refugia for dispersing animals. These reserves received rigorous review during the development of the 1997 Forest Plan and, when considered within the context of the entire strategy, are likely adequate considering the logistics of where each reside within the overall strategy.

Comment: Section VII.A.3 of Appendix K of the Draft EIS appears to mean that in VCUs where any portion is designated as a very large, large, or medium old-growth reserve, these VCUs do not need to contain additional productive old-growth to meet the minimum requirements of small OGRs. This is difficult to interpret because the Draft EIS fails to provide a map depicting these reserves, and large and medium reserves are often identified not as Old-growth Habitat LUD but as one of several other Non-development LUDs.

Response: This interpretation of the criteria is correct. The rationale for not requiring a small old-growth reserve in a VCU which has a portion designated as a medium, large, or very large old-growth reserve is that it is assumed that these reserves in combination with old-growth retained by standards and guidelines will provide sufficient productive old-growth to ensure connectivity across the landscape through time. Old-growth Habitat LUDs are depicted on the Forest Plan maps.

Comment: How much is enough [adequate portion of each ecosystem type maintained in an unmanaged state]? Ten to 30 percent of a biogeographic region is the generally accepted minimum. Most expert landscape ecologists would suggest 30 to 40 percent.

Response: Targets for landscape level conservation features are partially defined as the percentage of a resource's overall distribution that is contained within a given area (Dunn et al. 1999), but also must take into account specific planning objectives as well as the identification of vulnerable habitat types and critical habitats for vulnerable species. There are no defined thresholds for how much old-growth should remain within a biogeographic province on the Tongass. The Final EIS displays the amount of old growth that is predicted to remain after 100 years for each biogeographic province and identifies the resulting effects to wildlife and biodiversity. Table 3.9-14 in the *Biodiversity* section shows that none of the biogeographic provinces would have less than 53 percent of its original POG remaining on NFS lands after 100+ years of implementation under any of the alternatives at the maximum level allowed. Even if all lands in Southeast Alaska are considered together, the minimum percent of original POG remaining on all lands among all provinces would be 44 percent (see Table 3.9-20)

Comment: The Draft EIS fails to disclose the opposition to, and uncertainty behind, the Conservation Strategy.

Response: Additional discussion of risk and uncertainty related to the conservation strategy and wildlife viability assessments has been added to the *Wildlife* section of the Final EIS and Appendix D has been added which addresses these topics in more detail.

Comment: Some respondents felt that the process for preparing the amendment was flawed. They believe that the results of the conservation strategy review were not incorporated and that

the conservation strategy review itself was flawed because not all key experts were invited, the observers were not allowed to participate, and some key issues were not brought up.

Response: The conservation strategy review was designed as an interagency review of the conservation strategy focusing on new information and knowledge developed since 1997. As a structured information assessment it was not intended to be an all encompassing review of all aspects of the conservation strategy or to involve special interest groups with other agendas. The review focused on new information relative to implementation and monitoring of components of the strategy, especially within the matrix part of the strategy where development activities will occur through time. The review involved numerous interagency meetings to develop the agenda, much preparation time by the speakers and a full week meeting in Ketchikan in April of 2006. Expanding the meeting to encompass all subjects and all interested parties would have made it even more time consuming.

The information was very useful in the Forest Plan Amendment process but there was never any intent that the Amendment would address all of the ideas brought forward in the review. As noted on the Conservation Strategy Review Website at the time of the review:

> "The new information and knowledge will be presented at a science-based technical workshop designed to rigorously explore the subjects and to develop a suite of potential actions and investments the Tongass and its interagency partners can consider related to new information needs or exploring changes in how the conservation strategy is designed, implemented or monitored. The suite of considerations could lead to conservation strategy-related adjustments to the Tongass Forest Plan as well."

The planning record shows the findings from the review and the plan for how each finding will be addressed over time.

Comment: Some respondents also believed the process was flawed because changes to the small OGRs were completed after the Draft EIS was published. They also stated that the comment period was not long enough.

Response: Alternatives in the Draft EIS included those small old-growth reserve adjustments that had been completed by the interagency team at a point prior to the time of publication. The Draft EIS solicited comments on these changes and the interagency process in general. All of the small old-growth reserve adjustments were completed and posted on the Website with over 30 days of the comment period remaining. The comment period was then extended for an additional 18 days, because of the weather and because we wanted to ensure that those interested had a chance to comment on these changes. Even after the comment period closed, the Website was quite clear that we would continue to welcome comments on the small old-growth reserve changes.

The formal comment period on the Draft EIS lasted for a total of 108 days. In addition, most of the proposed changes to the Forest Plan were on the Website months in advance of the comment period. The public had a considerable amount of time to consider the changes we were proposing.

Old-Growth Mapping

Comment: Several comments were received regarding the use of the size-density model (SDM) for vegetation versus the original Vol-Strata vegetation model in the deer habitat capability model. Some feel this is unimportant provided model results are only used to make a relative comparison among alternatives. Others feel this is a modest improvement but that condensing the model into only three categories masks the loss of the highest value deer winter habitat due to past and future timber harvest. These respondents supported the modification of the model to represent all seven SDM vegetation classes.

Response: The deer model provides a means for making relative comparisons among alternatives in terms of their effects to deer winter range. The existing model parameters are based on the three volume strata categories. In addition to this fact and the fact that sufficient information to accurately update the model to use all seven categories does not exist, the statistical precision of the SDM classification into the seven classes is low. New deer models are in development, but are not ready for use at the Forest planning scale.

Specific concerns regarding deer and the deer model are discussed in a following subsection of this appendix under the heading “Deer.”

Comment: Much of the biodiversity and wildlife analysis in the Draft EIS is too “productive old-growth (POG)-centric” and the Draft EIS has violated NEPA by not disclosing this shortcoming. Some respondents felt that the general reference to POG as a key indicator for effects to many wildlife species made in Chapter 2 is incorrect in that many species have more specialized habitat requirements (i.e., coarse canopy productive old-growth provides higher quality winter habitat for deer) and the Draft EIS should have disclosed effects to individual SDM categories, particularly those that represent high-value POG including “big-tree” POG (i.e., SD67, SD5N, and SD5S categories).

Response: The summary statement in Chapter 2 that POG is a key indicator of effects to many wildlife species on the Tongass is correct, as this is the primary resources affected by timber harvest. Where appropriate, the wildlife analysis does separate out effects to the most important SD7 model categories of POG. A full analysis has been added to the *Biodiversity* section of the Final EIS showing effects to high volume (SD5N, SD5S, SD67) vegetation categories and large-tree (SD67) vegetation category POG, both on NFS lands alone, and on all lands in Southeast Alaska combined (by biogeographic province).

Comment: The Draft EIS fails to disclose how the assumed harvest of vegetation categories SD4N, SD4S, SD5H, SD5N, SD5S, and SD67 prior to 1954 was distributed among these categories for the estimate of 1954 deer habitat capability, and therefore violates NEPA.

Response: To estimate 1954 or original POG, it was necessary to “grow back” previously harvested units. Previously harvested units identified in the vegetation layer (HS1, HS2, and HS3 categories in the SDM GIS coverage) were assumed to have been stands of POG. To estimate original high volume and SD67 POG, an estimate was made of the percentage of past harvest in these categories using timber type mapping from the mid-1980s. Based on this analysis, prior harvest on NFS lands was estimated to have been 29 percent SD67 and 64 percent high volume (see Appendix B) These estimates are higher than estimates made by Audubon Alaska and The Nature Conservancy (Albert and Schoen 2007).

Comment: Populations of some species (bear, goshawk, marten, and wolf) occur at viable levels in habitats containing substantially less old-growth and greater levels of development than the Tongass. This suggests that habitat associations of species considered in the Proposed Forest Plan are in some instances less linked to old-growth than assumed.

Response: On the Tongass all of the species listed above are considered old-growth associates, being most closely associated with this habitat type. However, as described in their respective subsections in the *Wildlife* section of the Draft EIS, these species are all wide-ranging and their home ranges may encompass a variety of habitat types. Species-specific standards and guidelines focus on protecting old-growth because this is the habitat type most affected by timber harvest activity. Where new science has indicated that certain species are more adaptable than once thought, information from pertinent peer-reviewed literature has been included in the Final EIS.

Comment: The focus on retention of high-volume timber stands in the Proposed Forest Plan is based on the assumption that past harvesting targeted these stands. However, for purposes of economical and operational efficiency, harvests prior to 1976 more typically involved entire

watersheds or portions of entire watersheds and the range of volumes associated with stands occurring there.

Response: This is true to some degree, but there is no doubt that the lower elevation stands, which generally have the highest volume and wildlife values, were harvested at a disproportionate rate (Table 3.9-7 in the *Biodiversity* section).

Comment: The Draft EIS does not disclose the continued effects of high-grading on the forest or the cumulative effects of continued high-grading on non-federal lands. The Final Proposed Forest Plan must address past high-grading of the most productive forest types on federal and non-federal lands. Some respondents contend that because past high-grading has reduced forest and habitat diversity, additional conservation measures need to be applied on the Tongass to minimize the loss of additional diversity; others expressed opposition to all high-grading. Others brought up timber harvest statistics suggesting that the Forest Service's estimate that only 8 percent of the timber harvested on the Tongass is cedar is actually closer to 20 to 40 percent, based on independent ground truthing, evidence that the Draft EIS and market demand analysis under represent the role cedar exports play in the Tongass timber program and the corresponding impact on the environment.

Response: Additional discussion of the historical disproportionate harvest on certain landforms and of certain forest types has been added to the *Biodiversity* section of the Final EIS and includes NFS and non-NFS lands. The *Biodiversity* section also includes an expanded discussion of old-growth representation within reserves and matrix lands for high-volume and large-tree POG and the effects of the alternatives on this representation, as well as an expanded cumulative effects analysis evaluating future disproportionate harvest on non-NFS lands. We assume that this comment actually refers to the statement in the Draft EIS that 8 percent of POG historically occurring on the Forest has been harvested, not yellow cedar. As noted on page 3-241 of the Draft EIS, our records indicate that hemlock and spruce account for 94 percent of trees harvested in most sales on the Tongass. Cedar occurs as a minor tree species in most stands. The comment that cedar represents up to 40 percent of the total past harvest is not supported by historical data.

Comment: Historically, the most productive forest types have been disproportionately targeted for logging. As an example, low elevation karst and valley-floor forests have been logged at 560 percent and 160 percent of their proportional availability, respectively.

Response: More information on the disproportionate nature of past timber harvest in Southeast Alaska has been added to the *Biodiversity* section of the Final EIS.

Comment: A number of comments were received regarding the protection of high-value or rare habitats (e.g., large-tree old-growth, karst lands, yellow cedar) and the natural range of environmental variability across the forest. Some respondents asked the Forest Service to protect these habitats, some suggested that new standards and guidelines need to be developed for remaining rare and large-tree forests and others suggested these elements be protected in each biogeographic province. Others commented that areas of intense logging seem to correspond with areas of concentrated wildlife use.

In their comments TNC and Audubon describe an analysis in which they used the protection of high-value habitats as a measure of the effectiveness of the conservation strategy and analyzed the existing protection afforded to focal species and ecosystems (large tree forests, deer, bear, salmon, and marbled murrelet) within existing reserves by biogeographic province. This analysis revealed that, in general, the provinces with the highest biological value are also those with the greatest vulnerability (i.e., least amount of high-value habitats protected). North Prince of Wales, East Chichagof, Revilla/Cleveland, Kupreanof/Mitkof, and others rank as the highest priorities for

additional conservation and restoration measures. The analysis also looked at cumulative ecological risk, recommending this as a tool to be used for adjusting the Tongass Conservation Strategy to prioritize conservation and restoration actions.

Response: Harvesting high-value stands, which has affected high-value habitats such as large-tree old-growth, karst lands, and cedar) is discussed in detail in the *Biodiversity* section of the Final EIS. The fact that some areas of high value to wildlife coincide with areas of high value for timber harvest is also discussed in the *Biodiversity* section. Of note is that while it is true that there is high biological value in areas where timber harvest is allowed, there are also many high biological value areas on the Tongass (as ranked by TNC and Audubon) that are fully protected (for example, Admiralty Island National Monument).

Comment: Page 3-120 in the Biodiversity section of the Draft EIS states that "Albert and Schoen (2006) estimate that region-wide approximately 29 percent of 242,211 acres harvested since 1986 occurred in large-tree (SD67) ecosystems, and approximately 72 percent of these forests remain intact." This statement occurred in an earlier report to ADF&G prior to completion of our conservation assessment. The statement was preliminary and needs additional clarification. In our final conservation assessment (Albert and Schoen 2007) we stated the following: "Region-wide only 12 percent of all productive old-growth has been harvested since 1954, but at least 28 percent of Southeast's large-tree forest types have been cut. It is important to recognize, however, that this percentage-derived from post-1986 selectivity coefficients-represents a significant underestimate of the original high-grading of the large-tree stands." This should be corrected in the Final EIS.

Response: Additional information from Albert and Schoen 2007 has been added to the *Biodiversity* section of the Final EIS. Our independent estimate of the percentage of past harvest of large-tree POG is higher than the percentage calculated by Albert and Schoen (2007). Using timber type mapping from the mid-1980s, we estimated that 29 percent of the large-tree POG on NFS lands and 37 percent of the large-tree POG on non-NFS lands was previously harvested, for a cumulative harvest rate of 32 percent (see Appendix B).

Comment: The Size-density Model should have been used throughout the Draft EIS analysis and tables in Section 3.9 and 3.13 should be revised to provide a summary by SDM class. The fact that the ecological sensitivity analysis of the Size-density Model was omitted from the biodiversity analysis of the Draft EIS is a major flaw and should be corrected in the Final EIS. It would also be useful if the Final EIS could also account for the SD7 class separately from the SD6 class because of their great rarity and value on the Forest.

Response: Tables showing the amount of POG, high-volume POG (SD5N, SD5S, SD 67), and large-tree POG (SD67) harvested and remaining, and a cumulative effects discussion on future harvest of POG, high volume POG, and large-tree POG, have been expanded in the *Biodiversity* section of the Final EIS. SD7 is not one of the types in the Size-Density model. It is assumed the commenter is referring to the old volume class 7, which is not statistically distinguishable from other types, based on existing mapping.

Comment: One respondent discussed the new tools that are available such as the Size Density Vegetation Model and the modeling work recently completed by The Nature Conservancy. They suggest that implementation not begin until these new tools have been incorporated.

Response: The Size Density model has been used throughout the analysis. The Nature Conservancy's work has been examined closely and has informed the analysis, especially in the areas of biodiversity and roadless area evaluation.

Legacy and Goshawk/Marten Standards and Guidelines

Comment: Some respondents supported Alternative 7 with some modifications. They felt that some of the Conservation Strategy Standards and Guidelines lacked a basis in science and should be removed from Alternative 7. These standards and guidelines include the 1000-foot beach buffer, OGRs, Class III stream buffers, the Legacy standard, and the Goshawk and Marten standards.

Response: Table 2-16, page 2-41 of the Draft EIS illustrates that Alternative 7 has none of these standards and guidelines except for the Class III riparian standard. Alternative 7 has been modified in the Final EIS and it no longer includes buffers on Class III stream. See Appendix D of the Final EIS for more information about the scientific rationale behind the conservation strategy.

Comment: The Draft EIS provides no supporting science for adopting the Forest Legacy standard and guideline as a replacement of the Marten Habitat and Goshawk Foraging Standards and Guidelines. Without this assessment there is no way to evaluate any benefits of the standard and guideline to wildlife. The Final EIS should include a qualitative and quantitative analysis of how the Marten Habitat and Goshawk Foraging Standards and Guidelines have been applied and the extent to which these requirements have impacted timber harvest activities.

Response: Appendix D of the Final EIS provides the rationale behind the development of the Forest Legacy standard and guideline as well as an assessment of how it compares to the existing Marten Habitat and Goshawk Foraging Standards and Guidelines.

Comment: Risk levels (i.e., low, medium, and high) of VCUs used to determine application of the Legacy Standards and Guidelines in the Final EIS and Final Proposed Forest Plan should incorporate timber harvest on all land ownerships.

Response: The Final Proposed Forest Plan specifies only higher-risk VCUs in the application of the Legacy standard and guideline; the harvest level for determining risk category does not include all land ownerships, though it is anticipated that harvest on these lands will continue into the future. The overall conservation strategy design accounts for cumulative effects on non-NFS lands, and therefore the analysis of VCUs for application of Legacy has considered only the NFS portion of VCUs.

Comment: Because natural openings in old-growth forest on the Tongass average 2 acres, the Legacy standard and guideline should be implemented in all harvest units greater than 2 acres, as required under the existing Goshawk Foraging and Marten Habitat Standards and Guidelines, versus the 20 acre requirement under the Legacy standard and guideline. The loss of legacy retention in units between 2 and 10 acres in High Risk VCUs would increase impacts of logging on the goshawk and other old-growth associated species in landscapes where they are already most at risk.

Response: The use of 20-acres for the minimum unit size where the Forest-wide Legacy standard and guideline applies was selected because it represents a typical logical logging system setting, based on analysis of the LSTA. In order to better balance wildlife conservation concerns and timber sale operability concerns, this unit size was selected. This change may not be as beneficial as the 1997 Plan Goshawk Foraging and Marten Habitat Standards and Guidelines for some species. For wildlife species sensitive to forest fragmentation, clearly smaller units would have less impact than larger units. However, there is no strong empirical evidence on what the maximum unit size is before a clearcut becomes a barrier. It is also important to consider that wildlife encounter a range of conditions and natural fragmentation on the Tongass. Opening sizes from natural wind events range up to 1,000 acres, but are typically less than 40 acres (Nowacki and Kramer 1998). While there could be openings up to 20 acres without retention of legacy, we anticipate that there would be a mix of openings in a typical timber sale layout because of the

OGRs in buffers, over-steepened slopes, and other protection measures associated with those units. Appendix D of the Final EIS provides additional discussion of the rationale behind the development of the Legacy standard and guideline.

Comment: The Forest Legacy standard and guideline could result in trees retained along the perimeter of a harvest unit, unlike the Marten Habitat and Goshawk Foraging Standards and Guidelines which require that trees be individually spaced or retained in clumps.

Response: The legacy standard and guideline is simpler and clearer than the goshawk and marten standards. The intent is similar – retain forest structure in units. The standard is clear that this structure is meant to be within the harvest units, not on the edge, though it does provide for exceptions when logging systems preclude this. Continued Forest Plan monitoring provides for continual monitoring of this to ensure that legacy retention within units is occurring. Adjustments can be made through adaptive management if it is determined that objectives are not being met. Additional technical information has been added to the Timber and Forest Health sections to discussions regarding legacy and other retention standards and guidelines and to Appendix D of the Final EIS.

Comment: Several comments were received requesting clarification as to what harvest units the Legacy Standards and Guidelines would apply. One respondent stated that neither the Proposed Forest Plan nor the Draft EIS provide a scientific rationale for the criteria for defining the maximum sizes of units that can be harvested and still retain legacy forest structure, and how much legacy forest structure should be maintained, because both the maximum size of openings allowed and the amount of forest structure to be left depend on the risk level within the VCU. Other respondents were opposed to applying the Legacy Standards and Guidelines to all harvest units (or altogether), suggesting this would hamper timber sale economics by distributing timber harvest and setting aside the most economic timber stands in areas that are managed for multiple use.

Response: Based on further analysis and public comment, the Legacy standard has been refined for the Final Proposed Forest Plan. The Legacy Standards and Guidelines are to be applied only in higher-risk VCUs where 33 percent or more of the POG has been harvested as of 2005, or VCUs where less than 33 percent has been harvested but more than 67 percent of the POG is projected to be harvested by the end of the Forest Plan planning horizon. Within these VCUs the only criterion related to unit size is that the standard is to be applied to the original planned harvest units of 20 acres or greater. Appendix D of the Final EIS provides information on the rationale behind the development of the Legacy standard and guideline.

Comment: Several respondents questioned whether a mechanism would be in place for ensuring that legacy retention is protected from future removal, be it salvage or commercial harvest, firewood collection or personal use. A suggestion was made to develop a legacy structure tracking system.

Response: Standard and guideline IV.B of the Final Proposed Forest Plan states that Legacy forest structure should remain indefinitely after harvest and shall be tracked through the life of the next stand. Salvage logging of legacy trees is generally prohibited unless the rationale is clearly documented and the effects are clearly neutral or an improvement.

Comment: The Forest Legacy standard and guideline is a cookie-cutter approach that is inappropriate for an island archipelago. This approach fails to account for island size, fragmentation, the uniqueness of the area, the presence of karst or other landscape features, or the presence of endemic mammals. It also fails to account for impacts on adjacent private lands.

Response: The design of the conservation strategy took into account a variety of factors, including biogeographic province differences (which incorporates the fact that the Tongass is an island archipelago), fragmentation, and endemics. The OGR system in the conservation strategy fundamentally is a 'coarse filter' approach to addressing wildlife viability and the conservation of biodiversity. In addition, a variety of other coarse filter standards and guidelines provided connectivity between the reserves. At the "fine filter" level, species-specific standards were fully considered in light of additional information such as conservation assessments, panel assessment results, etc. and appropriate standards and guidelines were incorporated for species that needed additional protection measures to assure their viability and well-distributed status. The design of Forest Legacy standard and guideline also took into account past and future harvest within a VCU.

Comment: The Reserve Tree/Cavity-nesting standard and guideline leaves unanswered the question of how many trees and what sizes.

Response: The generality of these standards and guidelines is intended to leave some flexibility in its implementation as the quantity and quality of available reserve trees will vary by project location. This standard and guideline has not changed since 1997.

Comment: There is no science behind the 100-acre goshawk nest buffers. It is likely that the nest buffers afforded bald eagles would be sufficient for goshawks (8 acres versus 100 acres).

Response: Much information, including peer reviewed science, related to goshawk nest sites and use areas exists. Such information was used to inform development of the standard and guideline requiring the nest buffer included in the Final Proposed Forest Plan.

Comment: Foresters have recently field-applied the proposed Legacy standard and guideline and have concluded that it only slightly improves the economics of timber sales over the current Forest Plan and only marginally offsets the impacts of the OGRs and other conservation strategy measures in place. The commenter indicated they would like to see the research called for in the May 1994 "Response to the peer review of: a proposed strategy for maintaining well-distributed viable populations wildlife associated with old-growth forest in Southeast Alaska" completed and a full NEPA analysis made prior to proposing implementation of this standard and guideline.

Response: The various peer reviews conducted for the 1997 Forest Plan Revision were incorporated as applicable into the associated analyses which lead to the 1997 Forest Plan. That information is available in the 1997 Forest Plan planning record. The conservation strategy included in the 1997 Forest Plan was reviewed in 2006 and the Forest Service concludes the conservation strategy is still sound and an appropriate approach for the Tongass National Forest. The Legacy Standard has been modified for the Final Proposed Forest Plan.

Population Viability

Comment: The rating for Alternative 4 needs to be corrected on page 2-51 of the Draft EIS.

Response: This has been corrected in the Final EIS.

Comment: Carrying over results of the 1997 expert panel risk assessments and associated "likelihood ratings" into the Draft EIS should be justified, particularly in the case of wolves and endemic species in light of recent scientific findings..

Response: Appendix D of the Final EIS contains a detailed description of the 1997 panel assessment process, results, rationale for carrying over applicable results into the Final EIS, and a discussion of where new science differs from information used by the panel to rate alternatives.

Comment: Several comments were received about the population levels managed for under the Proposed Forest Plan. Some felt that the standard for fish and wildlife population levels should be based on sustainability rather than viability because a sustainable population provides for both human use and biological survival whereas viability only guarantees survival in the absence of human use. These respondents noted that the standard of sustainability is consistent with the State of Alaska's constitution. Others felt that the conservation strategy should focus on "abundant or moderate," "abundant and useable," or "sustainable and normally distributed" populations because they are more likely to sustain moderate levels of human use or meet regional subsistence needs.

Response: The Forest Service is complying with direction under the NFMA to maintain viable wildlife populations. It is recognized that minimum viable populations for many species may not satisfy the public need for wildlife populations depended upon to meet subsistence and/or sport hunting uses. Lengthy discussion is found in the *Subsistence* and *Wildlife* sections of the Final EIS regarding such species.

Comment: **The characterization of Alternative 7 as having a moderate to low likelihood of maintaining viable and well-distributed wildlife populations across the Tongass because of the elimination of the old-growth reserve system is not founded in science. The fact that this alternative is the least protective does not automatically translate into a risk for a species.**

Response: This statement has been modified to indicate risk relative to Alternative 5 No Action, which is equivalent to Alternative 11 of the 1997 EIS that had been evaluated by a risk assessment panel using the best available science. Due to elimination of the old-growth reserve system under Alternative 7 and the increase in area of development LUDs, Alternative 7 would have a reduced likelihood of maintaining viable, well distributed populations relative to Alternative 5.

Comment: The Draft EIS does not adequately address the potential value of harvest regulations and access control, in combination with habitat management, in helping assure the viability of some wildlife species.

Response: While the Forest Service has a role in setting harvest regulations through the Federal Subsistence Board, the Forest Service, by itself, cannot set or manipulate wildlife harvest levels. Therefore, harvest regulations are not considered as a sole means to mitigate effects to wildlife. However, we do recognize our ability to work within the federal system and to work cooperatively with the State in considering harvest regulations if needed. This is discussed as a specific means for mitigating the effects of timber harvest on species that are sensitive to over harvest (legal and illegal) due to increased human access along roads (e.g., marten, wolves). Access control is discussed in the *Wildlife* section of the Final EIS where appropriate; however decisions to close or maintain open roads are made at a district or project level and therefore are described only generally in the Final EIS.

Comment: The Draft EIS fails to address the joint statements issued by the Peer Review Committee, a distinguished panel of 12 PhD scientists assembled by the PNW Research Station, in 1996 in response to the release of the Draft EIS of the 1997 Forest Plan, and in 1997 after the release of the Final EIS. The 1996 statement concluded that (1) the best available science indicated substantial risk to the viability of wildlife associated with old-growth forests of Southeast Alaska; (2) none of the action alternatives included measures which would ensure the continued viability of all old-growth associated species on the Tongass; (3) deferring adoption of an effective plan to ensure viability of wildlife populations entails serious risk to Tongass wildlife;

and (4) the Forest Service should address new alternatives that a full array of necessary conservation measures. The 1997 statement concluded that the final management plan did not incorporate any of the review committee's findings in fundamental ways and the plan would not protect viable, well-distributed populations of vertebrate species on the Tongass.

Response: The Tongass conservation strategy has been implemented for 10 years and has not resulted in the decreased viability or listing of any species. It continues to be one of the most detailed and comprehensive strategies among national forests. In addition, over the course of its implementation the level of harvest has been substantially less than that anticipated by the peer review committee during their review. The 2008 alternatives also consider the peer review committee recommendations. The conservation strategies of Alternatives 1, 2, 3, 5 and 6 include enhanced connectivity through maintaining the 1,000-foot beach fringe, Riparian Standards and Guidelines, and other standards and guidelines that together would protect at least 66 to 74 percent of the existing POG inside the matrix (development LUDs) after 100+ years of maximum Forest Plan implementation (harvesting at the maximum harvest level). Further, from 71 to 93 percent of all existing POG on the Tongass would be protected in reserves. These alternatives would also provide at least one very large reserve within each biogeographic province. Appendix D has more information about the conservation strategy and the science that led to its development.

Comment: Several respondents expressed confusion over the conclusions drawn in Table 2-17 of the Draft EIS regarding viability ratings for some of the species under consideration.

Response: Appendix D of the Final EIS provides detailed background information on the viability panel assessments convened prior to the 1997 Forest Plan, and their application to the 2008 Final EIS.

Comment: Much of the Proposed Forest Plan deals with the management of "buzz words." The terms biodiversity, old-growth, endemics, extinction, protection, and endangered are not concisely defined or clearly set in the context of forest management. Old-growth appears to refer to "forest that has not been previously harvested by humans." Local extinction can be at any scale and should be defined, as should the term protect, which appears it the context of the Forest Plan to be protection from timber harvest. The Final Proposed Forest Plan should also define at what level endemism is considered (population, subspecies, species); the plan is also contradictory in describing "well-distributed" populations of endemic mammals across the Forest" (i.e., if populations are not well-distributed they are not endemic).

Response: The Glossary, which is located in Chapter 7 of the Proposed Forest Plan, defines these terms. Biological diversity is defined as "The variety of life forms and processes, including the complexity of species, communities, gene pools, and ecological functions, within the area covered by a land management plan." Endemic is defined as "restricted to a particular locality, or occurring at low levels" giving the example of "a particular species or subspecies may occur on only one or a few islands." Extinction is defined as "any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range," the definition given under the ESA. An endemic population may occur within a restricted range (i.e., island or group of islands), but can be widely-distributed within this range. Extinction, as described under the definition of Endangered, relates to all or a significant portion of a species range.

Management Indicator Species

Comment: Several respondents made suggestions for species that should be added to the list of MIS, including the marbled murrelet, Canada lynx, and wolverine. One respondent believed that recommendations made in 1999 by the Interagency Monitoring and Evaluation Group MIS subcommittee to reduce the current list of 13 species to 6 had been accepted and implemented on the ground for numerous timber sales. This respondent also felt that a discussion of changes to

the MIS list should have been disclosed in the Draft EIS. Another respondent felt that use of the MIS concept was appropriate only at very broad scales (i.e., indicators of old-growth) because but was not sufficient for finer levels of habitat selection such as specific features within old-growth forest (i.e., canopy openings, snags, or downed wood).

Response: An effort to re-evaluate the current list of MIS has been ongoing since 1999; however it is separate from this Forest Plan Amendment because any changes will depend, in part, on the selected alternative. Any changes to this list will be considered during this process. As noted in the Final EIS, there are currently 13 MIS wildlife species, each of which was addressed in the analysis. Each of these species was selected for different reasons. Some are representative of large tracts of old-growth habitat, however others were selected for their use of other habitat types, sensitivity to human disturbance, importance as subsistence/hunting resources, or use of specific features within old-growth forest (i.e., cavity nesters).

Comment: The Forest Service should not use MIS that are introduced on islands because they often do not adequately represent the responses of native fauna to habitat conversion and human disturbance. Red squirrels and marten are two examples of MIS that have been introduced to several islands in the archipelago and therefore should not be used as MIS in these locations.

Response: The MIS for the Tongass were selected so under the auspices of the 1982 Planning Regulations in which species of interest, whether native or non-native, could be considered as MIS. The list of MIS is currently under review and is likely to change in the future. This is based in part on evaluations of monitoring information since 1997 and associated analyses summarized in Chapter 3 of the Final EIS.

Wildlife Cumulative Effects

Comment: The cumulative loss of habitat value for deer, bear, large-tree forests, marbled murrelets, and salmon under Alternatives 4, 5, 6, and 7, when considered in combination with activities on adjacent non-NFS lands, represents greater than 45 percent of habitat forest-wide, and greater than 67 percent of habitat value in the North Prince of Wales and Kupreanof/Mitkof biogeographic provinces, as demonstrated by the Coastal Mountains and Forests Ecoregional Assessment (Albert and Schoen 2007).

Response: It is true that two of the most heavily developed provinces are North Prince of Wales and Kupreanof/Mitkof. The cumulative loss of old-growth habitat, taking all land-ownerships into account, is quantified and discussed in the *Wildlife* and *Biodiversity* sections of the Final EIS. Table 3.9-20 in the *Biodiversity* section indicates that the cumulative loss of POG after 100+ years of Forest Plan implementation at maximum levels would be 24 to 29 percent for all of Southeast Alaska under these four alternatives counting all ownerships. For the North Central Prince of Wales province the cumulative loss would be 49 to 56 percent and the cumulative loss would be 39 to 47 percent for the Kupreanof/Mitkof province..

Comment: Assumptions that non-federal lands have zero habitat capability and that there is a direct relationship between the amount of productive old-growth and the abundance of marbled murrelets and flying squirrels are incorrect.

Response: Substantial timber harvest has occurred on non-federal lands adjacent to the Tongass. Therefore the analysis in the *Wildlife* section takes a conservative approach by assuming that these lands provide little habitat value because continuing harvest activities are expected to occur in the future. The *Wildlife* section recognizes that relatively little is known about the terrestrial habitat relationships or population trends and abundance of marbled murrelets in Southeast Alaska, though nesting has been documented in old-growth. Therefore, the analysis focuses primarily on harvest of productive old-growth and because the scope of the analysis for this Forest Plan Amendment is related to timber demand. Harvest of productive old-growth is listed in the Final EIS as one of several possible causes of the estimated overall declines documented in the Alaska marbled murrelet population. Similarly, the Final EIS does not assume that flying squirrel abundance is solely dependent on old-growth but cites recent research that has documented their use of peatland-scrub-mixed conifer forests.

Comment: Table 3.4-3 of the Draft EIS suggests that Alternative 7 would reduce the productive old-growth by 31 percent. How is this possible when we will harvest less than 21 percent of the commercial timberland? Is the table referring to just the commercial old-growth outside of the congressional set-asides?

Response: Table 3.4-3 of the Draft EIS states that currently 88 percent of the POG existing in 1954 remains on the Tongass. Under Alternative 7, 69 percent of 1954 POG would remain long-term if percent Alternative 7 is selected and harvests at the highest rate modeled. The table also includes non-NFS harvests and the 31 percent refers to the reduction about 100 years from now relative to 1954 levels. In the Final EIS, this estimate has been refined to a 30 percent reduction relative to original POG levels.

Restoration and Young-Growth Management

Comment: Silvicultural treatments have been shown to be effective on the Tongass in increasing the amount of understory shrubs important as deer forage and as habitat for small mammals and shrub-nesting birds and should be recognized for their current and future contributions to habitat. Several respondents requested that the Final EIS acknowledge that there are many uncertainties related to the benefits and application of young-growth management as a tool for enhancing wildlife habitat given that some studies have documented correlations that indicate adverse effects (i.e., increased risk of black-tailed deer fawn mortality associated with pre-commercial thinning).

Response: A statement about the uncertainties related to young-growth management has been added to the text.

Comment: The Forest Service should shift priorities from timber harvest and road building to stream restoration and habitat enhancement.

Response: Stream restoration and habitat enhancement have been priorities on the Tongass for many years. The Final Proposed Forest Plan lists the maintenance and restoration of aquatic habitats as a forest-wide multiple use goal and lists designing and implementing structural and non-structural wildlife habitat improvement projects as a management objective (Forest Plan 2-3).

Comment: Please explain why you are adding "habitat restoration treatment" as a reason that programmed timber harvest can be done in the beach buffer. We fully support such restoration treatments, including commercial thinning, but this needs to be done with particular caution. The beach fringe should not be logged for commercial gain in anything other than a way that specifically benefits the beach fringe buffer values. When those interests overlap, then commercial timber harvest should be pursued.

Response: No programmed timber harvest would occur in the beach buffer; however, thinning or other treatments could occur if it is designed to improve wildlife habitat in dense young-growth stands. Timber cut for this purpose, if excess to down woody debris needs, could be sold, but this volume would not contribute to ASQ.

Comment: We recommend allowing selective harvest of second-growth timber in portions of the beach and estuary buffers that is more than 500 feet from the water, and in portions of riparian buffers that are more than 100 feet from rivers and streams; we do not support old-growth harvest in these buffers.

Response: The Final Proposed Forest Plan permits thinning dense young-growth stands in beach and riparian buffers to improve habitat.

Threatened, Endangered and Sensitive Species

Comment: Several suggestions were made to add species to the Regional Forester's Sensitive Species list as part of the Forest Plan Amendment. Several respondents suggested listing the marbled murrelet, given that the recent USGS status review indicates declines in the available habitat and the population in Southeast Alaska. Suggestions were also made to list *Martes caurina,* given its low numbers on Kuiu Island. Another respondent suggested adding endemic species.

Response: The Regional Forester's Sensitive Species list is currently undergoing review but this endeavor is separate from this Forest Plan Amendment and will occur on a separate time frame.

Comment: The U.S. Department of the Interior concluded that because the Kittlitz's murrelet, found in marine waters north of the Tongass, is most susceptible to recreation near tidal glaciers and high elevation land activities such as mining, changes reflected in the Proposed Forest Plan do not appear to pose a significant risk to this species.

Response: We concur with this conclusion, as indicated in the Final EIS.

Comment: No threatened or endangered species under the jurisdiction of the Fish and Wildlife Service exist within the project area. In response to the court-ordered remand the USFWS is currently evaluating the status of the Queen Charlotte goshawk and its habitat to determine if Vancouver Island is a significant portion of its range and, if so, whether listing under the ESA is warranted for all or part of the goshawk's range. In addition to the goshawk, the Alexander Archipelago wolf has previously been petitioned for listing; and the Kittlitz's murrelet is a candidate species. In addition there are numerous other endemic and sensitive species on the Tongass that will require continued collaboration between the Forest Service and USFWS in developing conservation provisions.

Response: The only federally listed species under the jurisdiction of the Fish and Wildlife Service determined in the past to occur on the Tongass National Forest is the peregrine falcon, which was delisted in 1999. An updated biological assessment has been prepared that addresses effects to this species. Information from the recent goshawk status review and 12-month finding has been incorporated into the Final EIS. Information regarding the Kittlitz's murrelet is also incorporated. We agree that there are many opportunities for collaboration with the Fish and Wildlife Service and are committed to continuing these endeavors.

Endemic Species

Comment: Standards and guidelines related to endemic mammals should emphasize climate change and connectivity between populations. Marten should be an emphasis of survey efforts.

Response: Standard and guideline VIII.A.2 of the Final Proposed Forest Plan relates to connectivity between populations of endemic mammals. Regarding species to survey, the species listed in standard and guidelines VIII.A.1.C of the Final Proposed Forest Plan are given as examples; it is inferred that marten are included in the medium-sized mammal category. Also see comments and responses in the Climate and Air section of this appendix.

Comment: The Draft EIS fails to adequately assess impacts to endemic mammals and the proposed plan fails to ensure viability of these species. The Draft EIS does not address impacts of the proposed plan on endemic mammals. It also fails to list specific islands or groups of islands with endemic fauna or recognize that a different management scheme may be warranted for such areas. Despite concerns about the inadequacy of the conservation strategy to protect endemic species expressed at the recent 2006 Conservation Strategy Review Workshop the Draft EIS fails to recognize these concerns.

Response: Additional information, much of which was presented at the 2006 Tongass Conservation Strategy Review workshop, has been added to the Final EIS text, including the opinion of some scientists that an island-centered management plan would be appropriate for the Tongass. Effects of the proposed plan on endemic mammals are discussed in the *Wildlife* section; additional discussion related to the ability of the conservation strategy to support viable endemic mammal populations is included in Appendix D.

Comment: Several comments were received regarding the project-level Forest Plan requirement for mammal surveys. Suggestions included requiring surveys for endemic mammals on all islands, not just those less than 50,000 acres; requiring surveys for all timber sales; requiring that surveys be conducted for rare and endemic birds, amphibians, and insects; and that the Final Proposed Forest Plan include considerations for adjusting timber harvest on islands as more information is gained on the habitat associations and population status of endemic species. Suggestions were also given for the intensity of surveys.

Related comments suggested that standards and guidelines basing the need for endemic mammal surveys on whether there is a "high likelihood" of the presence of an endemic mammal is too low a standard, given the lack of knowledge about endemics on the Forest.

Response: Surveys are required on all islands smaller than 50,000 acres and on islands larger than 50,000 acres if there is a high likelihood that endemic taxa are present and a high likelihood that these species would be affected by the proposed project (Wildlife Standards and Guidelines). Survey intensity will be decided on a project by project basis, depending on the size and type of project and level of anticipated disturbance, and information gained from these surveys (as well as from ongoing research) will be used to minimize the effects of forest management activities on endemic species. In addition, site-specific NEPA analysis generally consider the effects of the project on a wide range of wildlife species. Biologists use a combination of existing information, surveys and habitat assessment to determine effects. While having survey information is valuable, biologists generally assess the effects to species habitat if the species is suspected to be present, whether or not actual presence is verified.

The OGR system in the conservation strategy fundamentally is a 'coarse filter' approach to addressing wildlife viability and the conservation of biodiversity. In addition, a variety of other coarse filter standards and guidelines provided connectivity between the reserves. At the "fine filter" level, species-specific standards were fully considered in light of additional information such as conservation assessments, panel assessment results, etc. and appropriate standards and guidelines were incorporated for species that needed additional protection measures to assure their viability and well-distributed status.

The Wildlife Standards and Guidelines direct the Forest to conduct surveys when existing information on the distribution of endemic mammals is inadequate to assess project-level effects. It states that surveys should be conducted if there is a "high likelihood" that an endemic mammal could be affected by the proposed project, not if there is a high likelihood of its presence. Thus a proposed timber harvest in an area with little or no information on endemic mammals would require surveys.

As new information on endemics or other species is obtained, changes to the amended Forest Plan can be considered through the periodic Forest Plan review process, which occurs every 5 years, or at any time through an amendment.

Comment: Some respondents suggested that removing islands less than 1,000 acres from the timber base (to eliminate risk associated habitat loss or alteration) was sufficient to ensure viability of the 14 endemic mammals considered by the risk assessment panel and that other protective measures were unnecessary and costly, resulting in road construction and development in areas that would otherwise be untouched.

Response: Since 1997 a wealth of new information has been gained regarding endemic mammals on the Tongass which, in addition to expanding the knowledge base, has highlighted the substantial uncertainties that exist related to the population status and distribution of many species. Recent studies have also identified species in addition to the 14 species considered by the risk assessment panel and indicated that within Southeast Alaska the Prince of Wales Island complex is an endemism hot spot. Protective measures for endemic mammals include conducting surveys in areas where knowledge about the presence or distribution of endemic species is lacking and where projects could affect endemic species. Given the uncertainties that exist and the prevalence of endemism, these protective measures are appropriate for minimizing effects to endemic species. Moreover, conducting project-specific surveys for endemic mammals has no relation to the expansion of road construction and development in undeveloped areas.

Comment: Given that the insular landscape of the Alexander Archipelago has produced highly endemic populations, and is considered a hotspot for lineage diversity. The 2006 Conservation Strategy Review indicated that endemism was a "top priority" for the Tongass and that the Conservation Strategy fails to adequately address endemism on the Tongass. A new conservation paradigm should be developed for the Tongass under which each island is considered a unique biological unit until a better understanding of connectivity among these divergent populations is developed. Similar comments related to the lack of alternative conservation strategies considered in the Draft EIS.

Response: The general structure of the conservation strategy includes a system of OGRs and species-specific standards and guidelines that apply to matrix lands. Furthermore, the development of this strategy for the 1997 plan did take into account endemic species. Given that there are many uncertainties related to the effectiveness of the conservation strategy, each element of the conservation strategy requires consistent implementation across all islands. However, during project implementation, characteristics of individual islands are taken into account. All islands less than 1,000 acres are also fully protected. In addition, in a review of the conservation strategy, which has been incorporated into the Final EIS, Haufler (2007) indicated that a complete revision of the conservation strategy is not needed. Increasing our knowledge of endemic mammals continues to be a high priority for information needs on the Tongass (Appendix B of the Final Proposed Forest Plan) and as new information on endemics or other species is obtained, changes to the amended Forest Plan can be considered through the review process. See also related comments and responses above.

Comment: The location and status of endemic species is absent from the Draft EIS. The Forest Service is not incorporating scientific information on sensitive species into its management plans and not trying to locate this information. Arthropods, birds, and plants have not been surveyed as thoroughly as mammals, though there is a high likelihood that endemic forms will be found across these groups. Surveys should be required for non-mammalian rare and endemic species.

Response: Knowledge related to endemism on the Tongass (i.e., number of endemic species, distributions, and population status) is constantly expanding and being refined. The Final EIS addresses this by referencing some of the most recent peer-reviewed publications on this topic, but focusing the discussion of endemics on larger, Forest-level issues including landscape connectivity and fragmentation which relate to all endemics. We agree with the statement that survey efforts and existing scientific information are skewed toward endemic mammals but that there are likely many more non-mammalian endemic species on the Tongass. See also related comments and responses above.

Comment: The second definition for endemic in the Proposed Forest Plan glossary ("low occurrence of individual trees blowing over in a particular location") should be removed as this definition does not appear anywhere in the Proposed Forest Plan or Draft EIS.

Response: This term is used in the EIS. The definition in the glossary has been modified to better explain how it is used in the text.

Comment: The process for designating a subspecies is subjective and imprecise, and there are no quantitative criteria on which to base such designations. Therefore, it is inappropriate to uncritically accept designations such as the Queen Charlotte Goshawk and the Alexander Archipelago Wolf, which figure prominently in the Proposed Forest Plan.

Response: The Forest Service does not have legal authority to make determinations about the taxonomic status of a species. Subspecies addressed by forest planning documents are those currently recognized by the U.S. Fish and Wildlife Service.

Comment: The "Island Theory of Biodiversity" does not fit well with the Tongass. We have islands of development in a sea of old-growth. The short reaches of water between islands have proven not to be a barrier. Animals swim from island to island quite easily, which is why even very small islands have a diversity of wildlife. Differing areas traditionally have more or less of a particular species regardless of logging.

Response: It is true that some larger, more mobile species do swim between islands; however there are many smaller, less mobile species that are not capable of swimming and thus do not interact with subpopulations on other islands. It is likely that these less mobile animals populated the islands during periods when low sea levels created land connections.

Comment: Due to levels of past timber harvest, every timber sale on Prince of Wales Island should go through a rigorous scientifically designed inventory to assess impacts on endemic plants, birds, amphibians, and mammals.

Response: Endemic species were considered in the conservation strategy and some standards and guidelines, including Legacy, also take them into account. As noted in the *Wildlife* section of the Final EIS, there are likely many endemic non-mammalian species on the Tongass. However, current Forest Plan standards and guidelines focus on endemic mammals. Under the Forest Plan, surveys will be required for timber harvests on larger islands where there is a high likelihood that endemic taxa are present and a high likelihood that they would be affected by the proposed project. The extent and rigor of surveys will be commensurate with the degree of existing and proposed forest fragmentation, and potential risk to endemic mammals that may be present. See also related comments and responses above.

Birds—General

Comment: The selection of bald eagle nest sites in proximity to the shoreline makes it unlikely that a reduction in the beach buffer under Alternative 7 would result in risk to bald eagle

populations. Given the federal regulation for a 330-foot zone around bald eagle nests, a 330-foot beach buffer should be more than adequate.

Response: There is no statement in the analysis of effects to bald eagles that a reduction in the beach fringe under Alternative 7 would result in risk to the bald eagle population but rather it would reduce protection of nests located beyond 500 feet of shoreline to the 330-foot buffer surrounding them. Thus nesting habitat beyond 500 feet of the shoreline and outside of the nest buffers could be removed by timber harvest or road building. As stated in the Draft EIS, recent research indicates that nesting activity is reduced within 948 feet (300 m) of clearcuts, indicating that the 330-foot buffer may be inadequate to mitigate effects of harvest (Gende et al. 1998).

Comment: The local distribution of breeding birds may change but it is unlikely that any species will be at risk of major population declines. Timber harvest may create suitable habitat conditions for a number of species.

Response: It is true that timber harvest may adversely affect some species while benefiting others. A statement regarding the potential benefits of timber harvest to some bird species has been added to the Final EIS.

Comment: Surveys for raptors in proposed management areas should include forest owls, specifically western screech owls, barred owls, and northern saw-whet owls.

Response: The Wildlife standard and guideline for Heron and Raptor Nest Protection in the Final Proposed Forest Plan specifies that surveys required for raptor nesting habitat include the habitat of hawks and owls.

Comment: Classical fragmentation and effects of habitat loss (I.e., nest parasitism, loss of species, increased predation) are unlikely to be realized on the Tongass National Forest given the amount of remaining old-growth habitat, the rapid reestablishment of young forest on harvested sites, and the fact that some studies in western forests have not documented the same fragmentation/edge effects found in eastern forests.

Response: While studies of bird community response to timber harvest alternatives to clearcutting in Southeast Alaska indicate that creation of forest edge may increase nest predation rates, it is true that the actual response depends on a broad array of factors and is highly variable. This has been clarified in the Final EIS text.

Comment: Resident and migratory landbirds have been neglected in the planning process. Monitoring and habitat management considerations of cavity-nesters, other forest-associated species, and other species identified by state and national conservation plans as vulnerable (i.e., the olive sided flycatcher) should be incorporated into the Final Proposed Forest Plan.

Response: Maintenance of the biodiversity of all species was considered in the development of the conservation strategy. The Forest Service cooperates in the Alaska Landbird Monitoring System (ALMS) and other bird monitoring programs. Additional information needs by program area, including wildlife, will continue to be evaluated and prioritized using the framework described in Appendix B of the Final Proposed Forest Plan.

Marbled Murrelet

Comment: Respondents expressed opposing views on the status of marbled murrelet populations in Southeast Alaska. Some respondents were under the impression that the population was stable and did not appear to be in trouble, suggesting that the species was unlikely to be affected by levels of timber harvest proposed under the alternatives. Others cited the recent USGS status review (Piatt et al. 2007) which indicates that the population has declined substantially, as has suitable habitat. These respondents requested that this status review be referenced in the Final EIS and that additional species-specific standards and guidelines be added to the Final Proposed Forest Plan. One respondent commented that the analysis should consider effects of timber harvest on marbled murrelet habitat and should quantitatively evaluate how much marbled murrelet habitat is protected by OGRs and the effectiveness of this protection.

Response: Information on marbled murrelet ecology and status in Southeast Alaska published in 2007 has been added to the text. Effects of timber harvest on old-growth habitat are discussed under the marbled murrelet subsection of the wildlife analysis and tables indicating the distribution and protected status of this habitat are provided in the *Biodiversity* section.

Comment: Uneven-aged management should be specifically defined in relation to its use as mitigation for loss of marbled murrelet habitat and information on gap sizes and interspersion of individual trees or patches in cutting units should be provided to judge the effectiveness of this prescription.

Response: The definition and application of uneven-aged management is provided in the *Timber* section of the Final EIS. As noted in the *Timber* section, there is a lack of scientifically documented information on uneven-aged harvest in Southeast Alaska from which to document the effectiveness of this prescription. This has been the subject of retrospective study and is outside the scope of the Final EIS analysis. In terms of marbled murrelet habitat, uneven-aged management by definition reduces the loss of suitable habitat by maintaining mature forest within harvested units.

Comment: Providing 600-foot buffer zones around marbled murrelet nests provides no effective benefit because nests are difficult to detect. Respondents suggested eliminating this S&G and reinitiating marbled murrelet at-sea surveys. Other respondents voiced support for project-level surveys.

Response: A statement about the difficulty of detecting marbled murrelet nests has been added to the text. Given the current legal status of the marbled murrelet, it is unlikely that either at-sea or forest-wide nest surveys would be reinitiated or required. However, the Forest Service recognizes that declines in the population and available nesting habitat in Southeast Alaska have been documented. Information from the recent USGS status review (Piatt et al. 2007) has been added to the Final EIS text. The occurrence of marbled murrelets is assessed at the project level and surveys within suitable habitat could be conducted concurrently with other studies.

Comment: It is unclear what Forest Service supported marbled murrelet research is ongoing as stated in Appendix B.

Response: Appendix B of the Final Proposed Forest Plan has been modified to reflect the overall information needs program and acknowledges the many efforts to gain such information that is ongoing by state and federal agencies, academia, and many others. Specifics to marbled murrelet are not included in Appendix B now, but left to the appropriate entities that continue to study the species. Appendix B includes a greater intent to share and coordinate between those entities so all can benefit more readily when such information is available, as well as explore opportunities to share in the investments for new information.

Comment: For marbled murrelets, maintaining old-growth habitat for nesting is essential to the persistence of the species. When fully implemented the Tongass conservation strategy should provide adequate nesting habitat, therefore the old-growth reserve network should be maintained in the Final Proposed Forest Plan.

Response: The 1997 marbled murrelet panel assessment determined that the conservation strategy, including the old-growth reserve system, would have a high likelihood of maintaining well-distributed, viable populations in Southeast Alaska.

Comment: There is no science to support the conclusion that Alternative 7 would harm the viability of marbled murrelets.

Response: Additional information has been added to the *Wildlife* section of the Final EIS and Appendix D has been added which summarizes the 1997 marbled murrelet panel assessment.

Comment: The Draft EIS does not explicitly evaluate the cumulative effects of the alternatives on the long-term sustainability of marbled murrelets in Southeast Alaska.

Response: The effects analysis for marbled murrelets draws on the findings of the 1997 expert panel assessment. It is important to note that the conclusions drawn by the panel took into account the level of past and likely future harvest on non-NFS lands. Likelihood scores, which are described in more detail in Appendix D of the Final EIS, recognized this cumulative harvest. Therefore, the viability ratings represent a cumulative effects prediction for each alternative. The Biodiversity section quantifies the amounts of total POG, POG in reserves, POG in matrix, high-volume POG, large-tree POG, and other categories of POG at present and in the future under the alternatives.

Goshawk

Comment: Several respondents expressed concern that the existing and proposed Goshawk Nest Standards and Guidelines do not provide adequate protection. Reasons cited were that only a small number of nests have been found; proposed standards and guidelines potentially allow all the trees around a nest site be cut as long as there are 300 acres old-growth within a 0.75 mile radius (Threatened and Endangered Species II.K.1.e); and that a minimum no-harvest buffer of 500 acres surrounding active and alternate nests is needed to protect active goshawk nests from disturbance, preserve most alternate goshawk nests, and provide suitable goshawk post-fledging areas. Some respondents also requested that the Final Proposed Forest Plan retain the requirement for pre-project surveys using current protocols developed in cooperation with other agencies and that the Forest Service adopt an inventory and monitoring program for goshawk nests consistent with the guidance found in its recent publication on the topic (Woodbridge and Hargis 2006).

Response: Existing standards and guidelines require that a 100-acre no-harvest buffer be maintained around confirmed and probable active goshawk nest sites. The allowance for harvest in the future applies only to probable nest sites, not documented nest sites, and only if there is no evidence of occupancy in the future after two years. Though there is some risk that an occasional inactive nests may be affected by timber harvest, a majority of goshawk nests on the Tongass are protected by virtue of the fact that OGRs, beach and stream buffers and other standards and guidelines, and additional acreage removed from the timber base due to economic reasons protect over 90 percent of the existing POG over the life of the Forest under Alternatives 1, 2, 3, and 6. Additionally, on a forest stand level, most goshawk nests that have been found on the Tongass within timber sale project areas were included within the boundaries of small OGRs when districts were doing project level adjustments. This resulted in larger protection for most goshawk nests than just the nest stand. In regards to nest surveys, the Tongass will continue to do goshawk surveys for timber sale planning prior to NEPA decisions. Actual protocols will consider current research on goshawk inventory and monitoring, including Woodbridge and Hargis (2006). This requirement was mistakenly deleted from the Proposed Forest Plan, but has been added to the Final Proposed Forest Plan. Appendix D of the Final EIS provides additional discussion of the rationale behind the proposed changes to the Goshawk Standards and Guidelines.

Increasing nest buffers to greater than 100 acres was considered by USFWS in their November 2007 finding (Federal Register vol 72, no. 216 page 63123). While they acknowledge that larger buffers would likely enhance goshawk conservation by providing better habitat for fledglings in the immediate vicinity of the nest, they conclude that lack of larger buffers is not expected to reduce fecundity or survival to an unsustainable level because of the amount of nesting habitat that is retained in OGRs in non-development LUDs and other retained forest patches retained in the matrix. We concur with this and therefore, did not consider an increase in nest buffers.

Comment: Several respondents requested the inclusion of recent peer-reviewed literature on goshawk habitat requirements needs to be expanded to include annual and final Southeast Alaska specific reports produced by ADF&G (e.g., Flatten 2001), diet studies published by Lewis and colleagues (2006), and other published studies from the Pacific Northwest. Some respondents also requested the clarification that goshawks inhabit *western* forests rather than all forests in North America, and that the statement that the Queen Charlotte goshawk is a distinct subspecies be attributed to a primary reference rather than the 1996 status review (Iverson et al. 1996).

Response: Additional scientific information on goshawks, including that listed above, has been added to the Final EIS.

Comment: The Forest Service should consider using habitat associations of key goshawk prey species as a tool for sustaining goshawks on the Tongass.

Response: This comment stems from a consideration suggested during the 2006 Conservation Strategy Review Workshop. We believe that the conservation strategy coupled with application of site-specific nesting habitat standards and guidelines in the Proposed Forest Plan provide adequate protection to maintain sustainable goshawk populations. We have however, added the prey habitat relationship topic to Appendix B of the Final Proposed Forest Plan as one of the higher priority information need categories.

Comment: Several comments were received regarding the association of goshawks with old-growth forests. Some respondents felt that the statement in the Draft EIS regarding goshawks nesting in forest types other than old-growth (Draft EIS p 3-161 to 3-162) incorrectly implied that goshawk telemetry data from Southeast Alaska has produced similar results to those observed in the Southwestern United States which showed use of a greater range of forest types for nesting, clarifying that telemetry data from the Tongass still suggests a strong selection for old-growth. In contrast, other respondents felt that the relationship between goshawks and old-growth forest was overemphasized, given new research, citing a study (Flatten et al. 2001) on the east side of Douglas Island, which had been clearcut in the early 1900s.

Response: As noted in the *Wildlife* section of the Draft EIS, recent research indicated that goshawks use a greater variety of habitats than once thought and that there is some documented use of second-growth by nesting goshawks, though most goshawks in Southeast Alaska are associated with older forests. Goshawks can nest successfully in relatively young stands if adequate-sized trees are available to support a nest; however a majority of the second-growth on the Tongass is less than 50 years old and lacks these conditions. Flatten et al. (2001) documented higher nesting activity in the contiguous second-growth forests of northern Southeast Alaska (Douglas Island) compared to the more fragmented forests of southern Southeast, which they attributed to the fact that as second-growth stands mature they increase in contiguousness and thus in forest-dwelling prey and suitable hunting habitat. The authors noted that this trend may also reflect the lack of prey (squirrels and blue grouse) in southern Southeast

Alaska, though they emphasized that region-wide there is a lack of prey associated with open habitat, rendering fragmented forests less productive for goshawks.

Comment: The Draft EIS fails to discuss the scientific opposition to the current 100-year harvest rotation in relation to its effects on goshawks and is therefore in violation of NEPA. The Goshawk Conservation Assessment prepared for the 1997 EIS recognized a rotation of 300 years as adequate for regaining old-growth forest characteristics in harvest units; a 300-year rotation was also recommended by the Department of the Interior and by the 2002 Supplemental Wilderness Review.

Response: In the Goshawk Conservation Assessment, Iverson et al. (1996) differentiated two types of rotations: a 300-year "ecological" rotation applied to all old-growth as a means to express age class distribution over time, and a silvicultural rotation applied to suitable acres scheduled for timber harvest. Iverson et al. (1996) concluded that landscapes that maintained a forest age structure consistent with a 300-year ecological rotation would provide a high likelihood of sustaining goshawks. This composition would generally consist of one-third each of 0- to 100-year old stands, 100- to 200-year old stands, and 200-year old or older stands, categories with increasing value to goshawks, which can be accomplished by implementing a shorter harvest rotation. Notice that this is on a landscape scale like at the VCU scale or larger. Text has been added to the Final EIS to clarify this.

Marten

Comment: **The statement in the Draft EIS about the lack of clear correlation between marten population trends and habitat alteration is related to the lack of effort to study this dynamic or lack of data (i.e., no long-term datasets), rather than there being no relationship. Some respondents requested that marten harvest on Kuiu Island be separated out from the rest of harvest in GMU 3 for clarification because of low marten numbers on that island. The lack of information regarding the distribution of the endemic *M. caurina* marten subspecies on the Tongass needs to be emphasized in the EIS, particularly the fact that many unsampled islands could support endemic marten populations, and made a high priority issue. The EIS should devote larger attention to fragmentation of marten habitat.**

Response: These points have been clarified in the text in the Final EIS. Information on marten harvest on Kuiu Island has been added to the Final EIS text. A statement about the status of information on the distribution of endemic marten has been added to the Final EIS text. Additional discussion of fragmentation has been added to the marten subsection of the Final EIS.

Comment: Available data suggest old forest is important for marten, but they will also use other habitats including younger forest provided that structural features such as large downed logs are present. Plan alternatives with the highest level of timber harvest retain 76 percent of productive old-growth suggesting suitable marten habitat will continue to exist across the Tongass. A more apparent contribution to population levels is fur trapping which confounds interpretation of habitat need and which should be amenable to regulatory controls.

Response: We agree with the statements regarding marten use of younger forests and that plan alternatives will retain a substantial amount of marten habitat, as stated in the Draft EIS. It is true that trapping is one of many factors that affect marten population levels.

Comment: There is no science that suggests that marten require legacy trees.

Response: Additional information related to marten use of legacy structure has been added to the Final EIS text and in Appendix D.

Comment: Some respondents were concerned that the Draft EIS relied on the marten model to predict marten habitat capability due to various inadequacies.

Response: The marten habitat capability model was not specifically used in the Draft or Final EIS; however, the acreage of high-volume POG below 1,500 feet elevation was used as one measure of habitat.

Comment: Marten viability is only guaranteed by large, unfragmented areas of high volume old-growth that is not accessible to legal or illegal trapping. Rather than disclose or analyze this, the Draft EIS relies on the Proposed Forest Plan to adequately protect this species. The Draft EIS fails to analyze how various alternatives will affect marten survival across the landscape and particularly within islands such as Kuiu where concerns for this species have been documented by the scientific community.

Response: As stated in the Draft EIS, marten are wide ranging and require large tracts of contiguous habitat to move across the landscape. Further, the Draft EIS notes that although marten populations appear to be sensitive to habitat alteration, there is no clear correlation between population trends and habitat change. This is due to the lack of research on this dynamic and the absence of long-term population datasets, in addition to the many unknowns related to marten distributions on the Tongass. Therefore the effects analysis focuses on habitat alternation.

Maintaining viability and well distributed population of marten is dependent on many factors, including habitat, prey abundance and trapping mortality. Assuring viable marten populations through trapping regulations involves cooperation with the State and the Federal Subsistence Board. While the Forest Service has a role in setting harvest regulations through the Federal Subsistence Board, the Forest Service, by itself, cannot set or manipulate wildlife harvest levels.

Comment: Some respondents expressed concern over the Kuiu Island population of endemic marten because there are two approved timber sales (Crane Rowan and Threemile) and one planned timber sale (Kuiu Timber Project) proposed on a proportion of the island where this species is known to occur.

Response: The Final EIS discloses effects to marten and the likelihood of maintaining viable and well-distributed populations, based in a large part on the amount of land within the suitable timber base. Timber sales fall within the suitable land and therefore, viability concerns have already been addressed at the Forest Plan scale. The NEPA analysis for these timber sales considered site-specific issues, including marten habitat, documented in their EISs, and included mitigation to protect marten (i.e., Marten Standards and Guidelines). Individual timber sales are not the appropriate scale to address issues related to viability on a wide-ranging species such as marten.

Comment: Several comments were received regarding guidelines marten and road closures. One respondent felt that Marten standard and guideline XVIII. A.1.3 requiring road closures where roads are a significant factor in unsustainable mortality is important. In contrast, another respondent commented that it is unnecessary to perform specific road closures in areas of identified marten mortality due to trapping because ADF&G is capable of implementing appropriate enforceable regulations restricting trapping.

Response: The Final Proposed Forest Plan clarifies open and closed road density analysis requirements for consistency in helping to determine road influences on marten mortality that can be incorporated into Travel Management planning with the objective of reducing mortality risk using local knowledge of habitat conditions, spatial location of roads, and other factors rather than solely relying upon road densities. This analysis would be a collaborative effort between the Forest Service and ADF&G to assess the relationship between hunter/trapper marten harvest and human access. Note also that the open road density restrictions do not need to be applied without consideration of marten trapping harvest levels. Several thousand marten are trapped on a sustainable basis each year in Southeast Alaska.

Wolf

Comment: Some comments stated that the Draft EIS failed to consider the effects of climate change and other stochastic events on wolves and the predator-prey dynamic of wolves and deer. Wolves are depended on deer and the EIS needs to consider how declines in deer populations due to climate change will affect wolves.

Response: The exact effect of climate change on deer and wolves is uncertain; however, most researchers expect warmers winters. Current science supports that severe winters are the greatest threat to deer populations, as some comments state. Juday et al, (1998) predict that it is likely that there will be warmer winters and low snowfall in low elevation forests and this will lead to higher deer populations, which would increase prey for wolves. Conversely, Juday et al. also predict increased large-scale blow down from the increased in storm activity, though, as the Final EIS notes, this has not occurred even though the number of days with gale-force winds has doubled since 1950. Models cannot accurately predict whether snowfall will increase or decrease or whether blow down will increase or decrease in low-elevations; therefore, they cannot predict the effect on deer and wolves. This is why monitoring the effects of climate change on wildlife habitat was incorporated into Chapter 6 of the Proposed Forest Plan. One strategy the Forest is strongly considering is thinning dense young-growth stands in low-elevation areas, such as the beach fringe, to increase forage and to speed the development of mature forest structure. This may improve low-elevation winter habitat for deer, and therefore for wolves.

Comment: Some respondents questioned the statement in paragraph 2 on 3-170 of the Draft EIS that no clear link had been established between wolf population numbers and changes in habitat characteristics.

Response: This paragraph is referring to a direct link between project level habitat changes caused by forest management activities (e.g., timber harvest) and wolf population change on the Tongass. As noted, datasets available for monitoring wolves are insufficient for detecting all but very large changes in the wolf population and are not designed to track trends in the population resulting from changes in their habitat due to Forest Service actions. The Final EIS states that deer are the primary prey of wolves in Southeast Alaska, and the significance of predator/prey interactions indicates that wolf persistence is directly linked to deer habitat capability. That said, data on deer population trends across the Forest are also inadequate (i.e., consisting of limited pellet count data in heavily hunted GMUs) to enable a direct comparison between habitat changes associated with forest management activities and the Tongass deer population.

Comment: Respondents pointed out that a substantial decline in deer population could result in gaps in wolf distribution, particularly on islands, but a more likely outcome would be that wolf population density would be reduced as pack home range size increases. They also suggested that if deer numbers decline substantially wolves may experience increased harvest pressure from subsistence users in an effort to protect deer, which could ultimately further reduce wolf genetic diversity.

Response: Information on the potential response of the wolf population to changes in the deer population has been added to the Final EIS. This is speculative at best. If decreases in prey reduced wolf populations, density of wolves would also be reduced, decreasing opportunities to harvest wolves, despite potentially increasing pressure to harvest wolves. If over harvest of wolves were to become a concern, harvest regulations and closure of specific areas are tools the State and Federal Subsistence Board may use to limit that harvest.

Comment: Density-dependent population change in relation to habitat carrying capacity and the non-linear relationship between predation, carrying capacity, and deer population numbers should be discussed in relation to deer and wolves. Information from Person (2001) and Person and Bowyer (1997) regarding wolf population viability and the effects of the 1997 Forest Plan alternatives on the wolf population should be included in the Final EIS. New information presented at the Conservation Strategy Review regarding the ratio of recruitment to mortality in an unmanaged landscape should be included; respondents suggest using this ratio to compare OGRs in terms of their ability to support sources wolf populations.

Response: Additional discussion of density-dependence, predator suppression of declining deer populations, and other related information has been added to the Final EIS.

Comment: Several respondents noted that some of the new information presented at the 2006 Conservation Strategy Review workshop has not been incorporated into Wolf Standards and Guidelines. This includes information presented during the 2006 Conservation Strategy Review indicated that the den buffer standard and guideline needs revision.

Response: The Conservation Strategy Review workshop represents one step in the Forest Plan review process, with the purpose of identifying considerations to be addressed in the overall review of the Conservation Strategy. Subsequent steps will include an assessment of each consideration identified during the work shop based on workshop information, peer-reviewed scientific literature, the recent *Review of Conservation Science Produced Since 1997 and Its Relationship to the Tongass National Forest Land and Resources Management Plan* (Haufler 2006), as well as input from various state and federal agencies. These assessments will culminate in a determination of how each consideration will dealt with. Some considerations have been addressed in time for incorporation in the Final EIS however others, like the Wolf Standards and Guidelines, require additional interagency consultation, the formation of specialized workgroups, and more detailed development, and therefore will be implemented after the Final EIS. These long term considerations could lead to conservation strategy-related adjustments to the amended Forest Plan through additional amendments or may be identified as information needs.

Comment: The 2007 Proposed Forest Plan standards and guidelines for wolves specify an optimal deer density of 17 deer per square mile. This is incorrect and should be 18 deer per square mile, consistent with the Draft EIS and the science underlying the standard and guideline, however should not be confused with the 13 deer per square mile specified in the 1997 Forest Plan. The respondents note that there has been much confusion with these numbers, clarifying that the latter number represents population density, based on Person (1996), whereas the other numbers represent a habitat capability (18 deer per square mile being the accepted, correct number). The respondents request that the Final Proposed Forest Plan include specific guidance for computing the habitat capability deer density (using the deer multiplier to convert deer winter habitat capability models into deer densities) and clearly differentiate between the recommended actual deer density and habitat capability.

Response: The Forest Service primarily manages habitat and assesses effects to deer and wolves based on habitat capability rather than actual population numbers. The deer habitat capability density specified in the Wolf Standards and Guidelines has been corrected in the Final Proposed Forest Plan. Guidance for using the deer model is too detailed for inclusion in the Forest Plan, and may change as newer models are developed. Using the deer model is only one method of assessing effects to wolves and deer. The Final Proposed Forest Plan directs use of variety of methods, including the deer model, in assessing effects. This includes local knowledge of habitat conditions, spatial location of habitat, and other factors that need to be considered by the biologist rather than solely relying upon model outputs. In addition, the Plan allows for alternative tools to be developed as new information on assessing habitat for deer and wolves evolves.

Comment: The deer analysis is inadequate in that it does not quantitatively evaluate the risks under each of the alternatives associated with providing an adequate supply of deer for wolves and hunters and does show whether the alternatives meet the standard and guideline for maintaining a threshold habitat capability of 18 deer per square mile (as determined by the deer habitat capability model).

Response: Using a habitat capability of 18 deer/square mile is not a threshold. It is only one of several tools that can be used at the project scale to assess if sufficient deer habitat capability exists to maintain sustainable wolf populations. Other tools include local knowledge of habitat conditions and spatial location of habitat.. Other factors need to be considered by the biologist rather than solely relying upon model outputs. Habitat capability is also a tool to determine effects of a project on, human deer harvest demands. An analysis of the ability of the alternatives to meet the Wolf standard and guideline deer habitat capability has been added to the Final EIS text.

Comment: The Wolf standard and guideline for road density was based on the analyses described in Person et al. (1996) but has never been implemented in a manner consistent with Person et al. (1996). The 0.7 mile per square mile road density should account for all open, closed, and overgrown roads in areas below 370 meters elevation, not simply open roads. This is because it is hard to distinguish between open and closed roads (i.e., close roads may still be used by hikers and OHV users), and both may provide easier access for wolf hunting and trapping. Additionally, a majority of wolf activity occurs below 370 meters elevation (Person et al. 1996, 2001). The road density guideline should be applied at a scale equal to an average wolf pack home range (e.g., 300 km; Person et al. 1996). The incorrect use of this guideline has been brought up in interagency meetings since 1997, but has never been corrected in the Forest Plan. A respondent suggested that consideration should be given to peak road density.

In regards to the range or road densities, one respondent commented that an open road density requirement of 0.7 to 1.0 miles per square mile to reduce "human-caused mortality" of wolves is unnecessary because ADF&G is capable of applying and enforcing appropriate regulations to provide for abundant wolf populations. Conversely, another respondent felt that a less discretionary standard of 0.7 miles per square mile should be set.

Response: Specification of total road density for analysis purposes has been added to the Final Proposed Forest Plan to promote consistent interpretation and use. The misinterpretation of the guideline was described in the *Wildlife* section and, as stated, the analysis in the Final EIS accounts for lands below 1,200 feet in elevation, included both open and closed roads, evaluated road densities by WAA which are approximately equal in size to wolf pack home ranges in Southeast Alaska, and included all land ownerships. Because this EIS covers the entire Forest, all WAAs were included in the analysis. The wolf guideline of 0.7 miles per square mile road density is not a limit, but the lower end of a range of road densities (up to 1.0 miles per square mile) recommended if road access and associated human-caused mortality has been determined to be the significant contributing factor to unsustainable wolf mortality. Note that the 0.7 to 1.0 miles per square mile guideline does not need to be considered until that determination has been made and that consideration of wolf hunting and trapping harvest is also considered. In addition, local knowledge of habitat conditions, spatial location of roads, and other factors would also need to be considered by the biologist rather than solely relying upon road densities. As noted in the *Wildlife* section, the ADF&G currently enforces a harvest cap in GMU 2 to ensure that a viable wolf population is maintained, however there are other key components of wolf conservation, in addition to harvest regulations, including maintaining adequate deer habitat capability and minimally roaded core areas.

Comment: Transportation Standards and Guidelines need to implement the Wolf Standards and Guidelines for road density.

Response: Standards and guidelines in TRAN4.I.A requires the Forest Service to "perform route or site selection, location, geotechnical investigations, survey, and design to a technical level sufficient to meet the intended use and commensurate with both ecological objectives and the investment to be incurred" and to "ensure consistency with Forest-wide Standards & Guidelines and Best Management Practices." This includes the Wolf Standards and Guidelines.

Comment: The discussion of habitat use by wolves needs to summarize Person (2001) otherwise it is outdated.

Response: Information from Person et al. (2001) has been added the Final EIS text.

Comment: Wolf numbers are limited by prey availability, not social interactions. The discussion in the affected environment section should refer to and summarize the appropriate sections in Mech et al. (1998) and Fuller et al. (2003). The density limit of 10 wolves per square mile stated in the Draft EIS is incorrect. For example, Isle Royale has had densities of wolves that substantially exceed that limit.

Response: Information from Mech et al. (1998) and Fuller et al. (2003) has been added to the Final EIS text. In regards to wolf density, the Draft EIS actually states that "Due to social interactions, wolf densities do not exceed certain levels even when prey abundance is high. A density of one adult wolf per 10 square miles is considered high, and this density is often considered as a saturation point beyond which wolf populations would not expand. Wolves have large home ranges (about 100 square miles per pack), use a wide variety of habitats, and are very mobile." This information came from the Alexander Archipelago wolf conservation assessment (Person et al. 1996) which presented wolf densities for 9 study areas in Minnesota, Ontario, Quebec, Vancouver Island, and Prince of Wales/Kosciusko islands. Wolf densities reported from these study areas ranged from 1 to 1.7 wolves per 10 square miles (8 study areas had densities of 1 wolf per 10 square miles or less).

Comment: Units 2 and 3 support modest wolf densities compared to other areas where wolves prey on deer rather than moose, caribou, bison, or other large prey. While wolf densities are high in Units 2 and 3 compared to other parts of Alaska (where deer are absent), they are not high when compared to other areas where deer are the principle prey (i.e., northern Minnesota, southeastern Ontario, and British Columbia). More information on this is available in Person et al. (1996, 2001). The wolf population in Unit 2 is currently healthy but that does not imply it will be in the future when more of the landscape is in stem-exclusion forest. Current populations are not indicators of the future. Reference should be made to the concept of "succession debt" described by Person (2001).

Response: Information from Person et al. (2001) has been added to the Final EIS text.

Comment: Prince of Wales Island wolves seem to be a distinct population segment. However, the Draft EIS fails to disclose what those profound implications are or take them into account in the impact analysis. Weckworth et al. (2005) should be reviewed and cited in the Final EIS.

Response: Information from Weckworth et al (2005) regarding the distinct wolf population on Prince of Wales Island has been added to the Final EIS.

Comment: Factors affecting the Alexander Archipelago wolf are primarily density of black-tailed deer and road access for wolf hunters/trappers. A strong inverse relationship between wolf home range size and critical deer winter range was found. Wolves are highly mobile and move between islands in Southeast Alaska, some being separated by up to 2.5 miles. Between 1993 and 2000, 85 percent of radio-collared wolf mortality was due to trapping, with equal amounts of legal and

illegal harvest. The presence of roads has a significant effect on wolf harvest. Historically, the ADF&G allowed year-round no-limit wolf harvest.

Response: Deer populations and road access were identified in the Draft EIS as important components in wolf conservation. The Draft EIS also discussed harvest regulations in GMUs 2 and 3. The Forest Service, by itself, does not have the authority to regulate wolf harvest.

Comment: The Draft EIS and Proposed Forest Plan fail to adequately protect this wolves from human disturbance. In fact the proposed plan would weaken the protections already in place. The plan does not trigger action until road density is determined to be the <u>significant</u> <u>contributing factor</u> to unsustained wolf mortality. This is a very discretionary standard. The trigger should be when road density is determined <u>to contribute</u> to unsustained wolf mortality. The plan also lacks teeth in its remedial action to protect wolves when the road densities are exceeded; it should trigger road closures and road building prohibitions.

Response: If and when open roads contribute to unsustainable mortality, actions to reduce that factor can and will be considered. This would be guided by the appropriate Forest Plan standards and guidelines including the wolf mortality guideline. The extent of actions taken will be in consultation with other agencies and the affected publics as well.

Deer

Comment: Assumptions of the Tongass deer habitat capability model need to be evaluated and updated and model results should be ground-truthed.

Response: The 1997 deer model habitat capability model represents the most current tool available for evaluating deer winter range conditions on the Tongass. The habitat types included in the model are broad and general, and they are not based on any particular site-specific data which would enable ground-truthing. Given the large differences in deer habitat value between many of these broad classes of habitat, the model provides a useful and reasonable estimate of deer habitat value for large-scale analyses. Despite limitations to the existing model, which are discussed in the *Wildlife* section of the EIS, the model provides a relative estimate of deer habitat value which is appropriate for comparing management alternatives. Modifications to the model, such as refining coefficients due to changes in vegetation mapping on the Tongass, are forthcoming but will occur outside of the timeframe for the Forest Plan Amendment. Scientific research published after the 1997 has increased knowledge about deer-habitat relations in Southeast Alaska, but does not contain anything that would change the 1997 expert-based model significantly. However, a nutritional-based model has recently been developed that could provide the basis for completely re-evaluating our analysis of deer habitat. However, since, it is an entirely data-driven system, and its data requirements cannot be met with existing Forest data it will take additional time to fully implement this new analysis. See Appendix B of the Final EIS for additional information on the deer model.

Comment: Clearcuts have been assigned high value by the deer model but during severe winters these habitats provide little value to deer.

Response: This comment is incorrect in that the 1997 deer model, which is currently the only model available for conducting large-scale analyses of deer habitat on the Tongass, assigns the highest values to forests with closed canopy (based on volume class rather than canopy cover), maritime influence, south facing slopes, and low average snow depth. Recent clearcuts are assigned moderate values. See Appendix B of the Final EIS for additional information on the deer model.

Comment: Some respondents expressed concern that the cumulative loss of deer habitat will result in catastrophic population crashes, reflecting lost winter habitat, that may have cascading effects to wolves and bears, and that deer will be extirpated from some islands or will fall into predator pits. Related comments suggested that restoration of deer winter range is needed.

Response: The deer model presents a worst-case scenario by assuming that all suitable acres are harvested under each alternative. However, the current level of road construction and timber harvest on the Tongass is at a 5-decade low and the life of this Amendment is expected to be 10 to 15 years at most, at which time a Plan Revision will likely be undertaken. In addition, there will be a period of preparation prior to the implementation of any sale during which no harvest will occur, even if the timber industry responds rapidly. The management of second-growth stands on the Tongass has helped offset the cumulative loss of winter range by accelerating the stem exclusion phase of forest development, which occurs roughly 15 to 25 years following a major disturbance when the growing space is fully occupied, tree crowns are crowded, and forage is limited. The creation of new foraging habitat is not reflected by the current deer habitat capability model.

The analysis of effects to deer winter range provided in the *Wildlife* section takes into account past timber harvest and therefore serves as an assessment of cumulative effects. This assessment is conservative in that it assumes that non-NFS lands provide no habitat capability. Currently there is no defined threshold for loss of winter range with which to predict the likelihood of a population crash. We can only speculate that losses could be amplified during severe winters; however, one expected result of the current warming trend is warmer winters. Management of young-growth was discussed in the *Wildlife* section of the Draft EIS as a potential way to improve the quality of deer winter range.

Comment: The second paragraph under Deer in the description of the affected environment for wildlife in the Draft EIS, fourth sentence should read: "the quantity, quality, distribution, and arrangement of winter habitat are considered the most important limiting factors for deer."

Response: This sentence has been corrected in the Final EIS text.

Comment: Several respondents questioned the use of the 1997 deer habitat capability model in relation to the application of the deer multiplier (i.e., high HSI scores, whether 1.3 or rescaled to 1.0, should correspond to a deer habitat capability density of 100 deer per square mile).

Response: A re-occurring appeal point against the interagency deer model is the proper use of the deer density multiplier. The Final EIS uses the currently approved version of the model. In the Draft EIS the deer model was employed only to compare alternatives based on HSI scores rather than population numbers in the deer and wolf effects analyses. However, to compare the alternatives in terms of their ability to meet the Wolf standard and guideline for deer habitat capability (expressed in terms of the number of deer per square mile), an analysis using the deer multiplier has been added to the Final EIS.

Comment: One comment stated that the deer habitat capability model is not a valid risk assessment tool because it does not provide probabilities of risk with which to compare alternatives.

Response: The term "risk assessment" has been removed from this sentence in the Final EIS.

Comment: The Draft EIS only mentions the FRESH-Deer model as an alternative to the deer habitat capability model, however this model can not be expanded from a stand-level to a landscape-level analysis.

Response: This statement is not correct. The FRESH-Deer model consists of two levels of application: a web-based, stand-level module; and a GIS-based, landscape-level module. For more information on model specifics please see the FRESH-Deer model home page located at http://cervid.uaa.alaska.edu/Home.aspx.

Comment: Respondents clarified that black bears were primary predators of newborn black-tailed deer fawns on Prince of Wales Island, rather than Heceta Island.

Response: This statement has been corrected in the Final EIS.

Comment: The analysis of effects to deer is insufficient in that the use of POG as an indicator is an overly broad classification, there is no means provided to assess the implications of percentage changes in habitat because there is no established threshold beyond which reductions in habitat capability are deemed unacceptable, and relative rather than direct comparisons among alternatives is made. This type of comparison does not facilitate meaningful analysis of impacts to wolves or subsistence due to changes in deer population numbers. The Draft EIS should include a comparison among the alternatives based on their ability to provide the required 18 deer/square mile density standard and guideline.

Response: The deer analysis does not use POG as a means for comparing alternatives with respect to deer, rather the tables in the discussion of effects to deer present percentage changes in deer habitat capability, as quantified by the deer model. As described in the affected environment section under deer, the deer habitat capability model takes into account the value of individual SD7 model POG categories to deer. The tables provided in the deer section displays the existing percentage of remaining deer habitat capability relative to 1954 levels, indicative of baseline pre-large-scale timber harvest conditions, and percentages projected under each alternative. This enables a relative comparison among the alternatives in terms of how each alternative will directly affect baseline deer habitat capability. Additional information on the deer model, including how these numbers are derived, is provided in Appendix B of the Final EIS. As noted by the respondents, currently there is no threshold reduction in habitat capability that has been identified by science and therefore the effects of reductions in deer habitat capability are appropriately discussed in general terms. An analysis of changes to deer habitat capability expressed in terms of a deer density has been added to the analysis of effects to wolves.

Comment: The Draft EIS evaluates reductions in deer habitat capability on Tongass National Forest lands only and disregards substantial past and future anticipated losses on other land ownerships in the region.

Response: The Draft EIS states that for the deer habitat capability analysis lands under non-federal ownership have an assumed habitat capability of zero because these lands have been, or will be, developed for intensive timber production and are expected to have lower habitat capability over time.

Comment: The definition and analysis of "high value deer winter range" are inaccurate because by defining quartiles by equal land area what is considered high value may differ by WAA.

Response: There is natural variation among WAAs in what is considered high-value winter range. For example, maritime and interior WAAs naturally show differences in habitat capability due to differences in winter severity (i.e., snow levels during average winters are typically different). Consequently, high quality habitat within the home range from a deer's perspective may differ depending on the location of that home range within a particular WAA. Thus, defining high value winter range as the quartile of acreage within a WAA with the highest HSI scores allows a more accurate, and conservative, portrayal of lost habitat capability, given that there are WAAs where there is no habitat that falls within the upper quartile of possible HSI scores (i.e., scores above 75 on a scale of 0 to 100) yet they are inhabited by deer.

Comment: Critical deer winter habitat, especially in areas relied on for hunting, should be protected and not slated for logging under the amended Forest Plan.

Response: Effects to deer winter range are discussed in the *Wildlife* section of the Final EIS. The 2006-2007 Interagency Forest-wide Small Old-growth Reserve review considered deer winter range as a factor when evaluating the placement and configuration of small OGRs. Though this effort eliminates the need to conduct project level reviews for the most part, additional reviews that take place on the project level will follow a standardized protocol, developed as part of this forest-wide effort. This includes using the Tongass deer winter habitat capability model to identify high value deer winter range that warrants protection.

Comment: Winter range should be more clearly defined as it applies to the deer habitat capability model to incorporate severe, rather than average, winters. The Draft EIS fails to evaluate the effects of severe winters on deer, particularly in areas where there are no wolves.

Response: The Forest Service feels that the Draft EIS adequately addresses the subject of severe winters by noting that effects of reductions in carrying capacity for deer would be greatest during severe winters when resources are most limited. Severe winters are stochastic events that are highly variable. Heavy snowfall may occur with increased or decreased frequency or magnitude as a result of global climate change, there are many uncertainties and differences of opinion related to these predictions. Information on these uncertainties has been added to the Final EIS. As the Climate and Air section of the Draft EIS states, models available for estimating climate change are designed to predict changes on a regional level and are not detailed enough to predict changes to the Tongass. Consequently, they do not agree on how global warming will affect Southeast Alaska. Thus, it is impossible to accurately predict the frequency or magnitude of severe winters, much less the effects of severe winters on deer under each of the management alternatives.

Comment: It should be noted that the forage production in recent clearcuts is of lower nutritional quality than the same forage types found in old-growth.

Response: This statement has been added to the Final EIS text.

Comment: Deer and bear are abundant on Native Corporation lands where silvicultural management of harvest units provides forage and cover for these species, compensating for lost habitat capability.

Response: We agree that young-growth management can potentially benefit wildlife; however, there are many uncertainties related to appropriate young-growth treatment designs, specific beneficial effects of such treatments, and implications for deer and other wildlife species. In addition, some studies have shown the opposite results. Additional discussion of uncertainties related to young-growth management has been added to the *Wildlife* section of the Final EIS text.

Comment: The likelihood of long-lasting declines in deer population under all alternatives appears to be low; the potential for stand treatments to improve forage conditions in young stands is high.

Response: We concur that the effects of the alternatives are unlikely to result in long-term population declines. A discussion of young-growth management was included in the *Timber* and *Wildlife* sections.

Comment: Several comments were received regarding timber harvest and road construction in specific areas. On respondent stated that targeting important deer areas like Tenakee Inlet will

have long-lasting impacts on deer populations and subsistence. Another respondent stated that timber harvest and road building in the Bostwick Inlet/Gravina Island area could jeopardize subsistence and hunting resources. Another respondent expressed concern over effects to eagles in the 11 Mile area.

Response: Any timber harvest planned for the Tenakee Inlet (or any other part of the Tongass) will require a site-specific environmental analysis which will consider effects on deer and subsistence resources.

Comment: Forest Service planning assumes a static average deer density needed to support hunter demand and proposes restricting federally ineligible hunters when habitat impacts from the Forest Plan result in a density below levels needed for local subsistence. This is a false trade-off because hunting and habitat loss due to clearcut logging affect deer populations in different ways; hunting tends to stabilize deer populations in areas with few predators whereas logging winter range is a destabilizing force. Restricting non-local hunting effort will not maintain deer for subsistence but will amplify deer population cycles ultimately reducing the number of deer available to subsistence hunters during population lows.

Response: The Forest Service does not assume static deer densities, but recognizes cycles. Hunting may need to be regulated in some areas if deer numbers decline and that could include restrictions to non-federally qualified hunters.

Comment: Some young-growth stands, particularly those located on hillsides where sunlight can reach the forest floor, and noncommercial forests provide forage for deer. Thus, the deer model is conservative.

Response: It is true that habitats other than productive old-growth provide habitat for deer. The conservative nature of the deer model analysis was noted in the *Wildlife* section of the Draft EIS.

Comment: The statement in the Draft EIS that the deer populations in GMU 2 are at moderate levels and expected to decline is incorrect because an article in the Ketchikan Daily News (2006) states that Prince of Wales deer populations are sky-rocketing.

Response: The statement in the Draft EIS refers to long-term population trends and is correct. The 2005 ADF&G harvest summary for deer in GMU 2 (Porter 2005) states "as clearcut logging continues to reduce old-growth habitat in GMU 2, deer populations are expected to decline." This report also states that based on deer pellet-group counts, Unit 2 pellet-group densities represent low to moderate population levels relative to high pellet-group densities documented in Unit 4; they attributed this disparity to the presence of wolves in Unit 2 and their absence from Unit 4.

Comment: Every acre of high-quality old-growth cut greatly reduces the chance of survival of deer in hard winters. In areas that are clearcut deer are dying by the thousands and if the proposed alternative is implemented, that situation will only be made worse when we get another severe winter.

Response: The fact that effects to deer due to the loss of critical winter habitat would be of greatest concern during severe winters was noted in the Draft EIS. Individual timber sales will undergo appropriate environmental analysis and will address deer winter range at the project level.

Comment: The Proposed Forest Plan fails to adequately protect black-tailed deer; there is no definition of "critical winter range" and there is no means to ensure that an adequate number of

deer are maintained for wolves and subsistence use; standards and guidelines focus on assessing impacts to winter range as part of project-level analysis but do not require that an adequate amount of quality habitat be maintained. No mention of the Forest Service deer habitat capability model is made.

Response: The conservation strategy was designed to adequately maintain populations of wildlife, including deer. However, the Final EIS acknowledges that there may be impacts to deer in specific geographic areas due to timber harvest. The Proposed Forest Plan sets broad direction for project-level actions due to the variability in site-specific conditions. No definition is given for "critical" deer winter range because its identification will occur during project-level analysis and will involve local knowledge of habitat conditions, spatial locations of habitat, and other factors, in addition to outputs of the deer winter habitat capability model. Wolf standard and guideline XII.A.2 2 of the Final Proposed Forest Plan directs the Forest to provide for sufficient deer habitat capability to first maintain sustainable wolf populations and then to consider meeting estimated human deer harvest demands. It also requires use of the most recent deer habitat capability model along with field verification to estimate deer habitat capability in biogeographic provinces where there are wolves.

Comment: One comment noted that Southeast Alaska communities could face significant restriction to their deer hunting as a result of past and anticipated clearcutting and road building. The comment stated that the Forest should not log areas that provide corridors for deer and areas that are critically over-logged should be restored. They also note that thinning projects could provide valuable employment to residents in rural communities.

Response: Effects to subsistence and deer harvest in rural communities are discussed in the *Subregional Overview and Communities* section. Forest Plan Wildlife Habitat Planning (WILD1) standard and guideline VI directs the Forest to maintain landscape connectivity and standard and guideline VI.C requires the Forest to consider black-tailed deer habitat needs before or as part of project analysis. Forest Plan Wildlife Habitat Improvement Standards and Guidelines (WILD2) describe wildlife habitat improvement projects.

Comment: One comment noted that when Ketchikan Pulp was logging in the Thorne Bay area it was common to see deer with twins or triplets, probably due to good forage quality, but today, singles are more common. This, they conclude, suggests that timber harvest and deer exist well together. Another comment stated that more deer and more diverse wildlife habitat occurs forest edges and therefore timber harvest creates more wildlife habitat.

Response: There are numerous factors that can affect deer reproductive success, forage quantity and quality being one of them. Although timber harvest temporarily increases forage production in recently cut areas by increasing the amount of sunlight that reaches the forest floor, timber harvest also reduces other habitat elements that are important to deer, such as hiding cover and overstory cover for intercepting snow, and increases habitat fragmentation.

It is true that deer prefer to live on the forest edge adjacent to open habitat types where many resources (e.g., forage and cover) are available in proximity to each other. Though timber harvest does create more edge habitat, it also increases habitat fragmentation, resulting in remaining forested patches becoming smaller, more isolated, and less functional and therefore should always be considered in a landscape context. In addition, it is well known that old-growth forest provides important deer winter habitat.

Comment: The deer model is biased toward old-growth and over states the impact of timber harvest on deer habitat capability.

Response: The conservative nature of the deer model analysis is noted in the description of the affected environment under Deer in the *Wildlife* section of the Final EIS.

Comment: Important deer winter range should be displayed by development and non-development LUDs for each VCU to determine how much is fully protected under the reserve system and how much is partially protected in the matrix.

Response: Important deer winter range is identified by ground-truthing deer habitat capability model results and incorporating deer use levels, when available. This is required as part of the project planning process under the Forest Plan.

Comment: The standards and guidelines for deer, wolves, and subsistence are interrelated and all fail to define objectives in one or more of their sections; there is a lack of logic in how deer issues are distributed among the three broad standard and guideline topics. Some respondents felt that there needed to be a stated purpose or objective for protecting deer populations. Others commented that the focus was on assessing habitat rather than assuring an adequate amount or quality of habitat.

Response: It is true that deer, wolf, and subsistence issues are related, as discussed in the *Wildlife* section of the EIS. Standards and guidelines are included for species that were felt to be at risk or needed extra consideration at the project level. The extra consideration at the project level for deer that is provided under the Deer Habitat Standards and Guidelines is believed to be adequate.

Comment: Mitkof Island has some of the most restrictive deer seasons in all of Southeast Alaska due to the inability of the deer population to recover from several consecutive severe winters coupled with the effects of timber harvest, road construction, and habitat fragmentation.

Response: It is true that there are many factors at play in the status of Southeast Alaska deer populations and that the ADF&G takes these factors into account when setting harvest levels.

Comment: During severe winters, deer prefer southerly aspects below 500 feet elevation within 1,000 feet of the shoreline, medium- and high-volume stands, and forest edges; they avoid unforested and noncommercial habitats, predominantly north-facing gap phase old-growth and sheltered areas above 1,500 feet elevation. During summer and low-snow winters deer are habitat generalists and occupy a variety of habitats.

Response: Deer habitat relationships are described in the description of the affected environment of the *Wildlife* section of the Final EIS.

Comment: Past clearcutting, which has targeted high value deer winter habitat, has increased the likelihood of deer collapses during severe winters, and decreased the recovery potential when recoveries do happen. The occurrence of severe winters will remain a fact of life in Southeast Alaska in spite of climate change and this is beyond the control of the Forest Service. What is not beyond the control of the Forest Service is to limit the cutting of additional high quality deer habitat, and to not allow clearcutting where correct application of the deer model indicates that there is not sufficient habitat capacity to sustain sufficient deer numbers to provide for wolf needs and human consumption.

Response: As part of timber sale planning, Forest Plan standards and guidelines are applied to assure that sufficient deer habitat capability is maintained to provide for wolves and human consumption.

Elk

Comment: Although a radio-collared elk was located on Farm Island, at the mouth of the Stikine River, there is no evidence the elk have migrated up the river drainage.

Response: This statement has been corrected in the Final EIS text.

Brown Bear and Black Bear

Comment: Brown bears do not occur on all islands north of Frederick Sound.

Response: The description of the distribution of brown bears in the Final EIS has been modified to reflect this.

Comment: Some respondents requested clarification that hunting of brown bears is allowed throughout other parts of Southeast Alaska, outside of GMU 4, and a statement about outfitter uses of brown bears and available viewing areas.

Response: The statement about brown bear harvest has been clarified in the Final EIS. Outfitter and viewing uses have been noted in the text.

Comment: There is a lack of references provided for statements about the late-summer season being the most critical time for brown bears.

Response: Additional references for this information have been added to the Final EIS.

Comment: Black bears den in both harvested and unharvested forest stands. Because some dens on the Tongass have been documented in clearcuts it seems likely that black-bears prefer denning in clearcuts.

Response: It is true that black bears are habitat generalists and will use both early- (clearcuts and young growth) and late-seral (old-growth) forests. This was noted in the Draft EIS, though the focus of the analysis was road construction given that this species is sensitive to overhunting which can result from increased road access.

Comment: **One respondent commented that he would like to see commercial black-bear hunting on Prince of Wales Island abolished.**

Response: Sport hunting regulations are under the jurisdiction of ADF&G, and therefore not an issue that can be addressed by the Forest Plan Amendment process.

Comment: Several respondents cited information presented in Flynn (2007) regarding brown bear use of riparian areas along streams in two drainages, one intact and one heavily logged, requesting that it be incorporated into the Wildlife section of the Final EIS. They also requested that the recommendations provided by the authors for maintaining 500-foot no-cut buffers along all salmon streams in landscapes used by brown bears, and 1000-foot buffers along all streams (or complete watershed protection) in areas where bear management objectives are to maintain abundant healthy brown bear populations, be incorporated into the Final Proposed Forest Plan. Respondents noted that there are substantial risks to maintaining viable and well-distributed brown bear and black bear populations in some biogeographic provinces, particularly those where there is a low proportion of watershed-scale habitat protection, and that these areas may

warrant additional protective measures that maintain adequate habitat, minimize road densities, and maintain roadless areas.

Response: Information from Flynn (2007), which was also discussed at the 2006 Tongass Conservation Strategy Review workshop, was included in the Draft EIS. The recommendation for applying no-cut buffers to all salmon streams was initially made during the 2006 workshop, along with a number of other suggested items to be considered by the Forest Service. Some items were addressed in time for incorporation in the Final EIS, whereas others, such as the no-cut buffers, which might require additional interagency consultation, the formation of specialized workgroups, and more detailed development, may be considered after the Final EIS. These long term considerations could lead to conservation strategy-related adjustments to the amended Forest Plan through additional amendments or identified as information needs. The Final Proposed Forest Plan includes 500-foot buffers on important brown bear feeding streams. A discussion regarding brown bears can be found in Appendix D of the Final EIS.

Comment: The ADF&G allows a relatively substantial annual harvest of brown bears on northeast Chichagof Island, where one of the highest densities of this species occurs in Southeast Alaska; the area also experienced a high level of road building and timber harvest in the 1970s and 1980s. This brings the need for Brown Bear Standards and Guidelines into question.

Response: Species-specific standards and guidelines form the fine filter component of the Tongass conservation strategy. They are designed to ensure that the Forest's multiple use objectives are met, as directed by the National Forest Management Act, which include enabling continued subsistence and recreational uses (consumptive and non-consumptive) of wildlife resources. Therefore, the brown bear standards and guidelines, which work to minimize the effects of timber harvest on brown bears and reduce human-brown bear conflicts, contribute to the maintenance of sustainable brown bear populations and continue to let the ADF&G allow brown bear harvest on northeast Chichagof Island. A discussion regarding brown bears can be found in Appendix D of the Final EIS.

Comment: Several respondents commented on brown bear use of second-growth forest, some suggesting that brown bears do well in young-growth areas, and others stating that old-growth forests provide the only suitable habitat for brown bears. Respondents with the latter view suggested that the Forest maintain roadless areas to prevent clear-cut logging and attributed more restrictive regulations on outfitters and hunters to the loss of old-growth forest.

Response: Brown bears are habitat generalists in that they use a variety of habitats including young-growth. However, mature and old-growth forest, particularly in the form of riparian habitat along salmon streams, plays an essential role in brown bear population viability, both in terms of the maintaining adequate vegetative cover to support anadromous fish production (i.e., regulate stream temperature) and providing visual obscurity of bears from humans and other bears. The reserve system, including OGRs and other non-development LUDs, protects approximately 57 to 93 percent of the productive old-growth existing in 1954 on the Tongass, much of which is roadless, depending on the alternative.

Comment: The Draft EIS fails to adequately analyze direct, indirect, and cumulative impacts to brown bears and black bears, especially increased hunter access to bears (direct take, reduction in prey base, and human presence).

Response: The potential for increased human access under each of the alternatives was discussed in detail in the Draft EIS analysis of effects to both black and brown bears (pages 3-203; 3-205 to 3-207). The discussions focused on direct take, or other mortality associated with human-bear interactions, and the effects of human disturbance. The ability of each alternative to maintain important roadless refugia was highlighted for brown bears. Reductions in the prey base for each species was not discussed as neither species is a predator that specializes in one type of prey whose population has the potential to be affected by increased human access.

Comment: One respondent stated that she was quite appalled to discover that the Forest Service's Proposed Action would "essentially render the Tongass uninhabitable by grizzly bears."

Response: The analysis does not indicate that any of the alternatives would render the Tongass uninhabitable by grizzly bears, known as brown bears in Southeast Alaska. Even Alternatives 4 and 7 which propose the highest levels of harvest and reduce or eliminate the reserve system, respectively, rank as having moderately high likelihoods of maintaining well-distributed, viable brown bear populations. Alternatives 1, 2, 3, 5, and 6 rank as having a high likelihood of maintaining well-distributed, viable brown bear populations.

Comment: Standards and guidelines IX.A, C, D in the Proposed Forest Plan regarding management of human-bear encounters should be effectively incorporated into road management and timber harvest planning at the project level.

Response: Forest Plan standards and guidelines are incorporated into road management and timber harvest plans.

Comment: Standard and Guideline IX.D, of the Proposed Forest Plan regarding roads, should be strengthened by closing more roads because roads are correlated with bear mortality.

Response: Site-specific needs to minimize human/bear conflicts will be taken into account at project level planning including assess and travel management planning with regard to road management.

Comment: There is no science to suggest that brown bears require a 500-foot buffer for foraging. For areas where human bear encounters are predicted (i.e., Anan Creek, Pack Creek, Salmon River) this may be appropriate but otherwise is not needed, considering that the highest concentration of brown bears in Southeast Alaska occurs in an area with substantial past timber harvest and road building and harvest of brown bears is permitted on the Admiralty, Baranof, and Chichagof islands.

Response: As stated in the *Wildlife* section of the Draft EIS, cover for visual obscurity, provided by riparian buffers, is important for minimizing interactions among bears and between humans and bears. During the salmon spawning season bears concentrate their use within 500 feet of salmon spawning streams (Schoen and Beier 1990, Titus and Beier 1999), though will make greater use of upland areas in watersheds with greater development. The 500-foot buffers required by the Final Proposed Forest Plan are intended to provide visual cover in the areas that receive the greatest use.

Comment: One comment requested that the Forest Service adopt the Flynn et al. (2007) recommendations for bear buffers of 500 feet along each side of all salmon streams that are used by brown bears, and a buffer of 1,000 feet along each side in areas where ADF&G management objectives are for a brown bear population that exceeds the level of minimum viability.

Response: Standard and Guideline WILD1 IX.B, (Bear Habitat Management) in the *Wildlife* section of Chapter 4 of the Final Proposed Forest Plan requires consultation with ADF&G to determine the best application of needed buffers. Some sites might warrant these types of buffers, but this is best determined at the project level.

Plants

Comment: The Forest Service and the Tribes must work together to address the issues of noxious or invasive animal and plant species.

Response: The Forest Service works with the Tribes, as well as with other agencies and organizations, on issues related to noxious and invasive species.

Comment: One comment noted that the Proposed Forest Plan does little to prevent the spread of invasive plants.

Response: The Final Proposed Forest Plan has been modified to include a section on invasive plants. The standards and guidelines reference the direction in the recently completed (November 2007) Region 10 supplement to Forest Service Handbook 2000, Noxious Weed Management, Chapter 2080. Standards and guidelines in the Final Proposed Forest Plan implement direction in this Regional Supplement.

Comment: One comment asked how many of the 46 species classified as invasive plants present on the Tongass are the result of logging operations.

Response: It is likely that many of these plants were spread by logging operations, especially prior to the Forest implementing measures to halt their spread. However, invasive plants are also spread by recreational traffic and by natural means. The Forest Service has recently completed a regional supplement to Forest Service Handbook 2000 Noxious Weed Management, Chapter 2080. Standards and guidelines in the Final Proposed Forest Plan implement the direction from this Regional Supplement.

Comment: **One comment requested that the Final Proposed Forest Plan protect orchids and goldenthreads.**

Response: Bog orchid is listed on the Regional Forester's sensitive plant list. The Final Proposed Forest Plan contains standards and guidelines to protect sensitive species, as identified in the effects analysis in the Final EIS. There are two species of goldenthread on the forest. One is found in bogs and is not likely to be disturbed by harvest operations. The other is found in moist forests where some populations may be disturbed by logging. Neither species is listed as sensitive, threatened or endangered because neither is uncommon.

Specific Geographic Area Comments

The following section presents comment summaries and responses that address specific geographic areas. These comment summaries are organized into two sections. The first section presents comments that requested information or suggested management direction for specific places. The second section lists and discusses specific places that were more generally identified for protection from timber harvest and road construction.

Specific Geographic Area Comments and Responses

Comment: Several comments expressed concern about the recommendation that the existing Young Bay Experimental Forest be declassified as an Experimental Forest and assigned to the Remote Recreation LUD under management of the Juneau Ranger District. These comments argued that the Young Bay should become part of the adjoining Kootznoowoo Wilderness and Admiralty National Monument. Respondents stated that this would be inconsistent with President Carter's Proclamation 4611 and ignores ANILCA. One comment encouraged the Forest Service to

consult with the Kootznoowoo to determine the potential impacts of this designation on the unique coastal island ecosystem. Another comment emphasized the value of Young Bay to the public and as a "crucial wildlife linkage" between Mansfield Peninsula and the rest of Admiralty Island. This comment recommended that the mineral entry withdrawal for this area remain in effect.

Response: The recommended declassification of the Young Bay Experimental Forest will be addressed in a separate decision outside of this Forest Plan Amendment effort. The above concerns are noted and will be considered in that decision process. However, it is important to note that adding this area to the Kootznoowoo Wilderness would require Congressional action.

Comment: One comment requested that Corner Bay on Chichagof Island be classified as a new Experimental Forest, not the Cowee Creek-Davies Creek area, which is recommended for this designation in the Proposed Forest Plan. The comment author would prefer the Forest Plan recommend Corner Bay because it has an established road system and has been logged in the past.

Response: The Corner Bay area was examined as a potential Experimental Forest location, but the PNW Research Station recommended that the Cowee-Davis area be classified as an Experimental Forest. Their preference is reflected in the recommendation in the Final Proposed Forest Plan. A final decision on changes to the Experimental Forest will be made outside of this Forest Plan Amendment effort.

Comment: Some respondents want the name of Admiralty Island National Monument Wilderness changed to the Kootznoowoo Wilderness with appropriate legal boundaries identified in the Final Proposed Forest Plan and supporting maps. Others asked that the name Kootznoowoo be spelled with an "X" as they felt that was more traditional. Another comment pointed out that Angoon elders maintain that "Young Bay" should in fact be "Young's Bay" and requested that the Forest Service make the applicable changes as soon as possible

Response: The alternative maps in the Draft and Final EIS documents clearly show both Admiralty Island National Monument and Kootznoowoo Wilderness. Text in the Final EIS refers to Kootznoowoo Wilderness. The boundaries of the wilderness were legislated by Congress, as was the name and spelling. Changing the name of the area is beyond the scope of this Forest Plan Amendment. This is also the case with the suggested change from Young Bay to Young's Bay.

Comment: A number of respondents from the community of Angoon expressed concern about a proposal by the Borough of Juneau to extend the Borough boundaries to include Admiralty Island. They asked that the Forest Service stop this effort.

Response: Annexation proposals by the Borough of Juneau are outside the scope of this Forest Plan Amendment.

Comment: One comment requested that the Final Proposed Forest Plan clearly identify the following areas of subsistence-related concern in the text and also depict them graphically: Chatham Strait Sockeye returns, voluntary closures, and migratory maps; Mitchell Bay Coho returns and existing commercial fishing areas; Southeast Herring Stocks, returns and commercial fishing harvest areas; and all areas within the Kootznoowoo Wilderness currently open to commercial fishing.

Response: The Forest Plan guides natural resource management activities on the Tongass. Subsistence fisheries management issues and mapping are outside the scope of the Forest Plan.

Comment: Some respondents stated that the navigable waters in the Angoon area such as Kootznoowoo Inlet, Favorite Bay, Mitchell Bay and Kanalku belong to the Kootznoowoo.

Response: This issue is beyond the scope of decisions made in this Forest Plan Amendment.

Comment: Some respondents felt that Admiralty Island should either be removed from the Tongass or at least put into a different category that would foster more attention to this island and the people that live there. They also suggest that an integrated management plan needs to be developed with Kootznoowoo. Several respondents felt that the Admiralty Island District office should be in Angoon rather than in Juneau.

Response: The Final Proposed Forest Plan provides broad strategic direction for the Forest as a whole, but it also recognizes the differences between areas and allocates areas to different LUDs for management purposes. Most of Admiralty Island is a National Monument and a Congressionally designated Wilderness, and this is reflected in the LUD designations and the management direction associated with them.

Location of Forest Service offices is an administrative decision and beyond the scope of this Forest Plan Amendment.

Comment: One comment asked for a detailed analysis of Goldbelt Corporation's proposed tourism activities in Hobart Bay.

Response: This Final EIS is a programmatic forest-wide analysis appropriate for a strategic Forest Plan Amendment. Site-specific projects or activities are best examined locally during the decision making process as appropriate for that action. Tourism and recreation developments are considered in cumulative effects analysis.

Comment: One comment recommended the LUD boundaries of the Greater Situk Watershed be moved to protect an important fisheries resource.

Response: The alternatives in the Final EIS are designed to show varying levels of development in this watershed, including Alternative 1, which would have no development LUDs. The Forest Service will consider the importance of the resources and potential level of effects if a timber sale is proposed in this area in the future.

Comment: One comment recommended that the Forest Service increase stream buffers from 200 to 500 feet in the Yakutat Ranger District for some streams. This request was based on a recommendation for this size buffer in a 1996 Forest Service document.

Response: All of the past information, including the Panel Assessments (referenced in the comment), was considered when developing the standards and guidelines for stream buffers. There is leeway in the guidelines to increase buffers on a case-by-case basis if on-site evaluations determine that greater buffers are need to protect the function of the system. This is a Forest-wide programmatic amendment; therefore, site-specific buffer requirements for individual areas are not included.

Comment: One comment recommended that small patch cuts and selective harvest be used in the Yakutat area.

Response: These prescriptions are available for consideration by Interdisciplinary Teams planning harvests in the Yakutat Ranger District, and elsewhere on the Forest. Additional information on selective harvest has been added to the *Timber* section of Final EIS

Comment: Some respondents requested adjustments to the proposed LUD boundaries and placement in the Niblack and Hyder areas where minerals activity is high or has the potential to increase in the future. A number of comments were opposed to the Wild and Scenic River and Old Growth LUDs in the NIblack area and wanted to see the Minerals LUD overlay extended.

Response: The alternatives include a range of levels of development LUDs in these two areas. It is possible in the future also, to make a LUD change if and when specific mining operations are proposed and approved.. Extension of the Minerals LUD overlay in these two areas is evaluated in the action alternatives of the Final EIS. These changes were made to recognize the valid existing rights in these areas along with the potential for additional minerals activity in these areas because of their minerals potential.

Comment: One comment proposed that all non-Wilderness lands in the Petersburg Creek watershed be designated Wilderness, with the remaining lands within the "Petersburg Creek Land Acquisition" designated Remote Recreation.

Response: No additional areas are considered for wilderness under this Forest Plan Amendment. Wilderness recommendations were considered in detail in the 2003 SEIS. The area would be allocated to Semi-remote Recreation under Alternatives 1, 2, 3, 5, and 6. It would be allocated to a mixture of Semi-remote Recreation and Timber Production under Alternatives 4 and 7.

Specific Places Identified for Protection

Many respondents wrote to urge protection of specific places from timber harvest and road construction. The importance of subsistence in these areas was often the main rationale, as was recreation use. In other cases the identified areas were viewed has having unique values. Legislative protection of some sort was often requested.

Each alternative was designed to include these areas needed to achieve the timber harvest levels established for that alternative. So Alternative 1, with the lowest harvest level, excludes most of the areas mentioned from development. On the other hand, Alternative 7, with the highest harvest level, has the potential to impact many of the identified areas.

This section identifies many of the areas identified for protection and discusses the LUDs allocated to these areas under each alternative. The list of places presented in Table H-2 includes the majority of the areas that were identified by more than one respondent, but is not intended to be fully inclusive. Readers concerned about specific places not included in this section can find the same type of information by reviewing the large alternative maps that accompany this EIS.

The places identified in Table H-2 are organized by Ranger District. In many cases, identified areas were located in proximity to one another. These areas are grouped by general area in Table H-2 and the following discussion. The text discusses these places by Ranger District and geographic area.

Table H-2
Specific Places by Ranger District

Ranger District	Geographic Area	Specific Place
Yakutat	Situk Watershed	Situk Watershed
Hoonah	Elfin Cove	Elfin Cove
	Chicken Creek	Chicken Creek
Sitka	Tenakee Inlet	Crab Bay
		Kadashan Watershed
		Long Bay
		Saltery Bay
		Seal Bay
		Tenakee Inlet
	Neka Bay	Neka Bay
	Peril Strait	Broad Creek
		Broad Finger
		Deep Bay
		Finger Creek
		Peril Strait
		Poison Cove
		Saook Bay
		Ushk Bay
	Redoubt Lake	Redoubt Lake
	Sitka North	Katlian Watershed
		Nakwasina Straits
		Starrgavan Watershed
	Silver Bay	Silver Bay
	Kruzof Island	Kalinin Bay
		Krestof Sound
		Kruzof Island
Juneau	Homeshore	Homeshore
	Taku Inlet	Rhine Creek
		Slocum Inlet
		Taku River
	Sweetheart	Sweetheart Creek

Table H-2
Specific Places by Ranger District

Ranger District	Geographic Area	Specific Place
Juneau (cont.)	Port Houghton	Hobart Bay Port Houghton Sanborn Canal Windham Bay
Petersburg	Farragut Bay	Farragut Bay Cape Fanshaw
	North Kuiu Island	Kadake Creek Port Camden Saginaw Bay Security Bay Three Mile Arm North shore of Rowan Bay
	South Kuiu Island	No Name Bay Reid Bay South Kuiu Island
	Duncan Canal	Castle River Duncan Canal Kah Sheets Creek
	Petersburg Watershed	Petersburg Watershed
	Wrangell Narrows	Mountain Point Peterburg Creek Tonga Mountain Point
	Kushneahin Creek	Kushneahin Creek
	South Mitkof Island	Southeast Mitkof Island
Wrangell	Madan Bay	Madan Bay
	Bradfield Canal	Bradfield Canal
	Navy Lake	Navy Creek
	Anan Creek	Anan Creek
Ketchikan	Cleveland Peninsula	Cleveland Peninsula Spacious Bay Union Bay Yes Bay
	Gravina Island	Bostwick Inlet Gravina Island
Thorne Bay	Honker Divide Calder Holbrook 20 Road Eleven Mile	Honker Divide Calder Holbrook 20 Road Eleven Mile
Craig	Cat Island/Duke Island	Cat Island Duke Island
	Salmon Lake	Salmon Lake
	Sea Otter Sound	North Sea Otter Sound
	Dall Island	Dall Island
	Outside Islands	Outside Islands
	South Prince of Wales	Clover Bay Kassa Inlet Keete Inlet Mabel Bay Moira Sound Monie Lake Niblack Sunny Cove Trollers Cove

Yakutat Ranger District

Situk Watershed: This area is not available for timber management under Alternative 1. Portions of the upper watershed would be available for timber management under all other alternatives. All alternatives except 4 and 7 include a small old-growth reserve in the upper watershed. OGRs are withdrawn from timber management.

Hoonah Ranger District

Elfin Cove: This area is allocated to LUDs that do not allow timber management under all alternatives.

Chicken Creek: This creek is within an old-growth reserve under all alternatives except Alternatives 4 and 7. The area would be available for timber management under these two alternatives.

Sitka Ranger District

Tenakee Inlet: The southeast side of Tenakee Inlet includes Long Bay, Saltery Bay, Seal Bay, and Crab Bay. These areas would not be available for timber management under Alternative 1 and only small portions would be available under Alternatives 2 and 3. Nearly all of these areas are allocated to development LUDs under Alternatives 4 and 7. While most of these areas are within development LUDs under Alternatives 5 and 6, key portions are allocated to old-growth reserve, especially under Alternative 6. The Kadashan Watershed is allocated to LUD II under all alternatives. LUD II is withdrawn for timber management.

Neka Bay: The area around the bay would be entirely allocated to non-development LUDs under Alternative 1 and primarily to non-developement LUDs under Alternatives 2, 3, 5, and 6. This area would be allocated to a development LUD under Alternatives 4 and 7.

Peril Strait: Ushk Bay and Poison Cove are allocated to LUDs that do not allow timber management under Alternatives 1, 2, and 3 and to a mix of development and non-development LUDs under Alternatives 5 and 6. These areas would be allocated to development LUDs under Alternatives 4 and 7. Saook Bay would be allocated to a non-development LUD under Alternative 1 and primarily to non-development LUDs under Alternatives 2 and 3. The area would be allocated to development LUDs under Alternatives 4, 5 and 7 and to a mix of development and non-development LUDs under Alternative 7. Deep Bay would primarily be within an old-growth reserve under all alternatives except 4 and 7, which would allocate the area to development LUDs. Upper Peril Strait would remain LUD II under all alternatives. The Broad Finger or Broad Creek area to the southeast of the Pelican LUD II area would be an old-growth reserve under all alternatives except Alternatives 4 and 7. It would be available for timber harvest under those two alternatives.

Redoubt Lake: This area would not be available for timber management under any alternative.

Sitka North: This area, which includes Starrigavan Bay, Katlian Bay, and Nakwasina Sound, would not be available for timber management under any alternative, except for the area north of Nakwasina Sound which would be allocated to development LUDs under Alternatives 4 and 7.

Silver Bay: The area along Silver Bay would be allocated to LUDs that do not allow timber management under Alternative 1 and primarily to non-development LUDs under Alternatives 3, 4, 5, and 6. Most of the area would be allocated to development LUDs under Alternatives 4 and 7.

Kruzof Island: This island would not be available for timber management under Alternative 1. All other alternatives would allocate the island to a mix of development and non-development LUDs. The southern third of the island would be a special interest area under all alternatives. The northern portion of the island, including Kalinin Bay, would be an old-growth reserve under all alternatives except Alternatives 4 and 7. This portion of the island would have a development LUD under these two alternatives. Portofshikof Island to the east would be allocated to a non development LUD under all alternatives except Alternatives 4 and 7.

Juneau Ranger District

Homeshore: This area would be allocated to a non-development LUD under Alternative 1 and to development LUDs under all other alternatives.

Taku Inlet: Rhine Creek and Slocum Inlet near the entrance to Taku Inlet would be allocated to non-development LUDs under Alternatives 1, 2, and 3 and to LUDs that permit timber management under all other alternatives. Taku River would be allocated to non-development LUDs under all alternatives. There would be a Transportation and Utility LUD on the south side of the river under all alternatives.

Sweetheart: Both Sweetheart Creek and Sweetheart Lake would be allocated to non-development LUDs under all alternatives.

Port Houghton: The Windham Bay, Hobart Bay, and Port Houghton area would not be available for timber management under Alternative 1. Alternative 3 would allow some timber harvest near Port Houghton, while remaining areas would be allocated to non-development LUDs. Most of these areas would be allocated to development LUDs under Alternatives 4, 5, 6, and 7. The Sanborn Canal area would be within an old-growth reserve under all alternatives except Alternatives 4 and 7. The area would be allocated to development LUDs under those two alternatives.

Petersburg Ranger District

Farragut Bay: The Cape Fanshaw and Farragut Bay area would not be available for timber management under Alternative 1. Only a small area near Farragut Bay would be allocated to LUDs that allow timber management under Alternative 2. Alternative 3 would allow some timber harvest near Farragut Bay, while the Cape Fanshaw area would be allocated to non-development LUDs. These areas would be allocated to a mix of development and non-development LUDs under Alternatives 4, 5, 6, and 7, with Alternatives 4 and 7 allowing the most timber management.

North Kuiu Island: This area includes Port Camden, Security Bay, Saginaw Bay, Kadake Creek, Rowan Bay, and Three Mile Arm (Table H-2). These areas would not be available for timber management under Alternative 1. Most of North Kuiu Island would be allocated to development LUDs under the remaining alternatives. The west side of Security Bay would have a non-development LUD under all alternatives. The north side of Rowan Bay would be allocated to a non-development LUD under Alternative 1; to a mixture of development and non-development LUDs under Alternatives 2, 3, 5, and 6; and to development LUDs under Alternatives 4 and 7.

South Kuiu Island: This area includes Reid Bay and No Name Bay. No timber management would be permitted in these areas under Alternatives 1, 2, and 3. Both areas would be allocated to development LUDs under the other alternatives. Only Alternatives 4 and 7 would permit timber management in the Roadless Area south of the Kuiu Wilderness.

Duncan Canal: The west side of Duncan Canal, which includes Kah Sheets Creek and Castle River, would be allocated to non-development LUDs under Alternatives 1, 2, and 3 and to a mix of development and non-development LUDs under the other alternatives. The east side of Duncan Canal would have a mix of development and non-development LUDs under all alternatives, with Alternatives 4 and 7 allowing the most timber management.

Wrangell Narrows: The area along the Narrows would be allocated primarily to a mix of development and non-development LUDs under all alternatives, with Alternatives 4 and 7 allowing the most timber management and Alternative 1 the least.

Kushneahim Creek: The southwest corner of Kupeanof Island would be allocated to non-development LUDs under Alternatives 1, 2, and 3 and primarily to development LUDs under Alternatives 4, 5, 6, and 7. However, Alternatives 5 and 6 would include three OGRs in southwest Kupreanof Island, while Alternatives 4 and 7 would not.

South Mitkof Island: This area would have a mix of development and non-development LUDs under all alternatives, with Alternatives 4 and 7 allowing the most timber management and Alternative 1 the least.

Wrangell Ranger District

Madan Bay: The Madan area would be allocated to non-development LUDs under Alternatives 1 and 2 and to a mix of development and non-development LUDs under the other alternatives. Most of Madan Bay borders an old-growth reserve under all alternatives except Alternatives 4 and 7.

Bradfield Canal: The Bradfield Canal area would be allocated to non-development LUDs under Alternatives 1 and 2 and to a mix of development and non-development LUDs under the other alternatives.

Navy Lake: This area would be allocated to development LUDs under all alternatives except Alternative 1.

Anan Creek: The Anan Creek area is allocated to LUD II under all alternatives.

Ketchikan Ranger District

Cleveland Peninsula: The peninsula southwest of Yes Bay would be allocated to non-development LUDs under Alternatives 1 and 2. The area southwest of Spacious Bay would be allocated to non-development LUDs under Alternative 3 while the area to the north would be a mix of development and non-development LUDs. The area southwest of Meyers Chuck/Helm Bay would be allocated to non-development LUDs under Alternatives 4, 5, and 6, while the remainder of the peninsula would have a mix of development and non-development LUDs. Nearly all of the peninsula would be allocated to development LUDs under Alternative 7.

Gravina Island: All but a very small portion of the island would be allocated to non-development LUDs under Alternative 1. The small area of development LUD is not near Bostwick Inlet. Most of the island would have non-development LUDs under Alternatives 2, 3, 4, 5, and 6, with a development LUD extending north from Bostwick Inlet to California Ridge. Most of the island would be allocated to development LUDs under Alternative 7.

Cat Island/Duke Island: Both islands would be contained in the Duke Island Zoological Special Interest Areas under all alternatives. This area was designated because of its abundant wildlife, especially waterfowl.

Thorne Bay Ranger District

Honker Divide: This area would be allocated to non-development LUDs under all alternatives except Alternative 7, which would allocate the area to development LUDs, except for the Recreational and Scenic River corridor along the Thorne River/Hatchery Creek.

Calder Halbrook: The Mt. Calder/Mt. Halbrook area is allocated to LUD II under all alternatives. The area immediately to the northeast of the LUD II area would be allocated to development LUDs under all alternatives.

20 Road: The area along the 20 Road would be allocated to a mix of development and non-development LUDs under all alternatives.

Eleven Mile: The Eleven Mile Watershed would be allocated non-development LUDs under Alternatives 1 and 2; to a mix of development and non-development LUDs under Alternatives 3, 5, and 6; and to development LUDs under the Alternatives 4 and 7.

Craig Ranger District

Salmon Bay Lake: This area is allocated to LUD II under all alternatives. The area to the east would have development LUDs under all alternatives except Alternative 1. The area to the west would be allocated to non-development LUDs under all alternatives except Alternative 7.

Salmon Lake: This area is allocated to LUD II under all alternatives. Adjacent areas would have varying levels of development LUDs depending on the alternative.

Sea Otter Sound: Most of the area along Sea Otter Sound would be allocated to development LUDs under all alternatives.

Dall Island: NFS land on the island south of Diver Bay (which is on the north end of the island) would be allocated to non-development LUDs under all alternatives. The area north of Diver bay would be allocated to non-development LUDs under Alternatives 1, 2, and 3 and development LUDs under the other alternatives. The island would have several Special Interest Areas under all alternatives.

Outside Islands: With the exception of San Juan Bautista Island, all the islands west of Craig would be allocated to Wilderness, LUD II, or other non-development LUDs under all alternatives. San Juan Bautista Island would be allocated primarily to a development LUD under Alternatives 4, 5, 6, and 7 and to a non-development LUD under Alternatives 1, 2, and 3.

South Prince of Wales Island: Nine specific places were identified on south Prince of Wales Island were identified for protection (Table H-2). The south half of the island includes Keete Inlet, Mabel Bay, Kassa Inlet, Sunny Cove, Niblack, Clover Bay, and Moria Sound. These areas would be allocated to non-development LUDs under Alternative 1. Under Alternative 2, most of south Prince of Wales Island would be allocated to non-development LUDs except for the Cholmondeley Sound area, which includes Sunny Cove. This area would be allocated to development LUDs. Keete Inlet, Mabel Bay, Kassa Inlet, Sunny Cove, Niblack, and Moria Sound would primarily be allocated to development LUDs under Alternatives 4, 5, 6, and 7. As noted in the preceding section, the Minerals LUD overlay was extended in the Niblack area under all of the action alternatives.

The south side of Clover Bay would be allocated to a non-development LUD under all alternatives but the north side of the bay, and the Monie Lake area, would be allocated to development LUDs under all alternatives except 1 and 2. Trollers Cove would be allocated to non-development LUDs under all Alternatives 1 and 2 and to a mix of development and non-development LUDs under all other alternatives. The west side of south Prince of Wales Island would be allocated to non-development LUDs under Alternative 3, while most of the east side would be allocated to LUDs that permit timber management.

C. References

The references cited in this appendix are included in the reference section presented in Volume I, Chapter 6 of this EIS.

Attachment A

Letters from Agencies, Elected Officials, and Tribal Governments

Attachment A
Contents

Federal Agency/Elected Official

State Agency/Elected Official

Tribal Government

Local Government (Boroughs, Cities, and Towns)

Civic Groups

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

April 20, 2007

Dennis E. Bschor
Regional Forester
USDA Forest Service
Alaska Region
P.O. Box 21628
Juneau, AK 99802-1628

RE: Tongass Land Management Plan Amendment, DEIS

Dear Mr. Bschor:

The National Marine Fisheries Service (NMFS) reviewed the Tongass Land Management Plan (TLMP) Amendment Draft Environmental Impact Statement (DEIS). Our specific comments are enclosed and our general summarized comments follow below.

Overall Comments

The revised TLMP provides an opportunity to restore fish habitat and improve fish passage in areas that have been degraded as a result of past management practices. Below and in the enclosure we recommend several changes for the Final EIS and TLMP Amendment to ensure that future timber sales and forest management decisions incorporate measures to restore access to fish habitat blocked by inadequate culverts, restore fish habitat, and minimize further impacts to anadromous fish.

The proposed plan makes some changes in the Soil and Water, Riparian, and Transportation Standards and Guidelines (S&Gs) which improve the S&Gs from a fish habitat perspective. In particular, the Transportation S&Gs now include road storage and decommissioning, providing greater specificity as to what to consider and how to conduct road closure activities.

The Final EIS should provide additional clarity and information in the following areas:

Effects of Roads on Fish

NMFS recommends the environment and effects fish section include an analysis of the number of culverts on the forest that do not fully meet the criteria for passing fish (red and gray culverts). The analysis should include the potential cumulative effect of constructing additional roads with culverts that may not meet fish passage criteria. NMFS recommends that the products of the Fish Passage Working Group (decision information matrix and biological significance model) be incorporated into the EIS and into the proposed plan.

Restoring fish passage through red culverts should be a high priority in the Forest Plan. In addition to disclosing the number and location of problem culverts the Final EIS should include plans or opportunities for remedies in future timber sales pursuant to the revised TLMP.

Road Density

The density that is displayed by alternative is the average road density in all value comparison units (VCUs) including VCUs with no development. NMFS recommends that the average road density in VCUs with past and or proposed harvest be displayed and discussed for all alternatives. Such information would give a better idea of the density of roads in developed VCUs where impacts are most likely to occur.

Riparian Management Objectives and Riparian Standards and Guidelines

NMFS supports the continuation of riparian buffers along Class III streams. NMFS is aware of some discussions to eliminate riparian buffers along Class III streams. We are glad this was not a proposed change in the DEIS. As documented in a March 10, 2006, paper titled "Evaluation of Concern 04-25, Class III Stream Management" by Steve Paustian, Colleen Grundy, Dennis Landwehr and other Forest Service staff there is compelling scientific rationale to continue buffers along Class III streams . Recommendations made by this group include the following: *The literature review indicates that the Riparian Management Objectives and Standards and Guidelines in the forest plan are appropriate. Class III streams need large woody debris to function properly and that woody debris inputs need to be understood at the scale of decades or centuries. The literature indicates that forest plan objectives could be broadened to include invertebrate production, the majority of streamflow within a watershed, and contributions to primary productivity. Cumulatively Class III and IV streams may account for 60 to 80 percent of the runoff volume in Tongass Watersheds. Headwater streams need to be understood on decadal scale or centuries scale.*

Watershed Restoration

NMFS recommends that the Forest Plan place a greater emphasis on watershed restoration as a means of reversing the negative consequences of past forest management activities on watershed health, especially timber harvest and road building impacts. Restoration of aquatic habitat and ecological processes should have priority over mitigation (so-called watershed improvement projects).

NMFS Recommendations for a Preferred Alternative

Fish and the aquatic resources on the Tongass National Forest support major subsistence, commercial, and sport fisheries, as well as traditional and cultural values. Road building and timber harvest can negatively impact fish resources. Adverse effects can be minimized with best management practices but not eliminated. Alternatives 1, 2 and 3 provide for a range of timber harvest and have less potential effects on fish than alternatives 4, 5, 6, and 7 with higher allowable sale quantity (ASQ). NMFS recommends that the Forest Service preferred alternative be Alternative 1, 2, or 3. This alternative range allows for harvest at the present rate and higher and will satisfy a medium integrated-industry level of timber demand according to the Brackley study cited in the DEIS. These alternatives minimize entry into roadless areas which would leave most roadless watersheds in the forest intact. These alternatives provide a mix of National Forest uses and activities and allow up to an ASQ of 204 million board feet which significantly exceeds current demand.

If you have questions regarding our comments contact Cindy Hartmann at (907) 586-7585 or John Hudson at (907) 586-7639.

Sincerely,

Robert D. Mecum

Robert D. Mecum
Acting Administrator, Alaska Region

Enclosure (1)

cc: * r10_tongass_juneau_rd_plan_adjustment@fs.fed.us
Tongass National Forest, Attn. Forest Plan Adjustment, 648 Mission Street, Ketchikan, AK 99901
Lee Kramer, Project Team Leader, Forestry Sciences Laboratory, 2770 Sherwood Lane, Suite 2A, Juneau, AK, 99801-8545
*Chris Meade, EPA Juneau
*Tom Schumacher, ADF&G, Juneau
*Bill Hanson, USFWS, Juneau
*Kevin Hanley, ADEC, Juneau
*Cindy Hartmann and John Hudson, NMFS, Juneau
*Steve Kokkinakis, NOAA, Silver Spring
*Cristi Reid, NOAA, Silver Spring

*email

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John Hudson
Cindy Hartmann

April 20, 2007

National Marine Fisheries Service (NMFS) Comments on TLMP Amendment - Enclosure

Comments Specific to the: Tongass Land and Resource Management Plan, Draft Environmental Impact Statement (EIS), Plan Amendment, January, 2007.

Page 3-57 to 3-58, Environment and Effects, Fish, Essential Fish Habitat (EFH)
The EIS states "Habitat areas of particular concern are identified as living marine substrates in shallow and deep waters, and freshwater habitats used by anadromous fish (NMFS 2003)." This definition is no longer valid. An August 8, 2005, record of decision (ROD) selected Alternative 3 of the April 2005 Final Environmental Impact Statement (FEIS) for Essential Fish Habitat Identification and Conservation in Alaska (EFH EIS) for the identification of habitat areas of particular concern (HAPCs). Under this alternative the previous HAPC identifications (living marine substrates in shallow and deep waters, and freshwater habitats used by anadromous fish) were rescinded. Existing HAPCs in the vicinity of the Tongass are offshore on the Fairweather Grounds and near Cape Omnaney.

The descriptions of EFH for Pacific salmon were also modified per the August 2005 EFH EIS ROD. NMFS refers you to Appendix D pages D-77 to D- 82 (EFH descriptions for Alternative 3) of the EFH FEIS found at
http://www.fakr.noaa.gov/habitat/seis/efheis.htm.

Page 3-59, Environment and Effects, Fish, Invasive Aquatic Species
NMFS recommends that the Forest Service make changes to this section as noted below (additions are underlined and deletions are lined through). The recommended additional citation follows the paragraph on invasive aquatic species.

Invasive aquatic species can affect native species by eating them, competing with them, hybridizing with them, disrupting or destroying their habitat, or introducing pathogens or parasites that sicken or kill them (Schrader and Hennon 2005).
In addition to natural range extension, several potential pathways exist for introduction of invasive aquatic species. These pathways included fish farms, international and local movement of bait and game fish, trade in live seafood, aquaculture, and contaminated sport angle gear brought into Alaska, as well as ballast discharge from international vessels (Fay 2002, Schrader and Hennon 2005). Several aquatic species have been noted as potential threats to Alaska, including fish (northern pike, Atlantic salmon, yellow perch, ornamental aquarium fish), invertebrates (green crab, New Zealand mudsnail, Chinese mitten crab, zebra mussel, signal crayfish, spiny water flea), plants (cordgrass) and several additional other miscellaneous taxa (Fay 2002, Schrader and Hennon 2005). Additionally, eastern brook trout (non-native) and non-endemic rainbow trout have been stocked in many areas where they were not native and compete or hybridize with native trout (Schrader and Hennon 2005). Of these fish, transplanted northern pike and Atlantic salmon are the two fish species of greatest concern (Fay 2002). The invertebrates Chinese mitten crab, green crab, and New Zealand mudsnail, even though they have not been found in Alaska, are of major concern because of their potential to do serious damage to

~~the~~ Alaskan ecosystems (Hines et al. 2004; Schrader and Hennon 2005). Atlantic salmon that have escaped from fish farms pose a threat to native salmon by competing for habitat and introducing diseases and parasites. This species has already been observed in Southeast Alaska marine waters and rarely in streams (Fay 2002). Also, northern pike, which has not appeared in Southeast Alaska (with the exception of a native stock in Yakutat), have caused widespread damage to resident trout where they have been introduced, and could potentially affect coho salmon through predation. Northern pike have the potential to cause serious environmental and economic damage to highly productive salmon streams in Southeast Alaska (Fay 2002). In the Tongass there is a risk that these and possibly other non-native sport fish may be introduced into lakes and rivers by individuals seeking to increase sport fishing opportunities. As the road network is extended into more areas of Southeast Alaska, this risk increases.

Additional Citation:
Hines, A.H., G.M. Ruiz, N.G. Hitchcock, and C. deRivera. 2004. Projecting Range Expansion of Invasive European Green Crabs (Carcinus maenas) to Alaska: Temperature and Salinity Tolerance of Larvae. Smithsonian Environmental Research Center, Research Report Submitted to Prince William Sound Regional Citizens' Advisory Council. 1 Febuary 2004.

Page 3-61, Environment and Effects, Fish, General Effects, Roads
A previous section on fish habitat enhancement (page 3-55) had a paragraph on restoration of habitat access to streams through replacement of culverts that did not meet current fish passage design criteria. It stated that approximately 240 culverts have been replaced through 2006. It also stated, "The culvert replacement program declined in 2006 due to funding reductions and is projected to continue to decline in future years." The roads effects section should include a discussion on the number of culverts that do not meet current fish passage design criteria. Culverts that do not meet current fish passage design criteria (Q2-2day duration design flow or the stream flow that exists two days before and two days after a peak flow) have been classified as RED culverts, GRAY culverts require more analysis to determine their juvenile passage ability, GREEN culverts have a high certainty of meeting juvenile fish passage at all desired stream flows. There are currently approximately 2000 red culverts on the Tongass National Forest. Because of changes in standards and guidelines, better engineering ability, and implementation monitoring the number of red culverts from past road construction may not be predictive of future fish passage problems. However, fish passage through culverts is an important issue that needs further discussion in the general effects/cumulative effects section. The number of red and gray culverts should be identified and their impacts discussed in the EIS. Restoring fish passage through culverts should be a high priority in the Forest Plan.

NMFS participated in an interagency Fish Passage Working Group regarding red and gray culverts. The working group completed a number of products that could be used to further efforts to remediate red culverts. These products included a decision information matrix and a biological significance model. These products are tools that could be used in a process or decision framework designed to identify which red culverts to fix, and which culverts to submit for Clean Water Act 404 permitting (compensatory mitigation) instead of fix. The products were tested on the North Thorne Watershed stream and culvert replacement data set. The results of this test are documented in a January 27, 2006, paper titled "Test of a Process to Assign Fish Passage Remediation to Culverts in the North Thorne Watershed." The January 27 paper identified three components of the overall process that needed to be completed before expansion to the entire Tongass. Automating data acquisition was one component which included completing a stream crossing layer in the Forest Service GIS that contains all the attributes to run the biological significance model. NMFS hoped that these components would have been completed in time for this process to be incorporated into the Forest Plan Amendment and EIS. We recommend that the Forest Service make completing these components a high priority. At a minimum the data acquisition component should be automated and data gaps filled so the number of red culverts can be included in the EIS as well as the costs of fixing them. Our preference is for the full modeling and decision process to be incorporated into the Forest Plan Amendment.

Given funding reductions in the culvert replacement program, it is unlikely sufficient funding will be available to remediate the fish passage problem at one time Tongass-wide. Until such time, NMFS recommends that an analysis of the red and gray culverts within a timber sale area be incorporated into the timber sale NEPA process. Opportunities to fix red culverts should be expanded from the road maintenance planning process and the capital investment program to timber sale planning.

References that emphasize the importance of the potential effects of roads on fish include the following two references:

"Numerous studies show that watersheds with fewer roads are often associated with healthier fish populations, and roads may have unavoidable effects on streams, regardless of how well they are located, designed, or maintained (USDA Forest Service and USDI Bureau of Land Management 1995).

Citation: USDA, Forest Service and USDI, Bureau of Land Management. 1995. Decision Notice/Decision Record, Finding of No Significant Impact, and Environmental Assessment for the Interim Strategies for Managing Anadromous Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California. Washington, DC. 206 pp.

And from "Fisheries", Vol. 30, No. 1

".........the Alaska Department of Fish and Game reported that 66% of the culverts in salmon streams in the Tongass National Forest may be inadequate for fish passage, and 85% of the culverts across trout streams may be likewise (Flanders and Cariello 2000). A briefing document by Trout Unlimited (J. Konigsberg, Trout Unlimited, Anchorage, Alaska, pers. comm.) reported that one of the more significant threats to Alaska's wild

salmon was barriers created by culverts, causing loss of spawning and rearing habitats upstream."

Citations:

Gibson, J.R., R.L. Haedrich, and C.M. Wernerheim. 2005. Loss of fish habitat as a consequence of inappropriately constructed stream crossings. Fisheries Vol. 30 No. 1.

Flanders, L. S., J. Cariello. 2000. Tongass road condition survey report. Alaska Department of Fish and Game Technical Report 00-7.

Page 3-62, Environment and Effects, Fish, General Effects, Roads
The EIS states: "Currently the average road density in all VCUs is 0.19 mile per square mile, while the average road density in only VCUs with some past harvest is approximately 0.46 mile per square miles." "After more than 100 years of Forest Plan Implementation, the estimated overall road density on NFS lands would range from 0.26 under Alternative 1 to 0.43 mile per square mile for Alternative 7." NMFS interprets your use of "overall road density" to be the average road density in all VCUs. Since many VCUs are designated wilderness, national monument, remote recreation or LUD II (congressionally-designated unroaded areas) displaying only the average road density in all VCUs by alternative does not provide a true picture of road density in VCUs with moderate and intensive development. Since roads pose the greatest risk to fish resources on the Tongass (page 3-61) NMFS recommends adding a line to Table 3.6-2 which has the average road density by alternative for VCUs with timber harvest (past and/or future harvest) and adding a table and/or graph showing the distribution of road densities among all VCUs. These numbers then need to be fully discussed in the effects section.

Page 3-69, Environment and Effects, Fish, Essential Fish Habitat Assessment
NMFS offers the following clarification: Section 305(b)(2) of the Magnuson-Stevens Act requires all Federal agencies to consult with the Secretary on all actions or proposed actions authorized, funded, or undertaken by the agency that may adversely affect EFH.

Comments Specific to the: Tongass National Forest, Proposed Land and Resource Management Plan with EIS Appendices, January, 2007.

Pages 2-4 and 2-5, Chapter 2 - Goals and Objectives, Soil and Water Resources
Under Soil and Water Resources two objectives (see below) related to watershed restoration were deleted from the DEIS.

Deleted: Perform watershed restoration projects in at least two large watersheds (over a ten-year period). **Replaced with:** Complete Hydrologic Condition Assessments and Restoration Plans for priority watersheds.

Deleted: Perform an average of 3 single-year-type watershed improvement projects annually across the Forest. **Replaced with:** Complete watershed restoration projects in conjunction with Integrated Resource Program (see Appendix C).

These objectives were replaced with statements that lack the narrowly defined, precise, and measurable quality of an objective. The deleted objectives should be retained in the Final EIS because they provide a better means of gauging progress towards the stated goals of protecting and restoring watershed integrity. Many of the other objectives in this chapter are rather vague "general intentions" lacking the details required to properly evaluate progress towards achieving goals. All objectives should be reviewed and, if necessary, re-written as narrowly defined, precise, and measurable statements.

Page 4-4, Chapter 4 – Forest-wide Standards and Guidelines, Beach and Estuary Fringe, I. C. 1.
The proposed plan states: "The estuary fringe is an area of approximately 1,000 feet slope distance around all identified estuaries." If available, this definition should include reference to the source or sources that give the location of estuaries on the Forest.

Pages 4-8 to 4-12, Chapter 4- Forest-wide Standards and Guidelines, Fish Habitat Planning: FISH112
Past forest management practices that failed to consider the impacts of certain logging and road construction practices on watershed health have resulted in degraded fish habitat and productivity in many watersheds on the Forest. NMFS appreciates and supports the numerous references to restoration in the Fish Habitat Planning (FISH112) Standards and Guidelines. Fish habitat restoration should be a critical component of the Forest Plan. In the current draft, guidelines for fish habitat restoration are found in section IV under the Fish Habitat Planning heading (pages 4-9 and 4-10). NMFS would like to see fish habitat restoration elevated to a higher level within the Forest-wide Standards and Guidelines for Fish. To that end, NMFS recommends the addition of a "Fish Habitat Restoration" section to the Standards and Guidelines for Fish.

Page 4-8, Fish Habitat Planning, III. Fish stream value classification, B. 2. Class II
In defining Class II streams the phrase "have limited fisheries values" is used. Does "fisheries values" refer to the economic value of a fish population to a fishery? If so, why should the economic value of a fish population determine the classification of a stream channel? Fish populations can exhibit a wide variety of values - ecological, genetic, and economic among others. NMFS recommends that term "fisheries values" be defined and, if necessary, quantified and include the genetic and ecological benefits of a fish population.

Page 4-8 and 4-9, Fish Habitat Planning, III. Fish stream value classification, B. 3. Class III
The definition for Class III streams should describe the objective and measurable characteristics of a stream reach that result in an "immediate" influence on downstream water quality and fish habitat. How does one quantify whether a stream reach has an immediate or delayed or gradual influence on downstream reaches? Would a perennial or intermittent stream that is not flowing at the time of a survey be misclassified because it does not influence downstream water quality and fish habitat? The Forest Plan should clarify what immediate means. Also, NMFS recommends retaining the following statement from the current forest plan in the definition of a Class III stream: "in channels

with less than 30 percent gradient, special care is needed to determine if resident fish are present."

Page 4-9, Fish Habitat Planning, IV. Objectives/guidelines for management affecting fish habitat, A. 1.
Modify guideline number 1 to read:
1. Width-to-Depth Ratio. Relationship between <u>average</u> bankfull width and average bankfull depth, expressed as average bankfull width / average bankfull depth.

Page 4-12, Fish Habitat Improvement: FISH22
NMFS recommends that the Forest Plan distinguish between the terms "improvement" and "restoration" as applied to watershed and fish populations and habitat. This distinction would help to avoid confusion over projects that may have similar goals yet are achieved by very different means and with different ecological effects (e.g. stocking hatchery fish versus adding large woody debris to a stream. While both enhance fish populations, the former enhances an existing population – for example, with hatchery fish - while the latter allows an existing population to expand in numbers by increasing the quality and quantity of habitat). Although not explicitly defined in the Forest Plan, watershed and fish habitat improvement projects appear to be those projects which seek to enhance existing populations or create new populations such as through the construction of fish ladders, stocking programs, or lake fertilization. These types of projects are often promoted as mitigation for unavoidable impacts to fish habitat from timber management activities. Improvement projects can be quite costly (e.g. fish ladders) and certain improvement projects (e.g. lake fertilization) require continual expenditures and oversight to ensure long-term success. Despite careful planning and design, many improvement projects do not meet their target goals. In the case of fish ladders and stocking projects, the resulting enhanced fish production may come at the expense of resident fish populations through competition, predation, or interbreeding. In contrast, restoration projects seek to restore the original functionality and productivity of a watershed and associated fish population to its pre-managed condition. Watershed restoration projects may include road obliteration, enhanced fish passage (i.e. culvert replacement), tree thinning, and fish habitat creation. Although up-front costs for restoration can be quite high, restoration projects are typically self-sustaining because they re-establish ecosystem components and processes that sustain fish production without management intervention. As written, the Forest Plan focuses on watershed and fish habitat improvements. NMFS would like to see the Forest Plan address improvement and restoration separately with restoration being a priority. For example, under Section VIII Projects in the Fish Standards and Guidelines, the highest priority for fish habitat project work should be restoration/rehabilitation, followed by mitigation and enhancement (a.k.a. improvements).

Page 4-92 to 4-93, Watershed Resources Improvements: S&W2, I. Soil and Water Quality Protection and Improvement
Management activities have negatively impacted watershed health and fish habitat in numerous watersheds throughout the Forest. To date, restoration efforts have occurred in

only a small percentage of these watersheds. Watershed restoration must be a major component of a new forest management plan. Use of the term "improvement" in the Soil and Water standards and guidelines fails to recognize the current impaired status of many watersheds. Restoring watersheds to their pre-impact condition should be the goal of a new forest plan, not merely implementing improvement projects. NMFS recommends modifying the Soil and Water Standards and Guidelines as follows (additions are underlined and deletions are lined through):

Watershed ~~Resources Improvements~~ Restoration: S&W2

I. Soil and Water Quality Protection and ~~Improvement~~ Restoration

A. Protect or ~~improve~~ restore water quality and sustain soil productivity.

1. Conduct Watershed Condition Surveys and develop Watershed Restoration Plans to determine treatment priorities and needs. Consideration of treatment needs should include evaluating changed fish habitat and population levels, riparian vegetation community structure and function, and hydrology as measured against natural conditions predicted by baseline ~~fish habitat~~ objectives (see Fish Forest-wide Standards & Guidelines). Identify and prioritize needs in the NRIS Watershed Improvement Tracking (WIT) database. Complete watershed restoration project plans and coordinate with fish habitat ~~improvement~~ restoration projects. Include projects in Sale Area Improvement Plans and use K-V funds as appropriate. (Consult FSM 2510 and 2520.)
2. Give priority to cost-effective watershed ~~improvement~~ restoration projects in watersheds with the most erodible conditions directly affecting the beneficial uses of water.
3. For revegetation of disturbed sites, erosion control, fire rehabilitation, riparian restoration, forage enhancement, and other revegetation projects, consider natural revegetation as an alternative to seeding or planting. Encourage natural revegetation where seed source and soil conditions are favorable. Use native species of seeds and plant in revegetation projects where seeding or planting is appropriate. Native plant material sources include commercial nurseries, agency native seed programs, and local seed collection.
4. Inspect all watershed ~~improvements~~ restorations until the final evaluation indicates that maintenance is no longer needed.
5. Road decommissioning and storage projects to ~~improve~~ restore watershed conditions should pay special attention to fish passage, channel stability and water quality issues (Consult *Tran 24* guidance, and Soil and Water Conservation Handbook, FSH 2509.22).

Page B-2, Appendix B – Information Needs, II. Priority Research Needs

NMFS strongly supports research need #8: "Assess the effectiveness of restoration efforts in increasing fish habitat and fish production."

Page B-9, Appendix B, N. Soil and Water

Change Information Need number 20 from "Classify and develop a cost effective mapping scheme to map wetlands on the forest" to "Develop a cost effective mapping scheme to classify and map wetlands on the forest."

Page G-4), Appendix G - Log Transfer Facility Guidelines, S7. Sensitive Habitats, Discussion

The discussion concerning impacts of bark deposition on benthic water quality and biota tends to understate the biological impacts of bark accumulations. This section should be modified as noted (additions are underlined). The recommended additional citation follows the discussion on woody debris.

Woody debris from log transfer and water storage can be carried by currents and deposited on these plant and animal communities. Debris may cover the area and physically smother plants and animals. There is a concern that debris accumulation may reduce dissolved oxygen concentration in the water below the minimum level required by fish and other aquatic life. Bark debris is expected to reduce dissolved oxygen concentration in the bark interstices. High oxygen demand can lead to an anaerobic zone within the bark pile where toxic sulfide compounds are generated, particularly in brackish and marine waters. Reduced oxygen levels, anaerobic conditions, and the presence of toxic sulfide compounds can result in reduced localized habitat value for groundfish species and their forage base (National Marine Fisheries Service 2005). One study found that the dissolved oxygen, pH, oxidation reduction potential, and concentration of toxic products of decomposition in the water column at 30 centimeters (12 inches) above the bark were not significantly different than at the control sites. Reductions in dissolved oxygen below Water Quality Standards have not been documented.

National Marine Fisheries Service. Appendix G, Non-fishing Impacts to Essential Fish Habitat and Recommended Conservation Measures. April 2005

Congress of the United States

Washington, DC 20515

April 30, 2007

Chief Abigail Kimbell
USDA Forest Service
1400 Independence Ave., SW
Washington, DC 20250-0003

Dear Chief Kimbell:

We are writing to express our concern about the proposed action for the January 2007 Draft Land and Resource Management Plan for the Tongass National Forest. Under the revised plan, the timber sale program would continue to require annual federal subsidies of $40-50 million

Since 1982, the Forest Service has lost nearly a billion dollars subsidizing timber sales on the Tongass. During this time, timber employment has significantly decreased due to declining demand for Tongass timber products, however; program costs remains high. As a result, fewer than 300 jobs are now attributable to the Tongass timber sale program. The cost to federal taxpayers is over $150,000 per job per year.

The high cost of the Tongass timber sale program is based on past economic conditions in southeast Alaska. The new Forest Service plan fails to address these changes. The agency continues to plan timber sales at volumes far exceeding the demand.

Most timber sales continue to be planned in remote areas requiring expensive road construction, and resulting in significant adverse effects on wildlife, tourism, subsistence, and recreation. The Tongass National Forest contains the largest remaining tracts of old-growth temperate rainforest in the world, including many roadless watersheds with native species such as bald eagles, brown bears, wolves, black-tail deer and salmon. Given that almost four percent of the Tongass is made up of the large old growth that is vital to fish and wildlife, this habitat is a valued treasure. Already, more than half this rare and valuable old-growth in the Tongass has been clearcut.

The Tongass forest planning process now underway presents an opportunity for change. However; the proposed action does not make any substantial changes to the current plan. The annual allowable timber sale quantity would remain at 267 million board-feet; the total volume logged on the Tongass in the last six years combined. Like the existing plan, the proposed action leaves 2.4 million acres of roadless areas open to road construction, with most of the timber coming from these costly-to-access sections. The new plan should reduce costs to the federal taxpayers by decreasing the planned timber sale volume and eliminating new logging roads. Continuing without change is not sustainable and is a disservice to the American people and the residents of southeast Alaska.

We strongly encourage the USDA to reject the proposed action for the Tongass plan and adopt a balanced solution which meets the true needs of Southeast Alaska's communities and economy.

Thank you for your attention to this matter. We look forward to your response.

Sincerely,

Robert E. Andrews — Raúl M. Grijalva

Rahm Emanuel — Ron Kind

Jim Moran — Sander Levin

Mazie K. Hirono — Linda T. Sánchez

Sam Farr — Betty Sutton

Michael McNulty — Betty McCollum

Michael H. Michaud — Earl Blumenauer

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Bill Pascrell, Jr.	[illegible]
Tom Lantos	[illegible]
Bob Filner	[illegible]
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Jerrold Nadler	Carolyn B. Maloney
Elijah E. Cummings	Gary L. Ackerman
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Ben Chandler	Eddie Bernice Johnson
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United States Department of the Interior

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April 30, 2007

Mr. Forrest Cole, Forest Supervisor
Tongass National Forest
648 Mission Street
Ketchikan, Alaska 99901

Dear Mr. Cole:

The U.S. Department of the Interior has reviewed the Draft Tongass National Forest Proposed Land and Resource Management Plan Amendment (Proposed Forest Plan) and Draft Environmental Impact Statement (Draft EIS). The Draft EIS evaluates seven alternatives for managing the 17 million-acre Tongass National Forest. We believe the information included in this letter needs to be taken into account in the Final EIS and in the Final Forest Plan. These comments are submitted in accordance with the Fish and Wildlife Coordination Act, the Multiple Use-Sustained Yield Act, the National Forest Management Act, the Alaska National Interest Land Conservation Act, the National Environmental Policy Act, and the Council on Environmental Quality guidance for providing special technical expertise on water, biological, and geological resources.

We support the Proposed Forest Plan goal of maintaining viable and well-distributed fish and wildlife populations across the Tongass. We appreciate the long history of the U.S. Forest Service (USFS), the Fish and Wildlife Service (FWS), and the Alaska Department of Fish and Game working together to develop and implement conservation measures to address this goal. As you know, the 1997 Tongass National Forest Land and Resource Management Plan addressed this goal through implementation of the Tongass Conservation Strategy, a landscape conservation approach with special emphasis on species and habitats associated with old-growth forests. The strategy helps reduce risks to rare and endemic species, and therefore helps minimize, and/or avoid, wildlife species' numbers declining to the point of requiring protection under the Endangered Species Act (ESA).

The USFS is evaluating potential changes to the Tongass Conservation Strategy as part of this Proposed Forest Plan revision. Elements of the Tongass Conservation Strategy essential to Queen Charlotte goshawks and their prey include Old-Growth Reserves (OGRs), nest buffers, beach and estuary fringe, and tree retention under the Goshawk Foraging Habitat Standards and Guidelines and the American Marten Standards and Guidelines. Key Tongass Conservation Strategy elements for the Alexander Archipelago wolf and its prey include OGRs for habitat, and beach and riparian buffers for connectivity between habitats. Landscape pinch points are also important to wolf movement and dispersal across the landscape. Therefore, some of our key recommendations include: (1) eliminating, in the Final EIS, further consideration of Alternatives 4 and 7; (2) maintaining the Tongass Conservation Strategy in any alternative selected in the Final EIS, and implementing in the Final EIS and the Final Forest Plan, biological locations for Small and selected Medium OGRs as recommended by the Interagency Small OGR Work Group; (3) retaining in the Final EIS and the Final Forest Plan, the existing Goshawk Foraging Habitat Standards and Guidelines; and (4) improving in the Final EIS, the USFS proposed alternative 6 by adopting the Interagency Small OGR Work Group preferred biological locations for 48 additional Small OGRs and by retaining the existing Goshawk Foraging Habitat Standards and Guidelines, so as to help prevent the need to list the goshawk under the ESA. For more detailed information regarding these and other recommendations, see Attachments A, B, and C.

No threatened or endangered species under the jurisdiction of the FWS are currently known to exist in the project area. In response to a court-ordered remand, the FWS is currently evaluating the status of the Queen Charlotte goshawk and its habitat to determine if Vancouver Island is a significant portion of the goshawk's range and, if so, whether listing under the ESA is warranted in all, or part of, the goshawk's range. In addition to the goshawk, the Alexander Archipelago wolf has previously been petitioned for listing; and Kittlitz's murrelet is a candidate species. In addition, there are numerous other endemic and sensitive species on the Tongass that will require our continued collaboration in developing conservation provisions. More detailed information on specific Proposed Forest Plan revisions that may affect those species is included in Attachments A, B, and C.

If you have questions concerning our comments, or if we may be of further assistance with regard to fish and wildlife resource information, please contact Mr. Bruce Halstead, Juneau Fish and Wildlife Field Office, at 907-780-1161.

Sincerely,

Pamela Bergmann

Pamela Bergmann
Regional Environmental Officer - Alaska

Attachments

ATTACHMENT A

GENERAL COMMENTS

Tongass Conservation Strategy

We support the retention of the "Desired Condition and Goal" of maintaining viable, well-distributed fish and wildlife populations throughout the Tongass as outlined in the Draft Tongass National Forest Proposed Land and Resource Management Plan Amendment (Proposed Forest Plan) (Proposed Forest Plan, Pages 2-1 to 2-6). The Tongass National Forest Land and Resource Management Plan (1997 Forest Plan) addressed this goal through implementation of the Tongass Conservation Strategy, a landscape conservation approach with special emphasis on species and habitats associated with old-growth forests. These habitats are most at risk from timber harvest and road construction. The Tongass Conservation Strategy helps reduce risks to rare and endemic species in this naturally-fragmented landscape of islands, which are isolated from the rest of North America by coastal mountains, ice fields, and the Gulf of Alaska.

The Tongass Conservation Strategy is based on scientific information and assessments that specifically addressed species viability on the Tongass (Suring et al. 1993; Kiester and Eckert 1994; Suring et al. 1994). In April 2006, the U.S. Forest Service (USFS) convened a Tongass Conservation Strategy Workshop to review applicable scientific work completed since 1997. An expert panel including representatives of the USFS, U.S. Fish and Wildlife Service (FWS), and Alaska Department of Fish and Game (ADF&G) reconfirmed that the overall architecture of the Tongass Conservation Strategy continues to represent the best available science; and compiled more than 100 considerations for updating the Tongass Conservation Strategy and addressing scientific work published since 1997 (USFS 2006).

We believe it is important to retain the Tongass Conservation Strategy in its entirety throughout the Tongass, particularly the network of Old-Growth Reserves (OGRs), the 1,000-foot Beach and Estuary Fringe Standards and Guidelines, and the Goshawk Foraging Habitat Standards and Guidelines (Goshawk Standards and Guidelines). We also believe the Tongass Conservation Strategy represents the best management approach to help minimize, and/or avoid, wildlife species' numbers declining to the point of requiring protection under the Endangered Species Act (ESA). It is important to note that in 1997, the FWS found the revised 1997 Forest Plan and its Tongass Conservation Strategy adequate to sustain the Queen Charlotte goshawk (goshawk) and Alexander Archipelago wolf (wolf) in Southeast Alaska; therefore, concluding that ESA listings for those species were not warranted. Therefore, we recommend the Final Environmental Impact Statement (EIS) and Final Forest Plan retain the Tongass Conservation Strategy in its entirety throughout the Tongass, particularly the network of OGRs, the 1,000-foot Beach and Estuary Fringe Standards and Guidelines, and the Goshawk Standards and Guidelines.

Management of natural resources during climate change requires increased emphasis on building ecosystem resilience (WWF 2003). One of the most effective ways to help ensure ecosystem resilience is to eliminate or limit additional stresses through a system of OGRs and buffer zones (Noss 2001). We believe that retaining the Tongass Conservation Strategy in its entirety throughout the Tongass will provide the USFS with an important management tool for dealing with these changing conditions.

Old Growth Reserves

OGRs contain large blocks of old-growth forest set aside from timber harvest and most road construction to provide habitat for a wide array of old-growth associated species. Very Large, Large, and Medium OGRs are important for helping ensure the viability of wolves and goshawks, and for providing benefits for a wide array of endemic and other species. Small OGRs provide a system of "stepping stones" between the larger OGRs and help ensure that habitat is protected in each watershed. Small OGRs emphasize habitats important to birds (e.g., marbled murrelet and goshawk [e.g., known goshawk nests], small mammals (e.g., flying squirrel and marten), and deer [e.g., deer winter range]) (USFS 1997b, Appendix K; USFS 1997a, Appendix N).

It should be noted that implementation of OGRs across the entire Tongass was the most important factor in the 1997 ESA Finding that the goshawk did not warrant listing as a threatened or endangered species (FWS 1997b). It was also an essential factor in the "not-warranted Finding" for the wolf in 1997 (FWS 1997a). Appendix K of the 1997 Forest Plan (Appendix K) and various Tongass Plan Implementation Team (TPIT) clarifications (as identified in TPIT 1998) provide guidance for locating OGRs, including acreage requirements and other considerations pertaining to species of concern (e.g., marbled murrelet, black-tailed deer, marten, and goshawk) and special habitats (e.g., large blocks of productive old-growth, rare plants, highest volume stands, and deer winter range).

Small Old Growth Reserves

Biological Locations for OGRs. We believe that Alternatives 1, 2, 3, and 6 include better biological locations for Small OGRs than Alternative 5, the no-action alternative. Alternative 4 eliminates Small and Medium OGRs in 17 of 21 biogeographic provinces, effectively negating the overall Tongass Conservation Strategy. Alternative 7 eliminates all OGRs regardless of size and location. Therefore, we recommend that the Final EIS adopt an alternative (such as Alternative 1, 2, 3, or 6) that implements better biological locations for Small OGRs.

We believe it is important that the revised locations for Small OGRs, which fully meet the criteria specified in Appendix K and either fully implement, or implement, the intent of the Tongass Conservation Strategy, are adopted in the Final EIS and the Final Forest Plan. It is important to note that the proposed locations of 191 Small OGRs (see Attachment B, Tables 1 and 2) fully meet Appendix K criteria and either fully implement, or implement, the Tongass Conservation Strategy. Of those, 133 Small OGRs (see Attachment B, Table 1) implement the preferred biological locations. An additional 58 Small OGRs (see Attachment B, Table 2) implement acceptable (although not preferred biological) locations, thereby fully meeting Appendix K criteria, while implementing the Tongass Conservation Strategy and accommodating timber harvest, road construction, and/or other development activities. Therefore, we recommend that the Final EIS and the Final Forest Plan adopt the revised locations for Small OGRs that fully meet Appendix K criteria and either fully implement, or implement, the Tongass Conservation Strategy.

Revised Locations for Small OGRs. The 1997 Forest Plan identified draft locations for Small OGRs, and established an interagency process to identify the preferred biological location for each OGR (USFS 1997b, TPIT 1998). In accordance with that process, in 2006 and 2007, the Interagency Small OGR Work Group (which was comprised of USFS, ADF&G and FWS biologists and lead by the USFS) reviewed each of the draft locations for the 239 Small OGRs and recommended the preferred biological location for each Small OGR. The Interagency Small OGR Work Group then met with each of the USFS District Rangers and their respective foresters, engineers, and biologists, with the goal of reaching joint recommendations, through a collaborative process, that resolved potential conflicts between preferred biological locations and areas for proposed timber harvest and road construction. The results of that work were provided to the Forest Supervisor, who then reviewed and accepted 133 (see Attachment B, Table 1) of the joint recommendations as proposed locations. In addition, the Forest Supervisor proposed, in March 2007, additional changes to 48 Small OGRs (see Attachment B, Table 3) and 49 Medium OGRs (see Attachment B, Tables 4 and 5). It is important to note that the 48 Small OGRs listed in Attachment B, Table 3 do not fully meet the Appendix K criteria or fully implement the Tongass Conservation Strategy. Recommended changes for each Small and Medium OGR will be documented in the Interagency Small OGR Work Group's final report, which we anticipate will be completed by June 2007 and presented to the Forest Supervisor for additional consideration.

Small OGR Resolution. While it is our understanding that the USFS plans to modify the 48 Small OGRs to ensure that each of these Small OGRs meet the acre criteria in Appendix K, we believe additional changes are necessary in order for each Small OGR to fully meet Appendix K's other criteria and to fully implement the Tongass Conservation Strategy. We recommend that these changes be completed for as many of these Small OGRs as possible, so the resulting appropriately-modified Small OGRs may be included in the Final EIS and the Final Forest Plan. We believe this will result in more predictability, less uncertainty, and a reduced potential for conflict for the USFS and its Tongass stakeholders regarding these Small OGRs. Including this information in the Final EIS and the Final Forest Plan will also eliminate the need for time-consuming individual project (e.g., timber sale) reviews. If it is not possible for the necessary additional interagency review and analysis for the 48 Small OGRs to be completed and included in the Final EIS and the Final Forest Plan, we recommend that the Final EIS and the Final Forest Plan adopt the preferred biological locations as recommended by the Interagency Small OGR Work Group.

Interagency Small OGR Work Group Procedural Changes. As noted above, in the event there are Small OGRs remaining that do not fully meet the criteria in Appendix K or fully implement the Tongass Conservation Strategy, those Small OGRs will need to be addressed during individual project reviews. The process for the interagency review and analysis is delineated in Appendix K and various TPIT clarifications, as identified in TPIT 1998. We recommend that from this point forward, all interagency reviews and analyses of any OGRs include the following additions, which were identified and used in 2006 and 2007 by the Interagency Small OGR Work Group (Hanson et al. 2006):

- Development of a consistent protocol for incorporating interagency recommendations into the Forest Plan and individual National Environmental Policy Act projects.

- Documentation of the Appendix K criteria for each OGR, and periodic updating of that information.
- Assessment of the effects of roads in, and adjacent to, OGRs.
- Implementation of the TPIT clarification entitled "Conveyance on Overselected Lands and the Old-Growth Habitat Land Use Designation."

We further recommend that these additions to the interagency review and analysis identified above and TPIT clarifications as identified in TPIT 1998 be included in Appendix K in the Final Forest Plan.

[See Alexander Archipelago Wolf section below for information on the importance of adopting the Interagency Small OGR Work Group-recommended Small OGR for Value Comparison Unit (VCU) 5960 for the Rio Roberts watershed on Prince of Wales Island to address connectivity issues related to the wolf.]

Medium Old Growth Reserves

Out of a total of 130 Medium OGRs on the Tongass, as noted above in the Small OGR section, the USFS proposed in March 2007, changes to 49 Medium OGRs (see Appendix A, Tables 4 and 5). The proposed changes include relocations, addition and deletion of acreage, and replacement of some Small OGRs by adjustments to Medium OGRs. These changes, which were proposed primarily to facilitate potential timber harvest and road construction, have not undergone interagency review and analysis to fully consider the effects of these activities on the OGR system, to determine whether Appendix K criteria have been fully met, and/or whether the Tongass Conservation Strategy has been fully implemented.

While the remaining 81 Medium OGRs throughout the Tongass have not been reviewed, we believe such a review also needs to be undertaken for those Medium OGRs. As stated above, since 1997, land selections and transfers have affected, and in some cases, eliminated Medium OGRs. It is anticipated that this will continue to be the case in the future. For example, the Interagency Small OGR Work Group identified a small number of Medium OGR adjustments that need to be made to meet the 10,000 acres minimum size and the high-volume productive old-growth acres criteria required by Appendix K for Medium OGRs. We believe that Medium OGRs need to be considered in their overall landscape context, not only in relation to individual projects and/or OGRs, but also with respect to potential consequences to the Tongass Conservation Strategy.

We also believe a review and adjustment of Medium OGRs is warranted: (1) if any of the Medium OGRs fail to meet the Total Acreage, Productive Old-growth Acreage, and High Volume Acreage Standards described in Appendix K; (2) if any of the Medium OGRs have been compromised by land selections made by, and/or land transfers to, the State of Alaska and/or Native Corporations; and/or (3) if any of the Medium OGRs no longer fully meet Appendix K criteria and/or fully implement the Tongass Conservation Strategy. As shown in Attachment B, Table 5, at least 28 of the 49 Medium OGRs proposed for changes do not meet Appendix K acreage criteria.

In summary, we recommend that the USFS defer changes to Medium OGRs (see Tables 4 and 5) until a comprehensive interagency review and analysis of all Medium OGRs has been completed to determine whether these Medium OGRs continue to fully meet Appendix K criteria and fully implement the Tongass Conservation Strategy. As stated above under the Small OGR section, we further recommend that any comprehensive interagency review and analysis of Medium OGRs also include the additions to that process, which were identified in 2006 and 2007 by the Interagency Small OGR Work Group (Hanson et al. 2006), and the TPIT clarifications, as identified in TPIT 1998.

Beach and Estuary Fringe Standards and Guidelines

We believe retaining Beach and Estuary Fringe Standards and Guidelines of at least 1,000 feet will help support viable, well-distributed wildlife populations. Beach and estuary fringes, along with riparian management areas, are the primary landscape linkage between OGRs. Beach fringes protect long-term bald eagle habitat capability (Gende et al. 1998); help sustain habitat for goshawks and their prey; buffer the primary beach and estuary fringe from windthrow; and provide critical winter habitat for black-tailed deer, which are the primary prey of wolves and an importance species for subsistence users (USFS 1997a, Page 3-21).

Results from recent research conducted in Southeast Alaska support the retention of beach and estuary fringes at least 1,000 feet in width to mitigate loss of habitat for most forest-dwelling birds, such as the pacific-slope flycatcher and red-breasted sapsucker (Kissling and Garton in Review). Several species of thrushes had higher reproductive success in large (e.g., >1,000 foot) buffers (Sperry 2006). Some species (e.g., Townsend's warbler, brown creeper, and hairy woodpecker) are sensitive to small amounts of fragmentation on the landscape and require a minimum beach and estuary fringe of 1,000 feet in order to help maintain viable populations (see Kissling and Garton for details). Some goshawks preferentially use (presumably for foraging) areas close to the shoreline (Iverson et al. 1996). Birds constitute more than 70 percent of prey deliveries made to goshawk nests (Lewis et al. 2006). Thrushes are particularly important prey for goshawks early in the nesting period, and healthy beach and estuary fringe forests are critical to robust thrush populations. Therefore, we recommend that the Final EIS and the Final Forest Plan retain a Beach and Estuary Fringe Standards and Guidelines of at least 1,000 feet to help support viable, well-distributed wildlife populations.

Pinch Points

We believe it is important that the Final EIS and the Final Forest Plan (1) retain protection for pinch points, including those identified in the 1997 Forest Plan (USFS 1997b, Page 4-123) and the Proposed Forest Plan (Page 3-157); and (2) add protection for pinch points identified during the Small OGR review. The Draft EIS recognizes the importance of landscape pinch points to endemic species and other wildlife. Those pinch points serve as critical links between larger land units where future alterations in habitat could significantly reduce natural connectivity and limit the ability of land-based species to disperse or migrate (Draft EIS, Page 3-157; Kiester and Eckhardt, 1994). Four pinch points were included in the 1997 Final EIS and 1997 Forest Plan, and two more were added in the Proposed Forest Plan. We believe that pinch points are adequately addressed in Alternatives 1, 2, 3, 5, and 6. That is not the case, however, for Alternatives 4 and 7, since Alternative 4 only protects 1 pinch point and no pinch points are protected in Alternative 7 (Draft EIS, Table 2-17). It is important to note that none of the alternatives or proposed changes to Small OGR protect pinch points at Anita Bay on Etolin Island or at Rio Roberts on Prince of Wales Island (see also the Alexander Archipelago Wolf section below). Therefore, we recommend that the Final EIS and the Final Forest Plan (1) retain protection for pinch points identified in the 1997 Forest Plan and the Proposed Forest Plan, and (2) add protection for pinch points identified during the Small OGR review, including pinch points at Anita Bay on Etolin Island and at Rio Roberts on Prince of Wales Island.

Connectivity

We believe it is important that corridors and connectivity meet the Viable Population Strategy described by Suring et al. 1993. The 1997 Forest Plan requires Tongass District Rangers to analyze connectivity during project reviews (USFS 1997b, Page 4-118). In addition, the TPIT identified a number of key areas requiring additional connectivity analysis (TPIT 1998). It is unclear, however, to what extent this has been accomplished. Therefore, we recommend that the Final EIS and the Final Forest Plan require the development of a standardized protocol for conducting connectivity analyses as directed in the Proposed Forest Plan (Page 4-123).

Legacy Forest Structure

Standards and Guidelines

The Proposed Forest Plan proposes replacing the American Marten Standards and Guidelines (Marten Standards and Guidelines), the Goshawk Standards and Guidelines, and Reserve Tree/Cavity-Nesting Habitat Standards and Guidelines (Cavity-Nesting Standards and Guidelines) with a Legacy Forest Structure Standards and Guidelines (Legacy Standards and Guidelines). The proposed Legacy Standards and Guidelines would require retention of forest structure within harvest units throughout the Tongass, depending on the amount of harvesting in the surrounding landscape and the size of the harvest units. We agree that retaining legacy forest structure (e.g., residual trees and snags and clumps of trees remaining in timber harvest units) throughout the Tongass provides important wildlife benefits. Along with the Marten and Goshawk standards and guidelines, the 1997 Forest Plan addressed the need for residual forest structure in harvest units through a combination of the Cavity-Nesting Standards and Guidelines and two-aged forest management, which were intended to benefit red-breasted sapsucker, brown creeper, hairy woodpecker, and red squirrel (USFS 1997a, Page 3-364).

While we understand that the Legacy Standards and Guidelines are intended to provide similar benefits, it is not clear that it does so. For example, while the Legacy Standards and Guidelines would encourage retention of trees in harvest units across the entire Tongass; it would reduce retention of trees in the most heavily harvested biogeographic provinces where goshawks are most at risk. Furthermore, the Draft EIS provides no scientific assessment to support the general or specific changes included in the proposed Legacy Standards and Guidelines. If the Legacy Standards and Guidelines are adopted, we believe the changes would reduce the existing conservation standards for the goshawk. As always, the FWS is ready to work with the USFS and ADF&G to identify ways to modify the existing Goshawk Standards and Guidelines to address wildlife values, while helping ensure timber harvesting operational feasibility. In the meantime, however, we recommend that the Final EIS and the Final Forest Plan retain the existing Goshawk Standards and Guidelines.

We believe it is important for the USFS to analyze the effects of replacing Marten, Goshawk, and Cavity-Nesting standards and guidelines with the Legacy Standards and Guidelines, since the Marten, Goshawk, and Cavity-Nesting standards and guidelines were each designed to reduce risks to species identified during panel assessments (USFS 1997a ROD, Page 33-35, USFS 1997a, Appendix N). We further believe that the analysis needs to compare the number of harvest units to which each of the Marten, Goshawk, and Cavity-Nesting standards and guidelines would apply and the total acreage protected under each; and that this needs to be analyzed for biogeographic provinces as well as other logical landscape units for each species.

Risk Levels of Value Comparison Units

We believe that "Risk" levels of VCUs – which are landscape units designated on the Tongass that generally compare to small watersheds – need to reflect the cumulative effects of harvesting both throughout the Tongass and on adjacent, non-Tongass lands, since forest-dependent wildlife respond to the availability of habitat across the landscape. Some watersheds have been heavily harvested by USFS contractors and by operators on adjacent land owned by non-Tongass entities (e.g., private, local government, and State of Alaska entities). We believe that Risk levels (i.e., "High," "Moderate," and "Lower") of VCUs need to be defined to include all ownerships within each VCU. Therefore, we recommend that the "High", "Moderate", and "Lower" Risk levels of VCUs include, in the Final EIS and the Final Forest Plan, cumulative effects of timber harvesting on both Tongass and adjacent, non-Tongass lands.

High-Risk Value Comparison Units

We believe it is important in High-Risk VCUs, to retain the legacy forest structure in all units larger than 2 acres. Current Goshawk and Marten standards and guidelines require uniform distribution of at least 30 percent canopy cover in harvest units larger than 2 acres in High-Risk (i.e., heavily harvested) VCUs. The Goshawk and Marten standards and guidelines were designed to retain key elements of legacy forest structure similar to old-growth forest. The key features of old-growth forest were derived from scientific literature (C. Iverson, USFS, personal communication, 2006). Natural openings in old-growth forest on the Tongass average less than 2 acres (Nowacki and Kramer 1998). We believe the loss of legacy retention in harvest units between 2 and 10 acres in High Risk VCUs would increase impacts of logging on the goshawk and other old-growth dependent species in landscapes where they are already most at risk. Therefore, we recommend that the Final EIS and the Final Forest Plan retain in High-Risk VCUs, legacy forest structure in all units larger than 2 acres.

Horizontal and Vertical Structure in Harvest Units

To accomplish the objectives stated in the Proposed Forest Plan for the Legacy Standards and Guidelines, legacy forest structure needs to penetrate into created openings. Uniform distribution of retained legacy forest structure throughout a harvest unit, as required by the Goshawk and Marten standards and guidelines, is less important than attaining both vertical and horizontal diversity within the harvested area (Franklin et al. 2002). Retention of windfirm patches and clumps can effectively accomplish this, if the windfirm and patches and clumps are distributed within, rather than around the edges of, harvest units. Since the intent of the Goshawk, Marten, and Legacy standards and guidelines is to provide horizontal and vertical structure in harvest units, we recommend that the Final EIS and the Final Forest Plan retain legacy forest structure within harvest units, rather than along the perimeter of the units.

Maximizing Unit Size for Harvest Criteria

As currently written, neither the Proposed Forest Plan nor the Draft EIS provide a scientific rationale for the criteria for defining the maximum sizes of units that can be harvested and still retain legacy forest structure, and how much legacy forest structure must be maintained. This information needs to be included in the Final EIS and the Final Forest Plan, since both the maximum size of openings allowed without retention (i.e., 10, 20, or 30 acres) and the amount of legacy forest structure to be left (i.e., 10, 20, or 30 percent) depend on the risk level (i.e., amount of harvest) within VCUs. Therefore, we recommend that criteria (based on the best available science) that define the maximum sizes of units that can be harvested and still retain legacy forest structure, and how much structure must be maintained, be included in the Final EIS and the Final Forest Plan.

Since dead and downed trees are important habitat features, we believe retained legacy forest structure needs to be protected from firewood cutting and salvage logging, even if the trees die or blow down. Therefore, we recommend that the Final EIS and the Final Forest Plan retain legacy forest structure until the surrounding stand provides mature or old-growth structure. In addition, we recommend that the Final EIS and the Final Forest Plan include a system for tracking legacy forest structure and retention.

<u>Threatened and Endangered Species and Species of Concern</u>

Queen Charlotte Goshawk

OGR System and Beach and Estuary Fringe Standards and Guidelines. We believe it is important to retain the OGR system and 1,000-foot Beach and Estuary Fringe Standards and Guidelines throughout the Tongass to help protect key goshawk habitats. In 1994, the FWS was petitioned to list the goshawk as endangered under the ESA. Goshawks nest and forage in mature and old-growth forests and, therefore, are sensitive to habitat loss caused by logging. The FWS found the 1979 (amended 1991) Forest Plan to be inadequate to sustain goshawks in Southeast Alaska (FWS 1995). It should be noted that the 1979 (amended 1991) Forest Plan was similar to Alternative 7 and much of Alternative 4 in the Draft EIS. Subsequently, the FWS determined the revised 1997 Forest Plan and its Tongass Conservation Strategy were adequate to sustain goshawks in Southeast Alaska, concluding that listing was not warranted (FWS 1997b). That conclusion was subsequently challenged in court; and litigation is ongoing. The FWS is currently re-evaluating the status of the goshawk and its habitat to comply with a court remand.

OGRs and other non-development Land Use Designations (LUDs), linked by beach, estuary and riparian buffers and other habitat corridors, help maintain key prey species, and provide nesting and foraging habitat. Goshawk nesting territories tend to be evenly spaced across the landscape, where habitat is suitable. We believe elimination of OGRs would likely result in loss of viable nest territories in harvested landscapes, as adjacent unharvested areas are likely to be occupied by resident pairs. OGRs also help support local prey populations, which are largely dependent

on mature and old-growth forest in Southeast Alaska. Beach fringes similarly provide important breeding habitat for goshawk prey species and foraging habitat for goshawks. Information presented at the Tongass Conservation Strategy Workshop confirmed that many species of birds preyed on by goshawks rely on both OGRs and beach buffers for nesting habitat, and that beach and estuary fringes should be at least 300 meters (1,000 feet) wide to provide adequate nesting habitat (DeSanto et al. 2006). Therefore, we recommend that the Final EIS and the Final Forest Plan adopt an alternative that (1) retains the Tongass Conservation Strategy in its entirety throughout the Tongass, since it contributed to an ESA Finding of "not warranted", and (2) offers protections at least equivalent to the 1997 Forest Plan. We further recommend retaining the OGR system and 1,000-foot Beach and Estuary Fringe Standards and Guidelines throughout the Tongass to help protect key goshawk habitats.

Nest Buffers. We believe it is important for goshawk nest buffers to be increased to 500 acres of productive old-growth to protect active and alternate nest sites and post-fledging habitat. Nest buffers protect known nests from disturbance and offer long-term protection to habitat features selected by goshawks in locations consistent with natural spacing between adjacent resident pairs. Existing Goshawk Standards and Guidelines require the retention of at least 100 acres of productive old-growth around known and suspected goshawk nests. Alternate nests are often clustered near an active nest, but may be up to several miles away. Circular nest buffers of 100 acres protected 54 percent of alternate nests used in subsequent years in 24 active territories studied on the Tongass. Alternatively, 775 acre buffers (1 km radius) would have protected 80 percent of the subsequent-year nests (Flatten and Lowell 2001; Titus et al. 2006), although the entire circular buffer would not be productive old-growth (or nesting habitat) in most cases. For this reason, although they did not specify a particular size, Flatten and Lowell (2001) recommended expanding nest buffers beyond 100 acres.

Goshawk fledglings learn to fly and hunt in the mature and old-growth forest surrounding their nest. This area is known as the post-fledging area and is important to the survival of fledglings. While the size of post-fledging areas has not been measured in Southeast Alaska, studies of goshawks elsewhere have documented post-fledging areas of approximately 500 acres (Reynolds et al. 1992, Kennedy et al. 1994, McClaren et al. 2005). The British Columbia study by McClaren et al. (2005) documented post-fledging areas for Queen Charlotte goshawks. Although the studies by Reynolds et al. (1992), and Kennedy et al. (1994) documented post fledging areas of the northern goshawk, which is the more common subspecies of goshawk, the nesting and post fledging requirements of all goshawks are similar enough to believe that the 500-acre buffer recommended for the Queen Charlotte subspecies is justified.

Currently, almost all known goshawk nests on the Tongass are located in old growth reserves or other non-development LUDs. Therefore, no goshawk nest buffers have been established to date (P. O'Conner, USFS, personal communication, 2006). As new nests are discovered during project development, monitoring programs, and/or other activities on the Tongass, OGR delineations will need be adjusted to encompass the goshawk nest and 500-acre buffer. If it is not feasible to enclose the goshawk nest and buffer within an OGR, then we recommend that a nest buffer of 500 acres of productive old growth be established around the active nest.

In summary, we believe buffers of 500 acres would protect active goshawk nests from disturbance; preserve most alternate goshawk nests; and provide suitable goshawk post-fledging habitat. Therefore, to protect active and alternate nest sites and post-fledging habitat, we recommend that the Final EIS and the Final Forest Plan include goshawk nest buffers that are increased to 500 acres of productive old-growth.

Partial Canopy Retention. We believe it is important to retain partial canopy of legacy forest structure in all harvest units larger than 2 acres throughout the Tongass, including High-Risk VCUs. Forest legacy structure helps reduce impacts for many species, including goshawks and their prey. Because goshawks hunt primarily from perches, we believe leaving forest legacy structure in harvest units is likely to improve foraging habitat by providing perches and hiding cover. Kenward (1978, Page 458) reported that goshawks in Britain captured over 90 percent of their prey within 50 meters (164 feet) of cover, unless newly-fledged or starving prey were present, since newly-fledged or starving prey could be overtaken by goshawks on longer pursuits. Because a circular 2-acre opening has a radius of about 50 meters, larger openings are likely to have areas beyond the effective striking range of goshawks. We further believe that retention of forest legacy structure in High-Risk VCUs is likely to help reduce impacts on goshawks.

While the existing Goshawk Standards and Guidelines apply only to heavily harvested VCUs on Prince of Wales Island, the proposed Legacy Standards and Guidelines would be expanded to apply throughout the Tongass. We believe that if the proposed Legacy Standards and Guidelines require residual structure within, rather than along the perimeter, of harvested units, goshawks throughout the Tongass are likely to benefit. Therefore, we recommend that the Final EIS and the Final Forest Plan adopt partial canopy retention of legacy forest structure in all harvest units larger than 2 acres throughout the Tongass, including in High-Risk VCUs. (See the Legacy Forest Structure section for additional consideration.)

Nest Surveys. Effective management of goshawk nest sites depends on knowledge of nest locations. The Proposed Forest Plan eliminates the requirement for pre-project inventories. We recommend that the Final Forest Plan retain the requirement for pre-project (e.g., timber sale) surveys to locate goshawk nests as required under the 1997 Forest Plan (USFS 1997, Page 4-90). We further recommend that the Final Forest Plan include a requirement that the USFS adopt a goshawk inventory and monitoring program consistent with the guidance found in the USFS's recent publication on this topic (Woodbridge and Hargis 2006).

Investigation of Goshawk Biology. The Proposed Forest Plan eliminates the Goshawk Standards and Guidelines for cooperative investigation of goshawk biology. Much remains unknown about the goshawk and its responses to forest management. For example, the effects of increasing proportions of second-growth forest on survival and reproduction of both goshawks and their prey are not well understood. Despite considerable effort, we still do not have a good understanding of nesting densities or population size for goshawks throughout the Tongass. We believe these and similar unanswered questions are best investigated through cooperative, interagency research and monitoring. Therefore, we recommend that the Final Forest Plan retain the Goshawk Standards and Guidelines requirement for cooperative investigation of goshawk biology.

Alexander Archipelago Wolf

We believe it is important to retain the OGR system and 1,000-foot Beach and Estuary Fringe Standards and Guidelines throughout the Tongass to help protect key wolf habitats. The FWS

was petitioned in 1993 to list the wolf, an endemic subspecies confined to Southeast Alaska, as a threatened species under the ESA. Following adoption of the 1997 Forest Plan and Tongass Conservation Strategy, the FWS concluded that listing the wolf was not warranted (FWS 1997a), assuming full implementation of the 1997 Forest Plan.

Person (2006a) reviewed scientific information and submitted considerations concerning viability of the wolf during the 2006 Tongass Conservation Strategy Workshop. Person concluded that maintaining well distributed, viable wolf populations depends on retaining the Tongass Conservation Strategy in its entirety throughout the Tongass, including fully-functioning, well-distributed OGRs. It was also noted that even with the existing Tongass Conservation Strategy and 1997 Forest Plan, it is likely that wolf and deer populations will be lower in the future. Since OGRs and other non-development lands serve as population sources for wolves (and possibly deer), we believe that eliminating or degrading OGRs and other non-development lands would increase the likelihood that wolf populations will decline. Therefore, we recommend that the Final EIS and the Final Forest Plan retain the OGR system and the 1,000-foot Beach and Estuary Fringe Standards and Guidelines throughout the Tongass to protect key wolf habitats.

Landscape pinch points are important to wolf movement and dispersal across the landscape. The largest and most complex system of OGRs is associated with Honker Divide on Prince of Wales Island. These OGRs provide refugia in which wolves produce enough offspring to supplement areas with higher risk and less stable populations (Person et al. 1996). The Rio Roberts watershed is an important denning area and provides for dispersal through a pinch point created by timber harvest from the Honker Divide area to the southern half of Prince of Wales Island, as confirmed by ADF&G telemetry studies from 1998 to 2002 (D. Person, ADF&G, Personal Communication, 2006). Therefore, we recommend that the Final EIS and the Final Forest Plan adopt the Interagency Small OGR Work Group-recommended Small OGR for VCU 5960 (see Attachment B, Table 3) to protect the Rio Roberts watershed.

Murrelets

Kittlitz's murrelet, a candidate species for ESA listing, is found in marine waters adjacent to the northern Tongass. This species is likely to be most susceptible to increased recreation near tidal glaciers and high-elevation land activities such as mining. Therefore, we believe that proposed changes in the Proposed Forest Plan do not appear to pose a significant risk to Kittlitz's murrelets.

Since 1993, the marbled murrelet has been listed in the Lower 48 States as threatened under the ESA. Marbled murrelet populations in Alaska have declined by about 70 percent during the past 25 years (Piatt et al. 2007). While it is unlikely that the decline is attributable to timber harvest alone, we believe that maintaining old-growth habitat for nesting is essential to the persistence of the species. When fully implemented, we believe the existing Tongass Conservation Strategy should provide adequate nesting habitat for the marbled murrelet, while the factors that are leading to the population decline are identified and addressed, where possible. Therefore, in order to continue providing marbled murrelet nesting habitat, we recommend that the Final EIS and the Final Forest Plan retain the OGR system throughout the Tongass.

Subsistence

The Draft EIS states that "deer habitat capabilities in portions of the Tongass may not b adequate to sustain current/future harvest levels under any of the alternatives" (Draft EIS, Tabl 2-18, Page 2-57). Therefore, to help minimize, or prevent, restrictions on subsistence an competition with other users (including the wolf), we recommend that the USFS maximiz protection of important deer winter range, which is the primary limiting factor for dee populations (Person 2006b). To that end, we further recommend retaining the Tongas Conservation Strategy in its entirety throughout the Tongass, including OGRs and the 1,000-foo beach and estuary fringe.

Areas with High Wildlife Values

In 2003, the USFS revised the 1997 Forest Plan to address inventoried roadless areas (USF 2003). In reviewing this revision, FWS biologists conducted on-the-ground and/or aerial visit to each area, and then ranked the quality and importance of each area's habitat. As a result o this work, 13 inventoried roadless areas with outstanding fish and wildlife values and 2 inventoried roadless areas that contain important fish and wildlife habitats and populations wer identified (DOI 2002). We recommend that the alternative selected by the USFS in the Final EI include the 36 areas listed in Attachment C for their habitat value and their importan contribution to maintaining viable, well-distributed fish and wildlife populations throughout th Tongass.

Conservation Principles and Priorities

As in comments previously made by the U.S. Department of the Interior, (DOI 1996), w continue to support the USFS using the best available scientific information for planning an forest management activities related to the Tongass. Scientific assessments and risk assessmen panels ensured that the Tongass Conservation Strategy and 1997 Forest Plan were based on strong scientific foundation. We believe proposed changes to the Tongass Conservation Strateg and the 1997 Forest Plan need to be based on an equivalent level of science. Therefore, w recommend that the Final EIS provide the scientific rationale for any changes to the Tongas Conservation Strategy and 1997 Forest Plan as well as a comparison of the effects between th existing and proposed plan components.

Alternatives

In developing the Draft EIS for the Proposed Forest Plan, the USFS developed 7 alternatives tha are fundamentally the same as alternatives in the 1997 Final EIS (Draft EIS, Page 2-50). Th USFS adopted this approach so the panel assessments from the 1997 Final EIS may be applied t the 7 alternatives included in the Proposed Forest Plan. The panel assessments rated th likelihood that each of the alternatives would ensure viable, well-distributed populations o wildlife species throughout the Tongass. Alternatives 4 and 7 of the Draft EIS are designed to b essentially the same as Alternatives 2 and 6 in the 1997 Final EIS.

Alternatives 4 and 7

We believe the adoption of Alternative 4 or Alternative 7 would eliminate or undermine the Tongass Conservation Strategy, which, in turn, would fail to ensure that viable, well-distributed populations of goshawk, wolf, endemic mammals, and other species, would be maintained (Draft EIS, Table 2-17, Page 44). It is important to note that alternatives similar to Alternatives 4 and 7 were removed from final consideration during the 1997 Forest Plan revision process because those alternatives would not provide a "relatively high assurance that the habitat needed for long-term viability of all wildlife species would be maintained and commercial, sport and subsistence use sustained" (TLMP 1997 Record of Decision (ROD), Page 15). The Draft EIS identifies the "distribution of high quality old-growth blocks" as the key indicator of "protection of the wildlife habitat and biodiversity" across the Tongass (Draft EIS, Page 1-8), and concludes that Alternatives 4 and 7 would provide only "poor" distribution of high quality old-growth blocks across most or all of the Tongass (Draft EIS, Page 2-50). The 1997 Record of Decision stated that a "relatively low level of risk" to these resources was considered essential in order to meet stated goals of the 1997 Forest Plan, which included a biodiversity goal to "maintain healthy forest ecosystems [and] maintain a mix of habitats at different spatial scales (i.e., site, watershed, island, province and forest) capable of supporting the full range of naturally occurring flora, fauna, and ecological processes native to Southeast Alaska." (USFS 1997b, Page 2-2). The goal identified in the Proposed Forest Plan (Draft EIS, Page 2-7) has not appreciably changed over the goal included in the 1997 Forest Plan. Therefore, we recommend that in the Final EIS, Alternatives 4 and 7 be eliminated from further consideration.

Alternatives 1, 2, 3, 5, and 6

We believe Alternatives 1, 2, 3, 5, and 6 retain the Tongass Conservation Strategy in its entirety throughout the Tongass and provide reasonable assurance that viable, well-distributed wildlife populations will be maintained. For example, Alternatives 1, 2, and 3 are rated "high" to "very high" for all species except endemic mammals, which are rated as "moderate" to "high". Alternatives 5 and 6 are rated "moderately high" to "very high" for the goshawk, wolf, and brown bear, and "moderate" for endemic mammals and marten (Draft EIS, Table 2-17, Page 44). Therefore, we recommend adoption of an alternative in the Final EIS that retains the Tongass Conservation Strategy in its entirety throughout the Tongass and provides reasonable assurance that viable, well-distributed wildlife populations will be maintained.

Alternative 6

With respect to Alternative 6, the USFS proposed alternative, we note that it retains the Tongass Conservation Strategy; implements improved locations for 191 Small and 21 Medium OGRs; and retains the 1,000-foot beach buffer. However, we believe that Alternative 6 could be improved if it (1) included the Interagency Small OGR Work Group preferred biological locations for 48 additional Small OGRs; and (2) retained the existing Goshawk Standards and Guidelines. To help prevent the need to list the goshawk under the ESA, we recommend that in the Final EIS, Alternative 6 be amended to include the preferred biological locations for 48 additional Small OGRs (see Attachment B, Table 3) and to retain the existing Goshawk Standards and Guidelines.

SPECIFIC COMMENTS

Proposed Forest Plan, Page 2-51: The description of Alternative 4 needs to be corrected in the Final Forest Plan to match the ratings in Table 2-17 (Page 2-44) from which it is drawn. As currently written, the narrative incorrectly uses the ratings from Alternative 3.

Proposed Forest Plan, Page 3-5: In recognition of its high fish, wildlife, and subsistence values, we recommend that in the Final Forest Plan, the area currently designated "Young Bay Research Natural Area (RNA)" revert to the same LUD as Admiralty National Monument. The Young Bay RNA on Admiralty Island is proposed to be released and a new RNA is proposed for establishment in the Cowee Creek watershed near Juneau. As written, the Draft Forest Plan leaves the new LUD for Young Bay unspecified.

Proposed Forest Plan, Page 4-126: Forest owls, specifically western screech-owls, barred owls, and northern saw-whet owls need to be included in the Final Forest Plan in the list of nesting raptors to be surveyed in proposed management areas.

Proposed Forest Plan, Page 4-128: We believe the "Endemic Terrestrial Mammals Standards and Guidelines" need to be re-titled, in the Final Forest Plan, as "Endemic Terrestrial Wildlife Standards and Guidelines". We also believe the Endemic Terrestrial Wildlife Standards and Guidelines need to be: (1) revised to include surveys for rare and endemic mammals, birds, amphibians, and insects, which may represent populations that are unique and/or which have restricted ranges; and (2) subsequently included in the Final Forest Plan.

Draft EIS, Page 3-173: The population decline estimates and discussion for the marbled murrelet need to be updated in the Final EIS, using the recent U.S. Geological Survey status review (Piatt et al. 2007).

Draft EIS: Since Appendix N of the 1997 Forest Plan, "Additional Evaluation of Wildlife Habitat Conservation Measures," (USFS 1997a, pp. N1 - N50) provides essential background information related to the Tongass Conservation Strategy and provides an important reference for understanding the rationale for specific components of the strategy, we believe Appendix N needs to be revised to include updated information and then included in the Final EIS.

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ATTACHMENT B

Table 1.

Small OGRs that implement preferred biological locations. These OGRs fully meet Appendix K criteria and fully implement the Tongass Conservation Strategy (Small OGR Work Group Report, in prep.). (See Small Old Growth Reserves section for additional information.)

Value Comparison Units* (Total 133)

190, 240, 250, 380, 520, 550, 690, 700, 720, 730, 740, 750, 800, 810, 880, 890, 950, 960, 970, 1060, 1080, 1090, 1100, 1110, 1170, 1970, 2050, 2070, 2080, 2090, 2250, 2300, 2330, 2340, 2360, 2380, 2390, 2400, 2410, 2420, 2450, 2460, 2790, 2800, 2810, 2880, 2920, 2930, 2960, 2980, 2990, 3010, 3060, 3130, 4020, 4160, 4190, 4200, 4250, 4260, 4270, 4271, 4290, 4300, 4330, 4390, 4410, 4411, 4430, 4460, 4480, 4500, 4580, 4610, 4620, 4670, 4680, 4690, 4700, 4710, 4750, 4760, 4770, 4780, 4830, 4870, 4890, 5020, 5040, 5140, 5150, 5160, 5170, 5210, 5230, 5250, 5290, 5310, 5330, 5420, 5440, 5550, 5560, 5570, 5590, 5600, 5700, 5820, 5860, 5872, 5880, 5900, 6090, 6200, 6290, 6330, 6350, 6370, 6740, 6800, 6830, 7220, 7320, 7350, 7330, 7400, 7470, 7530, 7560, 7570, 7600, 7640, 7650

Table 2.

Small OGRs that implement acceptable (but not biologically preferred) locations to provide for development activities. These Small OGRs fully meet Appendix K criteria and implement the Tongass Conservation Strategy (Small OGR Work Group Report, in prep.). (See Small Old Growth Reserves section for additional information.)

Value Comparison Units* (Total 58)

200, 230, 510, 680, 2040, 2170, 2180, 2220, 2310, 2320, 2940, 3070, 3230, 4170, 4180, 4310, 4360, 4380, 4420, 4540, 4560, 4650, 4800, 5010, 5200, 5240, 5260, 5300, 5380, 5390, 5400, 5470, 5490, 5500, 5710, 5790, 5800, 5810, 5830, 5840, 5871, 5910, 5972, 6230, 6380, 6390, 6780, 6850, 6880, 6920, 6930, 7100, 7170, 7360, 7370, 7460, 7552, 7610

* Value Comparison Units are landscape units designated on the Tongass that generally compare to small watersheads.

Table 3.

Small OGRs that do not fully meet Appendix K criteria or fully implement the Tongass Conservation Strategy (Small OGR Work Group Report, in prep.). These Small OGRs require interagency review and analysis to determine how these Small OGRs need to be changed to ensure that each of these Small OGRs fully meet Appendix K criteria and fully implement the Tongass Conservation Strategy. (See Small Old Growth Reserves section for additional information.)

Value Comparison Units* (Total 48)

160, 410, 770, 790, 820, 830, 870, 1180, 1930, 2290, 2160, 4220, 4320, 4400, 4440, 4520, 4570, 4640, 5320, 5341, 5350, 5360, 5371, 5372, 5430, 5450, 5460, 5542, 5580, 5620, 5720, 5850, 5940, 5960, 5980, 6100, 6140, 6150, 6160, 6340, 6360, 6710, 6750, 6890, 6910, 7180, 7380, 7390

Table 4.

Proposed Medium OGR changes that appear to meet Appendix K acreage and other Appendix K criteria and appear to be in appropriate locations. It is unknown whether these Medium OGRs (as proposed) fully implement the Tongass Conservation Strategy. These Medium OGRs need interagency review and analysis: (1) to verify whether each of these Medium OGRs fully meets Appendix K criteria and fully implements the Tongass Conservation Strategy; and if not, (2) to identify changes that will ensure that Appendix K criteria are fully implemented and the Tongass Conservation Strategy is fully met for each of these Medium OGRs. Small OGR Work Group Report, in preparation). (See Medium Old Growth Reserve section for additional information.)

Value Comparison Units* (Total 21)

1960, 2230, 2240, 2430, 2440, 6120, 6130, 6210, 6220, 6240, 6700, 6720, 6770, 6790, 6810, 6820, 7190, 7230, 7430, 7440, 8642

Table 5.

Proposed Medium OGR changes that do not meet Appendix K acreage and/or other Appendix K criteria and may (or may not) be in appropriate locations. It is unknown whether these Medium OGRs (as proposed) fully implement the Tongass Conservation Strategy. These Medium OGRs need interagency review and analysis to determine how each Medium OGR needs to be changed to ensure that it fully meets Appendix K criteria and fully implements the Tongass Conservation Strategy (Small OGR Work Group Report, in preparation). (See Medium Old Growth Reserve section for additional information.)

Value Comparison Units* (Total 28)

840, 2010, 2260, 2270, 2280, 2890, 2910, 3980, 3990, 4210, 4350, 4470, 4790, 5050, 5410, 5510, 6110, 6170, 6180, 6190, 6250, 6300, 6310, 6320, 6760, 7200, 7210, 7630

ATTACHMENT C

Inventoried Roadless Areas with Special Values (DOI 2002)

Roadless Areas with Outstanding Fish and Wildlife Values (total 13)
201 Fanshaw
207 Harding
209 Anan
215 Castle
242 Camden
244 Bay of Pillars
245 East Kuiu
308 Windham-Port Houghton
311 Chichagof
328 Hoonah Sound
507 Eudora
528 Cleveland
529 North Cleveland

Roadless Areas with Important Fish and Wildlife Habitat and Populations (total 23)
204 Madan
205 Aaron
218 Woewodski
225 Kadin
233 Mosman
234 South Etolin
240 Security
243 Rocky Pass
246 South Kuiu
301 Skagway-Juneau Icefield
302 Taku-Snettisham
303 Sullivan
304 Chilkat-West Lynn Canal
306 Mansfield Peninsula
307 Greens Creek
326 North Kruzof
330 North Baranof
339 Yakutat Forelands
515 Koskiusko
519 McKenzie
530 Hyder
531 Nutkwa
577 Quartz

1001

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

April 30, 2007

Reply to
Attn Of: ETPA-088

RECEIVED MAY - 4 2007

Ref: 06-015-AFS

Forrest Cole, Forest Supervisor
USDA Forest Service
Alaska Region, Tongass National Forest
648 Mission Street
Ketchikan, Alaska 99901

Dear Mr. Cole:

The U.S. Environmental Protection Agency (EPA) has reviewed the **Draft Environmental Impact Statement (DEIS) and Proposed Tongass Land and Resource Management Plan (TLMP) Amendment** for the Tongass National Forest in southeast Alaska (CEQ No. 070003). Our review has been conducted in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act. Section 309 specifically directs the EPA to review and comment in writing on the environmental impacts associated with all major federal actions. Under our Section 309 authority, our review of the DEIS will consider the expected environmental impacts, and the adequacy of the EIS in meeting procedural and public disclosure requirements of NEPA.

The 16.8 million acre Tongass National Forest is the largest forest in the National Forest System. Management of this forest is guided by the Tongass Land Use Management Plan (Forest Plan). The current Forest Plan was revised in 1997, and was intensively reviewed in 2005 (5-Year Review). Since 1997, the Forest Service (FS) has been responding to a variety of appeals and litigation on the processes that were used to create the 1997 Plan. In August 2005, the U.S. Court of Appeals for the Ninth Circuit issued a decision that found deficiencies in the process used to develop the 1997 Forest Plan revision. Specifically, the Court found inadequacies related to timber demand, the range of alternatives considered relative to timber demand and potential effects on roadless areas, and cumulative effects from activities conducted on non-National Forest System lands.

The current DEIS is intended to address these deficiencies, and to incorporate opportunities identified through the 5-Year Review into the Plan. The DEIS considers projections of timber products output and timber harvest over the next 20 years under four different timber demand scenarios (low to high). The DEIS evaluates seven alternatives that encompass all of these demand scenarios in a variety of ways, while addressing three key issues. Those key issues are identified as:

- Key Issue 1 – Protection of high value roadless areas from road development and timber harvest activity on the Tongass National Forest is of local and national importance, particularly for wildlife and biodiversity, recreation, and tourism.

- Key Issue 2 – The Tongass National Forest needs to provide a sufficient timber supply t meet the market demand and help maintain a vibrant economy in Southeast Alaska.
- Key Issue 3 – Protection of the wildlife habitat and biodiversity of the Tongass National Forest is of local and national significance and is affected by road development and timber harvest activities.

The alternatives differ principally in the amount of land designated for development (in development land use designations or LUDs), and the amount of timber harvest propose

- **Alternative 1** would place 1.2 million acres in Development LUDs, and 15.6 million acres in Non-development LUDs. The estimated suitable forest land base (harvestable land base) would be .43 million acres, and the allowable sale quantity (ASQ) would be 5 million board feet (MMBF).
- **Alternative 2** would place 2.0 million acres in Development LUDs, and 14.8 million acres in Non-development LUDs. The estimated suitable forest land base would be .54 million acres, and the ASQ would be 152 MMBF.
- **Alternative 3** would place 3.0 million acres in Development LUDs, and 13.8 million acres in Non-development LUDs. The estimated suitable forest land base would be .68 million acres, and the ASQ would be 204 MMBF.
- **Alternative 4** would place 4.7 million acres in Development LUDs, and 12 million acre in Non-development LUDs. The estimated suitable forest land base would be 1.01 million acres, and the ASQ would be 360 MMBF. In addition, Alternative 4 uses a different strategy to provide old-growth habitat.
- **Alternative 5** is the no action alternative. This alternative would maintain 3.6 million acres in Development LUDs, and 13.2 million acres in Non-development LUDs. The estimated suitable forest land base would be kept at .76 million acres, and the ASQ woul remain 267 MMBF.
- **Alternative 6** is the proposed action alternative. This alternative is similar to Alternativ 5 (3.6 million acres in Development LUDs, and 13.2 million acres in Non-development LUDs), however, it includes refinements to the boundaries of a number of small old growth reserves and other refinements. The estimated suitable forest land base would b .79 million acres, and the ASQ would be 267 MMBF.
- **Alternative 7** would place 5.1 million acres in Development LUDs, and 11.7 million acres in Non-development LUDs. The estimated suitable forest land base would be 1.15 million acres, and the ASQ would be 421 MMBF. In addition, Alternative 7 would hav the least restriction on harvest in old-growth forest. It does not include old-growth reserves or have minimum old-growth retention requirements.

The EPA appreciates the efforts of the Tongass National Forest in preparing this DEIS and i developing an innovative website and CD to help agencies and the public analyze impacts associated with the proposed alternatives. We have assigned a rating of EC-2 (Environmental Concerns – Insufficient Information) to the DEIS. This rating and a summary of our comments will be published in the Federal Register. A summary of the rating system we used in conducting our review of the DEIS can be viewed at http://www.epa.gov/compliance/nepa/ comments/ratings.html. The FS did not identify a preferred alternative, therefore we focused our review on the full suite of alternatives within the context of the three key issues identified in the document.

Based on this review, we find alternatives 1, 2 and 3 to be environmentally preferable. These alternatives provide significant protection of water quality and a connected network of aquatic and terrestrial habitats, afford extensive protection of old growth, minimize road development and associated impacts, and provide a sustainable supply of timber consistent with current and recent timber harvest levels. The conservation emphasis under these alternatives is less sensitive to agency budget levels and less dependant on active management. Our environmental concerns with Alternatives 5 and 6 primarily relate to high and moderate intensity land use designations, increased road development, and associated impacts to aquatic and terrestrial habitats and water quality. Additional information on how these impacts will be minimized and on monitoring and adaptive management strategies should be provided in the FEIS. We believe that as currently proposed, Alternatives 4 and 7 do not address key issues 1 and 3, and hence, are not viable. EPA would have serious objections to the selection of Alternative 4 or 7 as the Preferred Alternative in the Final EIS/Record of Decision.

In general, we recommend that the FS select an Alternative in the Final EIS and Record of Decision that:

- Minimizes the acreage of forest designated for Intensive or Moderate Development;
- Protects high value roadless areas for wildlife and biodiversity, recreation and tourism, thus supporting local and regional economic viability and subsistence activities;
- Accurately reflects the most recent timber industry market trends; and
- Clearly identifies monitoring plans and adaptive management strategies to be employed for the next planning cycle.

Thank you for the opportunity to comment on this draft EIS. If you would like to discuss our response further, please contact Jennifer Curtis, at (907) 271-6324 or me at (206) 553-1601.

Sincerely,

Christine B Reichgott

Christine Reichgott, Manager
NEPA Review Unit

Enclosure

cc: Lee Kramer, Project Manager, Tongass National Forest

EPA Region 10 Detailed Comments
Tongass Land and Resource Management Plan Amendment
Draft Environmental Impact Statement

As noted above, the FS identified three key issues to frame each of the alternatives. EPA appreciates this strategic and focused approach to the Plan amendment. We have accordingly structured our own detailed comments around the identified key issues.

Key Issue 1 - Protection of high value roadless areas from new roads and timber harvest is locally and nationally significant for wildlife and biodiversity, recreation, and tourism.

EPA agrees with the identification of high value roadless areas as a key issue, and we commend the FS for establishing this as a standard of review. The Tongass is the earth's largest, intact temperate rainforest, and contains some of the largest, intact blocks of forest in North America. Each of the 21 distinct bio-geographic provinces within the Tongass contributes to the biodiversity of the national forest system, making the Tongass rich with endemic species. The Tongass also contains nearly 5,000 salmon-supporting streams (Halupka et al. 2000). These streams provide the spawning and rearing habitat for more than 90 percent of the salmon commercially caught in southeast Alaska.

As recognized in the document, those alternatives that place emphasis on maintaining inventoried roadless areas (IRA), protecting productive old growth (POG), and limiting road construction and the amount of acreage placed in Development LUDs, pose a lower risk of direct and indirect effects to focal resources. Alternatives 1 and 2 perform well against this measure. As noted on page 2-41, none of the 21 biogeographic provinces would contain less than 50 percent of their areas in Non-development under these alternatives. Alternatives 3, 5, and 6 represent higher harvest levels and additional road building, but would retain good to very good spacing of old growth reserves and other Non-development LUDs. These alternatives are less protective than Alternatives 1 and 2 but, when taken together with site-specific analyses and interagency monitoring, continue to address Key Issue 1. Alternatives 4 and 7 would each result in five biogeographic provinces with less than 50 percent in Non-development LUDs, and do not appear to be as responsive to Key Issue 1.

We are particularly concerned about the number of roads that would be constructed under Alternatives 4 and 7. At present, there are 4,942 miles of road on the Forest. The Tongass Road Condition Survey Report (ADFG, 2000) looked at approximately 40 percent of these roads (2,153 miles). The report documents numerous instances of ditch plugging, ditch erosion, cut-slope and fill-slope erosion, road surface erosion, catch basin failure, ditch blockage, culvert inlet and outlet erosion, and other system failures. These are the very kinds of failures that resulted in the listing of Katlian River and Nakwasina River on the CWA 303(d) list for sediment and turbidity. In addition, the Road Condition Survey indicates that 66 percent of the culverts across anadromous streams (Class I streams) are assumed not to be adequate for fish passage, and eighty-five percent of the culverts across resident fish streams (Class II streams) are assumed not to be adequate for fish passage. EPA acknowledges that the FS has used the results of this report to help target restoration work, and to acquire additional road maintenance funding. We also note, however, that the 2003 Forest Level Roads Analysis for the Tongass (p. 75) indicates that deferred costs for solving all passage problems at maintenance level 3, 4, and 5 road-stream crossings could be as high as $30 million. Given current budget shortfalls and anticipated

reduction in staff, we question the ability of the FS to maintain the existing road network, address fish passage and other road-related issues (such as drainage and road stability), while at the same time undertaking to construct over 5,000 miles of new road. We recommend that the document give discussion to how the FS will meet the proposed construction, maintenance and decommissioning goals while continuing to address the deferred maintenance backlog. A recent letter from the Wrangell District Ranger, Mark Hummel, regarding the decision to select an alternative for the Wrangell District Road Analysis and Access and Travel Management Plan stated the following: "This alternative will reduce the potential for resource damage more than any other alternative by removing the most miles of risk from culvert failure, loss of fish passage, erosion, and sedimentation. The sooner the District acts to close roads it can no longer maintain, the more likely that funding is available to close them. Funding is currently anticipated for the next few years. After that, the likelihood is greatly reduced." This statement recognizes that budget shortfalls will continue into the future.

In addition, we note that many of the transportation corridors authorized under Public Law 109-59 would cross the Tongass, as would a number of power transmission lines currently proposed by the State of Alaska. Given that Transportation and Utility LUDs would be given priority over all underlying LUDs, including LUDs that do not normally allow road construction, it is critically important to fully analyze road-related cumulative impacts. We recommend that the document more fully address the cumulative impacts of existing roads, the proposed increase in roads under the various alternatives, road activity on non-NFS land, and the proposed road and energy infrastructure under Public Law 109-59.

Lastly, we note that the DEIS states that, "[p]rotection for riparian areas would be the same under all alternatives" (p. 3-40). Regardless of which alternative or combination of alternatives the FS selects, EPA recommends that the Forest Plan Amendment include the riparian standards and guidelines as shown in the Proposed Land and Resource Management Plan (p. 6-41).

Key Issue 2 – The Tongass National Forest needs to provide a sufficient timber supply to meet the market demand and help maintain a vibrant economy in Southeast Alaska.

EPA agrees with the identification of sufficient timber supply as a key issue. As noted in the document (page 3-424), the Tongass Timber Reform Act (TTRA) of 1990 states that "…the Secretary shall, to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber and (2) meets the market demand for each planning cycle." Additionally, we recognize that there is a particular need in southeast Alaska for year-round, family wage employment, as well as a need to strengthen and diversify the regional economy.

The Alternatives proposed in the DEIS roughly correspond with four timber demand scenarios developed by Brackley et al. (2006): (1) Limited Timber Production (under this scenario, total derived demand is projected to be 65 MMBF in 2020); 2) Expanded Lumber Production (163 MMBF in 2020); 3) Medium Integrated Industry (204 MMBF in 2020); and 4) High Integrated Industry (325 MMBF in 2020).

The document gives discussion on page 3-441 to the ability of the various alternatives to meet these demand scenarios. In general, Alternatives 1 and 2 would be sufficient to meet limited timber production. Alternatives 3, 5 and 6 would provide volume sufficient to meet scenarios 1 thru 3 (up to the medium integrated industry scenario). Only Alternatives 4 and 7 would provide volume sufficient to meet scenario 4 (high integrated industry). We do not disagree with the premise that sufficient "shelf volume" is needed in order for the timber economy to fully realize market demand and stimulate investment (thereby addressing key issue 2) but we do question the attainability of the highest volume scenario (scenario 4 - high integrated industry).

The model developed by Brackley et al. considers a number of drivers affecting timber demand (timber statistics, trade data, etc.), but is unable to account for other factors potentially affecting timber demand, such as competition, fuel costs, labor costs, complicated shipping logistics, litigation and Congressional action. The study in fact notes (p. 34) that changing conditions in Alaska and world markets are rapidly making the existing model and approach obsolete, and that future attempts to project demand for National Forest timber in Alaska will require new methods and additional information.

We also note that the Forest has not harvested over 50 MMBF annually since 2000, and that the wood products industry accounted for only 1 percent of total regional employment in 2004 (p. 3-413). Notably, this is under the current ASQ of 267 MMBF, which according to the study is enough to support medium integrated industry. The lack of investor response to date would seem to indicate that there are variables outside the realm of FS influence (and available ASQ) that are limiting investment into wood products in the Tongass region.

Additionally, we question some of the assumptions in the DEIS related to projected employment. Page 3-449 indicates that projected timber industry employment figures were calculated assuming a linear relationship between harvest and employment levels (a one percent change in harvest resulting in a one percent change in employment). We are concerned that not only will changes in employment will lag changes in harvest, but that given current trends in automation, there is not a direct linear relationship between harvest and employment. This could lead to an overestimation of the amount of employment generated by the higher timber output scenarios. An examination of the timber market in Oregon concluded that even if harvest levels could be maintained, increased productivity would result in a 1.2% drop in employment over a 7-year period (Conway and Wells 1994).

In summary, Alternative 1 would maintain current harvest levels. As noted by the Brackley study, this may be the "most probable outcome" (p. 32), but it also falls short of fully satisfying key issue 2. Alternatives 2, 3, 5 and 6 would provide for a timber economy that is expanded from present levels. It is likely that each of these alternatives would, to varying degrees, satisfy key issue 2. Alternatives 4 and 7 would clearly provide ASQ levels sufficient to meet any potential timber demand, but, given the noted uncertainties surrounding the timber economy in Alaska, we question the whether these sale quantities are in fact attainable.

Key Issue 3 – Protection of the wildlife habitat and biodiversity of the Tongass National Forest is of local and national significance and is affected by road development and timber harvest activities.

EPA agrees with the identification of wildlife habitat and biodiversity as a key issue. The Tongass is naturally fragmented by islands and coastal ice fields and many of the islands have

distinct climatic, floral, and faunal differences. This presents a challenge for conservation of biodiversity and highlights the need to manage for intact habitats as a priority.

Impacts to habitat and biodiversity vary under the alternatives according to the amount of road construction and timber harvest proposed. Because ecosystems in naturally fragmented landscapes are less resilient to further fragmentation, logging additional unroaded areas poses a higher risk to species existence and persistence.

Chapter 3 of the DEIS provides an excellent discussion of the effects of the alternatives on landscape connectivity and biodiversity, noting the importance of an intact Old Growth Reserve (OGR) strategy in terms of ensuring long-term habitat viability. The reduction of OGR protections under Alternative 4, and the elimination of OGR protection under alternative 7, would effectively eliminate old-growth connectivity across numerous ecological "pinch-points" (3-187) and reduce the functional connectivity of the old-growth ecosystem (3-188).

Based on the information provided, we concur that Alternatives 4 and 7 could have a low likelihood of maintaining viable, well-distributed populations (3-186), and that Alternative 7, in particular, would result in the greatest loss of biodiversity among the alternatives (3-143). Based on the analysis, it seems clear that Alternatives 1 and 2 would result in good distribution of high quality old-growth over the long term, Alternatives 3, 5 and 6 would likewise continue to provide good habitat distribution, though to a lesser degree (affecting one ecological "pinch-point") and Alternatives 4 and 7 do not meet key issue 3.

In addition to old-growth as a habitat component, we are concerned about affects to wetland structure and function due to timber harvest and road construction. As noted on page 3-47, wetlands provide important physical, biological, and chemical functions that contribute to the overall functioning within a watershed and landscape. These functions are particularly critical to maintaining stream health. Page 3-45 indicates that 22 percent of existing road miles are in wetland areas. New road miles under the various alternatives range from 434 miles under alternative 1 to 2,043 under Alternative 7. As noted above, road impacts have resulted in the listing of two Tongass streams on the state 303(d) list. We are concerned that opening new wetland areas to road construction and harvest could increase sediment yield to streams within the Tongass and, subsequently, add more miles of streams to the 303(d) list. Site specific analysis and the TLMP riparian conservation strategy will help to mitigate some of these impacts, but as the FS has recognized, road construction can have significant unavoidable adverse impacts to water quality, regardless of how well the roads are designed constructed or maintained (USFS, 2001). Given the potential adverse effects of roads on aquatic life, we feel that in order to be consistent with key issue 3, the FS should pursue an alternative that minimizes road construction, particularly in wetland areas.

EPA Recommendation for a Preferred Alternative

Alternatives 1, 2, and 3 place the most emphasis on maintaining inventoried roadless areas (IRA), protecting productive old growth (POG), and limiting road construction and the amount of acreage placed in Development LUDs. These alternatives are environmentally preferable from a water quality, habitat, and roadless value perspective. Alternatives 5 and 6 are more responsive to key issue 2, and seek to strike a balance on habitat and roadless values, but result in significantly greater impacts. Given site-specific analysis and interagency monitoring, it is likely that Alternatives 5 and 6, together with the robust TLMP aquatic and riparian strategy, would continue to address key issues 1 and 3. Alternatives 4 and 7 appear designed to respond principally to key issue 2, and in fact go beyond the ASQ deemed necessary for a highly integrated industry. We are concerned not only with the assumptions driving this high ASQ, but also with the lack of responsiveness these alternatives demonstrate to key issues 1 and 3.

Regardless of which alternative is selected in the Final EIS and Record of Decision, we cannot stress enough the importance of continuing to engage Federal and non-Federal partners in the monitoring and assessment of the Land Management Plan (including POG designation). The Forest's use of the 1984 planning rule to pursue this amendment is testament to the Forest's commitment to broad collaboration. We commend you for making this a priority, and encourage you to maintain that focus as the plan moves once again into implementation. Specifically we request that the Interagency Monitoring Group be engaged in the 5-Year Review process, in addition to the involvement it has in the annual assessment report.

Comments Specific to the Tongass National Forest, Proposed Land and Resource Management Plan with EIS Appendices, January, 2007

Page 4-92 to 4-93, Watershed Resources Improvements: S&W2, I. Soil and Water Quality Protection and Improvement

Past road building and timber harvest activities, in combination with extensive harvest on adjacent private lands, have negatively impacted water quality and watershed health. This is particularly true for those biogeographic provinces with a history of intensive timber harvest (such as Kupreanof-Mitkof islands). Watershed restoration should be a major focus of the Forest Plan for these areas in order to ensure that they do not lose their ecological integrity.

The Soil and Water standards and guidelines talk of the need to "improve" these areas. This terminology does not adequately convey the current impaired status of these watersheds. Furthermore, when speaking of water quality protection, the wording in the Plan should be consistent with wording in the Clean Water Act. That Act mandates *restoring* and *maintaining* the chemical, physical and biological integrity of the nation's waters. We recommend amending S&W2 to remove the words "improve" or "improvement" and insert the words "restore" or "restoration."

Page G-2, Appendix G – Log Transfer Facility Guidelines, S7. Siting Guidelines

Impacts of Log Transfer Facilities (LTFs) typically include: 1) disruption of biota during log transfer and storage; 2) leaching of soluble materials that may be toxic; and 3) loss of bark and resultant effects on the benthos (Jackson, 1986). In order to avoid cumulative effects on sensitive marine environments, an examination of past and current LTF impacts should be made prior to siting. We recommend that the Siting Guidelines require a cumulative impact assessment prior to siting that references the following parameters: 1) measurements of bark and organic accumulation; 2) measurements of the concentration of organic log leachates, biological oxygen demand, dissolved oxygen, and hydrogen sulfides; and 3) a comparative survey of the kinds and relative abundances of benthic organisms.

Page 4-20, Invasive Species Protection

Invasive species can aggressively spread into areas altered by road construction and harvest activities. Nationally, as well as in Alaska, the establishment of invasive nuisance species has rapidly become an issue of extreme environmental and economic significance. EPA commends the FS for incorporating invasive species standards and guidelines into the Plan. We recommend that the new section be expanded upon to include discussion of Integrated Pest Management (IPM). EPA promotes IPM because it represents a prudent approach to understanding and dealing with environmental concerns. IPM promotes a thoughtful awareness of the pest management inherent in natural systems through an understanding of pest life cycles and through the use of beneficial organisms, cultural modifications, physical barriers and other mechanical controls. It does not rule out the use of pesticides, but requires that their use be thoughtfully considered.

We also recommend that the Invasive Species section discuss compliance with Executive Order (EO 13112) on invasive species. This Order emphasizes the need to address invasive species in the context of NEPA, and mentions six key categories of issues federal agencies should consider. Specifically, the Order states: "Each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law:

> (1) identify such actions. [and]
>
> (2) use relevant authorities to: (i) prevent the introduction of invasive species, (ii) detect and respond rapidly to and control populations of such species..., (iii) monitor invasive species populations reliably and accurately, (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop the technologies to prevent introduction and provide for environmentally sound control of invasive species and (vi) promote public education on invasive species..., and
>
> (3) not authorize, fund or carry out actions that it believes are likely to cause or promote the spread of invasive species in the U.S. or elsewhere unless...benefits of such actions clearly outweigh the potential harm caused....".

Page 6-3, Monitoring and Evaluation

EPA continues to view the Monitoring and Evaluation Plan in Chapter 6 as a critically important element of the proposed Plan, especially with the FS's application of an adaptive management strategy to forest planning activities on the Tongass. An interagency monitoring and evaluation program designed to provide the necessary feedback on the successes (and failures) of management practices specified in the Plan and implemented on-the-ground is the cornerstone of a successful adaptive management strategy. EPA's support of the current Plan continues to be predicated on the full implementation of a successful interagency monitoring and evaluation program. In light of budget shortfalls, we are encouraged that the FS is continuing to place a high level of emphasis on monitoring in the Plan. We ask that you continue to work in close collaboration with other Federal and non-Federal partners as you move forward with this program.

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April 27, 2007

Mr. Forrest Cole
Forest Supervisor
Tongass National Forest
Federal Building
648 Mission Street
Ketchikan, AK 99901-6591

Re: State of Alaska Comments on the Tongass Land and Resource Management Plan Amendment and Draft Environmental Impact Statement

Dear Mr. Cole:

The State of Alaska (State) appreciates the opportunity to work with the USDA Forest Service (USFS) as a Cooperating Agency under the 2006 Memorandum of Understanding to amend the Tongass Land and Resource Management Plan (TLMP). A Management Plan that will minimize legal challenges and stabilize the supply of resources to the economic enterprises of Southeast Alaska is essential to the well-being of the entire region. Our comments describe our goals and principles for the plan amendment and Draft Environmental Impact Statement (DEIS). These comments focus on timber management in the context of wildlife conservation. Overall, we seek to balance protection of fish and wildlife resources, recreation and tourism activities, and development of timber and minerals within the Tongass National Forest (TNF). This letter summarizes our general comments, with more detailed information in the following pages and appendices.

I understand that this plan amendment is primarily in response to timber issues, and our comments are accordingly focused. However, I must emphasize that the State of Alaska acknowledges that the Tongass National Forest has many other uses and benefits to the local residents, the State of Alaska, and the Nation. However we decide to manage the timber resources of the TNF, we must always consider these non-timber uses in our decision making.

Timber industry. The State of Alaska supports a sustainable timber industry in Southeast Alaska as part of a diversified regional economy. A sustainable timber industry is one which operates efficiently and supports reinvestment in capital infrastructure. Sufficient timber must be available from federal land to allow the

existing industry to operate efficiently and sustainably. This will require annual timber sales of at least 167.5 million board feet of economically feasible timber (see Appendix A). Historically, the volume of economically feasible timber offered has been significantly different than the gross Allowable Sale Quantity (ASQ) figure. The focus should be on the volume of economically feasible timber offered, not the ASQ. More detailed comments on this topic follow in the section on specific issues (see page one of our detailed comments).

Transitioning to a sustainable industry supported by second-growth timber is a key objective. However, given current timber stand ages, fully transitioning to second-growth harvests will take at least 50 years. Reaching this goal will require considerable investment, and intensive management of second-growth stands. We are committed to working with the USFS, the timber industry, and the full range of interests in Southeast Alaska to develop a strategy for this transition.

In the interim, it is critical that the USFS provide a sufficient, predictable supply of old-growth timber that sustains the existing industry and has the flexibility to incrementally increase timber supply as the industry expands. This will best be achieved by concentrating timber harvest in areas that are intensively managed. This will reduce the area affected by harvesting, improve timber sale economics, and increase the undisturbed area for wildlife, recreation, subsistence, and other uses. Within intensively managed harvest areas, it is appropriate to relax some Standards & Guidelines (S&Gs), in exchange for more stringent S&Gs in other areas.

Conservation Strategy. The timber goals must be balanced with a sound, science-based, conservation strategy. Conservation values and economic values are not mutually exclusive – both are needed for a healthy economy and a healthy environment. Regardless of land status, the State is obligated to manage all renewable resources on a sustainable basis, including habitat for fish and wildlife, public access, and wilderness values.

These resources should be managed on the basis of the most recent, credible, scientific studies available, including information compiled by the 2006 Conservation Strategy Review. We request that the USFS complete a synthesis of key findings from the review so that the information can be used to identify and address proposed or anticipated modifications to the S&Gs. To the extent possible, implementation of conservation measures should be flexible enough to enable tailoring them to site-specific conditions and facilitate design of economically feasible timber sales. Measures may vary from area to area to reflect different species concentrations and sensitivities, and to concentrate timber harvesting in intensively managed areas rather than dispersing harvesting throughout the forest. Intensive timber management which minimizes the areas affected by harvesting will have the least impact on conservation values and the best chance of broad public support.

The system of small, medium, and large old-growth reserves (OGRs), along with beach and riparian buffers, must remain the cornerstone of the wildlife conservation strategy. The system of buffers and reserves provides a safety net for the conservation of viable fish and wildlife populations. Combined with the other protected areas in Southeast Alaska (e.g., wilderness areas) and prudent management of the lands where timber harvest is allowed (matrix lands), the overall strategy provides habitats sufficient for providing sustainable and usable fish and wildlife populations.

Tongass Futures Roundtable. We strongly support the efforts of the Tongass Futures Roundtable (TFR) to find common ground among the many entities with deep interest in the Tongass National Forest. The TFR is striving to build consensus on a plan to convert to an industry based on second-growth and to identify areas where more intensive timber management can occur with minimal impacts on fish and wildlife conservation. We are committed to active participation in these efforts. We believe that building consensus offers the best chance to alter the pattern of litigation over Tongass management. The TLMP amendment must retain flexibility to implement consensus recommendations developed by the TFR, without compromising adoption of the amended plan this fall.

IMPLEMENTATION STRATEGY

The State recommends that the USFS employ a phased strategy to implement the plan quickly, stabilize timber supply, protect fish and wildlife resources, and provide time for the TFR to develop consensus recommendations. Throughout implementation of this strategy, we also support development of other commercial and personal uses of the forest such as recreation, tourism, subsistence, commercial fishing, and mining. The following outline describes this strategy.

Phase 1 - Short-term - Support the existing timber industry and continue to apply the existing Conservation Strategy.

- Offer at least 167.5 million board feet of economically feasible timber annually to support the existing timber industry at an efficient level and allow for a facility that can utilize low value timber. Focus harvests on roaded areas. Limit incursions into unroaded areas to the level necessary to provide economically feasible timber during the transition to a second-growth industry. Due to the young age of most existing

stands, timber harvest would continue to be predominantly old-growth in this phase. Monitor timber demand and encourage local, value-added timber uses.
- Maintain the existing Conservation Strategy, including the old-growth reserve system, beach and riparian buffers, and Standards and Guidelines. Monitor the effectiveness of the Strategy.
- Continue TFR efforts to plan for conversion to a timber industry based on second-growth, identify areas for intensive timber management and flexible implementation of S&Gs, and assess opportunities for flexible implementation of the S&Gs that would improve operability for timber harvesting without compromising fish and wildlife conservation.
- Prepare for the conversion to second-growth harvesting by:
    - Developing a coalition to work with Congress to revise the National Forest Management Act (NFMA) requirement for use of Culmination of Mean Annual Increment to determine rotation age. The NFMA should be revised to allow shorter rotations for second-growth;
    - Considering appropriate means to reduce the rotation age for second growth stands through intensive management; and
    - Working with recreation, tourism, timber, and conservation interests to review portions of Modified Landscape and Scenic Viewshed LUDs that are outside areas protected under the Conservation Strategy, for potential inclusion in Timber Production LUDs.

Phase 2 - Mid-term - Expand timber harvest based on industry growth, demand, and demonstrated success of the Conservation Strategy with a goal of developing an integrated timber industry.

- Review results of monitoring on timber demand and conservation effectiveness.
- Update the Conservation Strategy based on consideration of research (including the 2006 Conservation Strategy Review), monitoring results, and TFR recommendations on flexible implementation of S&Gs in intensively managed areas.
- As the timber industry grows and demand increases, increase the volume of economically feasible timber offered for sale.
    - Most harvests would continue to be old-growth due to the young age of most second-growth stands; harvests would include second-growth where suitable stands exist.
    - Concentrate timber harvests in intensive management areas and incorporate TFR recommendations on the location of these areas.

Phase 3 - Long-term - Convert to a timber industry focused on second-growth harvests.

- Offer economically feasible timber sales in second-growth based on demand. Given the distribution of stand ages in the forest, full conversion to a second-growth harvesting will not be feasible until at least 2057. Intensively manage second-growth to maximize the available timber volume and minimize the area needed to support the timber industry. If intensively managed, we expect second-growth stands to produce a greater volume of timber per acre and provide more flexibility in management.

- Review the Conservation Strategy and modify it as necessary to tailor it to conditions of second-growth harvesting, address slash management, and incorporate restoration activities. The review should include information developed in the Tongass-Wide Young Growth Study (TWYGS) and other research.

Under all three phases,

- Continue restoration management work, including commercial thinning in second-growth, stream habitat restoration, road removal and fish passage improvements.
- Support development of other economic activities that utilize the forest for recreation, tourism, mining, commercial fishing, and subsistence activities at a variety of scales and from commercial to personal in scope.

ANILCA AND FEDERAL LAND MANAGEMENT ISSUES

The proposed plan amendment is inconsistent with several provisions of the Alaska National Interest Lands Conservation Act (ANILCA) and other federal-state laws and policies. In particular, there are issues with restriction of off-highway vehicle use for subsistence activities, application of required zoning for public recreation and encounter rates to limit public uses on Forest Service lands, and allowance for fish and wildlife management activities and facilities in Wild and Scenic River Corridors, Research Natural Areas, and Experimental Forests. We request that the Final EIS and plan amendment be consistent with ANILCA and other federal-state agreements on these issues.

The State of Alaska supports completion of Alaska Natives Claims Settlement Act (ANCSA) land conveyances for Sealaska Corporation. The lands to be conveyed to Sealaska must be of a nature and character to fulfill the promise of ANCSA. This can only be achieved by the conveyance of lands suitable to meet Alaska Native cultural, traditional, and economic needs.

AGENCY STATUS AND PLAN IMPLEMENTATION

The State urges the USFS to implement the TLMP amendment in a timely fashion. While the recent legal settlement allows Tongass timber to make it into the "pipeline" and provides short-term relief to the timber industry, final plan approval

and implementation is critical to the industry and economy of Southeast Alaska. Until the timber supply is stabilized, there is no assurance that the industry can survive.

Under the 2006 MOU between the State and USFS, the State is a cooperating agency for TLMP amendments and revisions through 2013. We are committed to working with you throughout the remaining process. We strongly believe that an interagency effort that includes expertise in timber management, economics, and fish and wildlife science and management has the greatest chance of success.

In addition to the overview of our goals and policies above, specific comments on the DEIS and Proposed Amendment follow.

We look forward to working with you during the completion of the TLMP amendment process and implementation of the plan. I am confident that our collective efforts will result in a viable and widely supported plan amendment.

Sincerely,

Sarah Palin
Governor

Enclosure

cc: The Honorable Ted Stevens, U.S. Senator
The Honorable Lisa Murkowski, U.S. Senator
The Honorable Donald E. Young, U.S. Congressman
Dennis Bschor, USDA Forest Service, Region 10
John Katz, Office of the Governor
Larry Hartig, Commissioner, Department of Environmental Conservation
Tom Irwin, Commissioner, Department of Natural Resources
Denby Lloyd, Commissioner, Department of Fish and Game
Emil Notti, Commissioner, Department of Commerce, Community, and Economic Development
Erin Dovichin, Tongass Futures Roundtable

DETAILED COMMENTS

Timber Issues

Timber Sale Thresholds. In this document, the State refers to three harvest levels that represent different thresholds for the timber industry.

- First, a volume of 83.5 million board feet (MMBF) is the bare minimum needed to keep existing Southeast Alaska mills in operation over the next one to two years while the supply of timber from the Tongass National Forest is increased. With this amount of timber, the existing mills could operate only a single shift daily and could not stay in business long-term.
- Second, 167.5 MMBF are needed to 1) allow the existing mills to operate two shifts daily, and 2) provide 30 MMBF per year for development of a new facility that utilizes low-value timber. This level of volume is necessary for efficient mill operation over the longer term, and for development of an integrated timber industry. This is the level of sales that must be achieved to support a sustainable timber industry in Southeast Alaska.
- Lastly, 231.7 MMBF would be required for the existing mills to operate at full capacity (three shifts daily) while still providing 30 MMBF for a facility to utilize low-value timber.

These volumes refer to the volume of economically feasible timber that is required annually, not the Allowable Sale Quantity (ASQ). See the section on Timber Sales and ASQ on page 8 for a more detailed discussion of this topic.

Timber volume. A stable, moderate-sized, integrated timber industry is an important component of a vibrant economy in Southeast Alaska, and is a feasible objective. To make this a reality, TLMP must provide a sufficient, stable supply of timber from the Tongass National Forest. Timber industry survival depends on a sufficient supply of economically feasible timber. This requires that at least 167.5 million board feet be offered annually, and that all timber sales be economically feasible for the purchasers. Economic considerations and expertise in timber harvesting must be included from the very beginning of timber sale design.

Timber supply and demand. The new analysis of the demand for Tongass timber prepared by Brackley et al. (2006), and released by the Pacific Northwest Research Station (PNW) is a significant improvement over the demand analysis prepared by Brooks and Haynes (1997), which was used in the 1996 Supplement to the DEIS and the 1997 Record of Decision. Specifically, Brackley et al. (2006) includes results from other analyses since 1996, describing the potential markets for Tongass timber if sufficient supply is made available (*e.g.*, McDowell 1999 and McDowell 2004). We disagree, however, with some of the assumptions that were made in the timber demand study by Brackley et al. (2006), and note that it did not consider several important factors affecting timber sale purchases.

First, the study failed to acknowledge the influence of timber supply on timber demand. Until a few years ago, the Southeast Alaska timber industry was set up to process all of the components of a timber sale, with the possible exception of some of the utility volume. Utility logs are

defined as cull logs with 50% chip volume. Low value and small diameter logs were being processed by Viking Lumber and Pacific Log and Lumber. Both mills also chipped the better quality utility logs for sale to the Pacific Northwest. They were also ready to provide the Ketchikan veneer mill with veneer quality logs. Shake and shingle mills were operating on Prince of Wales Island. The reason this partially integrated industry did not persist was the lack of a sufficient, long term supply of economic timber. Without a reasonable assurance of sufficient supply, the veneer mill could not continue to operate, forcing the existing mills to process this volume. The lack of a consistent supply also affected the existing mills' ability to fill the market requests for their products. The supply of timber was not enough to meet the market demands, and the mills lost part of their market share. At reduced production levels, the mills' costs per unit increased. Current mills are operating at just a third of their capacity or less. At this level of production, they must focus solely on high quality logs. If the existing mills (including the veneer mill) had a sufficient supply of timber to operate at full capacity, we would expect to have an integrated industry. Supply greatly affects the level of demand!

Second, high logging costs that result from poorly designed sales also affect the mills' ability to process all of the volume from the timber sales. Higher logging costs increase the delivered cost of logs to the mills, negating the mills' ability to process low quality and small diameter logs. Reducing the logging costs by providing economic sales would allow the mills to process all the volume from these sales, as they did in the past.

The quality of the timber in the timber sales is the third factor. Areas of non-merchantable timber should be excluded from timber sales. Tongass timber sales contain more and more non-merchantable timber. This strongly affects the economic viability of the sale and forces the purchaser to deal with unusable volume.

Finally, re-establishing an integrated timber industry in Southeast Alaska will require a means to fully utilize lower grades of logs. When the pulp mills ceased operation, there was no longer a market for low grade logs. This contributed substantially to the problem of uneconomic timber offerings in the Tongass. Efforts made by the USFS to address this problem in the short term have included offering some sales with the option of leaving utility volume in the woods, and granting more export permits for low grade hemlock. These measures have not been entirely satisfactory in addressing harvest economics, and the challenge of finding an economically viable means of utilizing the low grade timber remains. The timber industry should be given an opportunity to redevelop itself so that the full range of Tongass timber resources can be utilized and processed efficiently in the mid-term and long-term scenarios. The USFS should continue to support efforts to identify new products and markets for low-grade timber, and ensure that the Plan allows a harvest level that can support new operations that can use low-grade timber.

Timber Sale Design. As noted above, the timber sale planning process often fails to adequately incorporate timber sale economics into sale design decisions. Many proposed sales are not economically feasible, which defeats the purpose of the sale and wastes agency resources. Sales must be designed so that they still include sufficient economically feasible timber after meeting the requirements of the Conservation Strategy.

We request that the plan amendment and DEIS recognize that providing economically viable timber is the primary consideration for timber sale design within the sale boundary. Timber sales can be designed within the constraints of the existing Conservation Strategy, but only if economic feasibility is the clear goal throughout the design process. Except for site-specific concerns about endemic species of fish and wildlife[1], conservation requirements beyond those required by the Conservation Strategy should not be instituted for individual sales during the sale design process. A standard requiring economic timber sale design should be included in the section on Standards and Guidelines.

We also request that the USFS include personnel with experience and expertise in timber economics in all stages of the timber sale design process. The process should include people with a thorough knowledge of timber value, road construction and harvest costs, harvest methods, and access construction in Southeast Alaska. We look forward to working with you to accomplish this through the Economic Timber MOU between the State and the Tongass National Forest.

Timber sales and ASQ. Timber offered for sale must be economically feasible to have any value to the timber industry. Several factors result in a significant falldown between the ASQ set for the Tongass and the amount of economically feasible timber that is purchased and processed locally. Factors contributing to falldown include:

- In the sale design process, standards and guidelines established to protect non-timber values decreases the amount of timber available for harvest in a unit. This increases the cost of road access and the cost of harvesting the timber.
  - The Interdisciplinary Team (IDT) process used to design timber sales often fails to adequately incorporate timber sale economics into design decisions for individual harvest units and for total sales. Many proposed sales are not economically feasible, and are pulled from offerings prior to sale or are not purchased when offered.
    - Timber sales that are economically feasible are commonly subject to court challenges that delay or eliminate the sale.
      - Export is allowed on up to 50% of the timber in USFS sales. This improves the sale economics but decreases the volume that goes to support local mills.

As a result, the current timber supply to support local mills is actually far smaller than the ASQ volume. Based on work prepared for the bridge timber committee of the Tongass Futures Roundtable[2], 167.5 MMBF per year is required for the existing mills to operate efficiently (i.e., at two shifts per day) and allow for a facility to use low-value wood (see Appendix A). The existing mills need this volume to stay in business. Operating at full three-shift capacity would require 237.1 MMBF (see Appendix A).

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[1] Endemic species are those that are prevalent in or peculiar to particular isolated localities.

[2] It should be noted that the TFR never adopted the bridge timber committee report. This work was done at the committee level and presented at a work session in Juneau on July 12-13, 2006. Some TFR members do not agree with the report's finding concerning mill capacity, which is a controversial subject. The mention of the TFR is not meant to imply an endorsement of this statement, but rather cites the source for where the work was accomplished.

Timber supply timing. If the amendment and implementation of TLMP fails to promptly provide sufficient economically feasible timber, the remaining family-owned companies that depend on Tongass timber will go out of business in the next few years. Even if the plan amendment is adopted and implemented quickly, there will be a lag between the current situation and a significant increase in timber sales. The federal timber pipeline is constricted at the top and has a weak outflow that may produce less then 25 MMBF of timber for purchase in the next year. At least 83.5 MMBF is needed to run a single shift at the existing mills – this volume could keep the mills in operation temporarily while timber flow increases, but it is not sufficient to support long-term operations (see Appendix A).

The year 2010-2011 is a crux year for timber supply. The old timber pipeline is not producing sufficient economic volume, a new pipeline under the TLMP amendment will not be flowing, and state bridge timber efforts will be nearing completion. Over the past three years the state stepped up its timber sale program in Southeast Alaska to supply some critically needed volume to the industry. However, this effort can continue for only 1-2 more years before reaching the cap on what the state can offer within its sustained yield capability of 12.8 MMBF per year. Federal timber sale volume for 2009 and 2010 is primarily in roadless areas where timber sales have been subject to litigation from the environmental community. Based on the USFS sale projections for the next five years, there is only enough volume in the pipeline to supply timber for Alternatives 1, 2, and 3, and that is only possible if there are no roadless issues. If appeals and litigation over roadless areas impede the timber sale process, there will only be enough volume for Alternative 1. The roadless issue must be resolved promptly to provide enough volume to keep the mills open even to 2010.

The state requests that the USFS promptly adopt and implement the TLMP amendment, and continue efforts with the TFR to find innovative and collaborative ways to keep timber volume flowing to the mills while a long-term management solution is crafted.

Second-growth and old-growth. The State strongly supports efforts to convert the current industry from old-growth timber to second-growth timber. However, it will take at least 50 years to reach the point where sufficient second-growth volume could be available to fully support the local industry. Continued harvest of old-growth timber will be necessary during the conversion period and may need to continue on a limited basis after that to provide sufficient economically feasible timber to meet demand.

Based on USFS studies on second-growth stands, the rotation age for second-growth stands should be at 90 years, not 160 years. Maintaining a 160-year rotation on second-growth stands will produce only enough volume for Alternative 1.

Converting the industry to second-growth manufacturing should result in intensive management and harvest of these second-growth stands. Changing just the rotation age will only provide enough volume for Alternatives 1, 2, and 3. Providing additional volume may require relaxation of current Standards and Guidelines (S&Gs) within second-growth areas. Some of the S&Gs established to protect wildlife in old-growth harvest areas do not reflect second-growth conditions, and may need to be applied differently in those areas. For example, we recommend allowing selective second-growth harvesting in the portion of beach and estuarine buffers that is more that 500' from the water, as well as within the portion of second growth riparian buffers that is more than 100' from rivers or streams. We anticipate this requiring project level review to define appropriate amounts and layouts for such harvests. Other guidelines that should be reviewed for possible revision in intensively managed second-growth areas include the S&Gs for marten and goshawks.

We recommend that the USFS emphasize pre-commercial thinning in second-growth stands that are available for harvest. The goal of the pre-commercial thinning is to shorten the rotation age from 160 years to 90 years, which will greatly increase the second-growth volume that is available for harvest. Pre-commercial thinning also creates openings in dense second-growth stands which have short-term benefits for wildlife. By contrast, commercial thinning is aimed at producing large, high quality logs. Mills designed to process second-growth are not likely to be able to handle large (>32" DBH) logs.

Conversion to a second-growth industry will be expensive. Existing mills must be replaced with new mills capable of efficiently processing smaller trees, and second-growth stands must be managed more intensively than old-growth stands. A second-growth industry uses mechanized harvesting equipment and manufacturing equipment specifically designed for smaller logs. After businesses convert to the new equipment, their ability to harvest and manufacture large logs will be severely limited. Sufficient second-growth volume must be provided to justify the capital investment. Much of the initial supply of second-growth is on outer islands where handling and transportation of small timber will be costly. Log transfer facilities (LTFs) will have to be secured and roads maintained to facilitate harvesting in second-growth areas. Finally, to be profitable, second-growth mills will have to process a larger volume of timber than existing mills, to offset the increased costs of handling more, smaller pieces of wood to produce a given volume. On the positive side, intensively managed second-growth stands should produce more volume per acre than typical old-growth stands.

Concentrated vs. dispersed timber harvest areas. Concentrating timber harvesting may benefit both the timber industry and wildlife conservation, and is an approach suggested previously by the State. Allowing more intensive harvest of timber within certain areas -- especially in areas that are already roaded -- may reduce the need for roads into new areas. Reducing the footprint of logging on the landscape would likely reduce the cost of logging operations and decrease the area affected by new timber harvesting. Human access, ATV use, hunting, trapping, and fishing typically increase along new roads, even if they are closed to vehicular use after logging. Potential benefits could accrue to wildlife if concentrating harvest areas allows conservation of more high-value old-growth. Timber management strategies that minimize road development are generally better for certain wildlife species and should be considered whenever possible. Roads pose one of the greatest risks to fish habitat on the Tongass, and minimizing road development often benefits fish as well.

Existing S&Gs apply throughout the Tongass. S&Gs contribute to the high cost of harvesting timber in the Tongass and reduce the available timber. The plan should strive to identify areas where harvesting would have relatively low impacts on other resources and focus harvesting on these areas. Within these areas, timber should be managed intensively to improve economic feasibility and timber volume output. The goal for these areas would be continued second-

growth production and harvest rather than a return to old-growth conditions. Concentrating harvest areas to reduce impacts may require conscious tradeoffs in the application of S&Gs between intensively harvested areas and other more sensitive lands. In intensively managed areas, S&Gs might be loosened in exchange for applying more stringent requirements in other areas.

This approach assumes that more impacts occur to wildlife if logging activity is dispersed. This assumption should be tested through studies to confirm whether it is correct and assess the benefits and impacts of concentrating harvests in intensively managed areas.

Fish and Wildlife Issues

Best available data. Use the best available information for evaluating impacts to fish and wildlife and establishing the Conservation Strategy. At a minimum, the amendment should include a synthesis of key findings from the 2006 Conservation Strategy Review workshop, incorporate the findings into the Final EIS where possible, and identify when and how other study results will be addressed subsequent to adoption of the amendment. Appendix C of our comments includes a summary of new information from the workshop that is relevant to the Conservation Strategy. This includes information presented by State staff on specific species (e.g., goshawks, forest birds, wolves, deer, marbled murrelets, and brown bears). Appendix D of our comments includes a list of associated references and cited literature.

Sustainability. The Plan protects habitats capable of providing for viable, well-distributed populations of fish, wildlife, and other resources, but also recognizes a need to provide for a variety of uses, including subsistence harvests, big-game guiding, fishing charters, and wildlife viewing programs. The standard for fish and wildlife population levels should be based on sustainability rather than viability. A sustainable population provides for both human use and biological survival; viability only guarantees survival in the absence of human use. A standard of sustainability is consistent with the State of Alaska's constitution.

Conservation Strategy

Old-growth reserves. The system of small, medium, and large old-growth reserves (OGRs) is, and must remain, the cornerstone of the wildlife conservation strategy. The reserve system provides a safety net for the conservation of habitat for minimum viable populations. It was not designed to ensure habitats necessary to provide for the sustained yield use of key fish and wildlife populations in the locations where the public has a history of subsistence or recreational harvest. For the reserve system to ensure sustainable populations of wildlife, it must include plant communities whose structure and composition are representative of the forest types. Reserves should be established in proportion to their occurrence and abundance across the Forest before widespread logging. The reserves also need connectivity to allow for animal movements. Finally, they must be well-distributed across biogeographic provinces and larger islands, as well as across the range of elevations and aspects. Failure to adhere to these design principles will jeopardize sustained yield and increase risks of extirpation for some wildlife species on the forest. Insights on this are offered by Cushman et al. (2006; see Appendix D).

Some of the timber management options under consideration in this plan revision would require modifications or reductions to the existing OGR system. While the state recommends assessing possible flexibilities within the Conservation Strategy, any relaxation of existing requirements must not unduly compromise the conservation of fish and wildlife habitats. Changes that reduce the OGR system will increase the risks associated with maintaining viable populations of some wildlife species and eventually could lead to consideration of listing species, subspecies, stocks, or endemic populations under the Endangered Species Act. Recent wildlife surveys have shown significant levels of mammalian endemism on some islands within the forest. In these isolated areas, current reserves may not be adequate to maintain an acceptable level of risk for population viability. We encourage the USFS to work with other agencies to assess such risks and consider alternative conservation measures.

Small OGRs: Specifications and design requirements for establishing small OGRs were included in the 1997 TLMP; however, many small OGRs were never finalized, some were subsequently relocated, and several have been blamed for creating issues for timber sale reviews and analyses. As a result, the USFS, Fish and Wildlife Service (USFWS) and ADF&G reviewed all small OGRs to resolve remaining issues of size and location, and map the final small OGRs in the TLMP amendment. We supported this goal and contributed significant amounts of staff time and expertise to the process. USFS district staff reviewed the recommendations from the interagency group, and with few exceptions agreement was reached on their final configuration and placement. The Forest Supervisor subsequently reviewed all the small OGR decisions and changed roughly 40% of the agreed upon locations. The interagency group reconvened to assess and comment on these changes.

At the time of this review, the group expressed discomfort with some of the placements and agreed to place the reviewed small OGRs into one of three categories: (1) those that were considered biologically preferred (IOGR), (2) those that were not considered biologically preferred, but could be accepted (FPOGR), and (3) those that were not considered to be acceptable and should be further evaluated as part of project level reviews (PROGR).[3] The group also identified 13 small OGRs that raised especially high levels of concern for wildlife. These were later reviewed cooperatively by the group and Forest Supervisor, and resulted in 4 being classified as IOGR, 6 as FPOGR, and 3 as PROGR. Overall, of the 238 small OGRs identified on the Tongass, it is our understanding that 133 (56%) are now classified as IOGRs, 58 (24%) are classified as FPOGRs, and 47 (20%) are classified as PROGRs. We encourage the USFS to review future PROGRs with an eye to timber operability and economics as well as fish and wildlife conservation. Overall, we conclude that the newly proposed sizes and locations for the small OGRs are better than they were previously.

Since the adoption of the 1997 Forest Plan, small OGRs have been examined and adjusted during project level reviews. In most cases, the result has been growth in the gross acreages included in OGRs and a reduction in available timber. Appendix B shows the resulting reduction in suitable and available acres by project over the past 10 years. Of particular concern is that project-level reviews removed more than 5,100 acres of Productive Old Growth (POG) from the suitable land base during 1998 – 2005 (USDA, unpublished 2005 monitoring report found at http://www.fs.fed.us/r10/tongass/projects/tlmp/2005_monitoring_report/#1).

[3] IOGR = Interagency OGR; FPOGR = Forest Plan OGR; PROGR = Project Review.

This steady erosion of the timber base presents a significant obstacle to maintaining a viable timber industry in Southeast Alaska. Therefore, we appreciate the joint effort under way to map final locations of small OGRs across the Tongass. We urge that this cooperation continue beyond the current planning effort and further urge that transfer of POG from the suitable land base into small OGRs be kept to the minimum necessary to achieve the stated wildlife goals and to satisfy the criteria in Appendix K of TLMP.

Medium OGRs: The interagency OGR group only reviewed small OGRs. The USFS has modified some medium OGRs, and some of the existing medium OGRs do not meet the minimum requirements specified in Appendix K of TLMP. We do not know how these changes and conditions will affect the Conservation Strategy, and we urge the USFS to undertake an interagency assessment of medium OGRs. This process should include state and federal expertise on both wildlife conservation and timber management. We further urge the USFS to do this as soon as possible in order to avoid limiting or eliminating suitable options to meet requirements for the size, placement, and composition of medium OGRs.

Beach and Riparian Buffers. In 1997, forested beach buffers were extended from 500 to 1,000 feet. This extension reflected the value of this habitat to a host of wildlife species, including river otters, mink, bears, wolves, Sitka black-tailed deer, bald eagles, goshawks, and others. Beach buffers are a key component of the Conservation Strategy and must be retained. At the same time, we recognize the utility of allowing some selective timber harvesting of second-growth within beach buffers, to the extent that it accelerates a return to characteristics of the old-growth condition and is a benefit to wildlife. For this reason, we recommend allowing selective harvesting of second-growth timber in the portion of beach and estuarine buffers that is more than 500' from the water, and within the portion of riparian buffers that is more than 100' from rivers and streams. We do not support the use of beach buffer or riparian buffer areas for old-growth harvesting.

Forested buffers along all Class I and II streams are critical elements of the Conservation Strategy. Class I and II streams provide valuable spawning and rearing habitat for species of Pacific salmon, trout, and char, and forested riparian buffers along Class I, II, and III streams provide protection from erosion, sedimentation, and temperature increases.

Class III streams are also a component of the Conservation Strategy and are important sources of water, energy, nutrients and organic matter for downstream reaches. Land uses along headwater streams influence this linkage with downstream areas (Wipfli 2005). At the same time, we appreciate that implementation of Class III stream buffers can reduce the timber base and create difficulties for timber economics. This issue is further complicated by mis-classification of some Class III streams. Field verifications of Class III streams often occur during the drier summer months, when fish typically are not present. As a result, some streams classified as Class III may actually provide fish habitat and have fish present at some time during the year and should be reclassified as Class I or II streams. In other cases, some streams classified as Class III streams may be more accurately classified as Class IV.

We recommend that the USFS in consultation with the State, develop objective criteria and protocols to use for stream classifications, and train USFS staff in application of the classification criteria. We also urge the USFS to use existing flexibility in the Class III guidelines to protect water quality and downstream fish habitat in a manner that is practical for timber harvesting. Lastly, we would like to discuss with the USFS, industry, and other agencies and groups flexibilities within the existing Class III S&Gs, and would be willing to discuss possible alternatives to existing stream buffer requirements for Class III streams, provided that they assure conservation of habitats for fish and wildlife.

Riparian buffers are important to wildlife, including river otters, which are known to use cavities adjacent to inland streams as natal dens (Woolington 1984), and to brown bears, which strongly select for these areas during the salmon spawning season (Schoen and Beier 1990, Titus et al. 1999, Flynn et al. 2007). They also provide critical connectivity between old-growth reserves and are important for maintaining the ecological function of small OGRs.

Marten & Goshawk / Legacy Forest Structure Standard and Guideline. Under the amended plan, a new "Legacy Forest Structure" (legacy) S&G is proposed as a substitute for the existing "Marten and Goshawk" S&G. We understand this change is being proposed because: (1) the existing S&G is not particularly effective for conservation of marten and goshawks, and (2) the marten and goshawk S&G creates significant difficulties from a timber harvesting standpoint (feasibility, safety, and cost).

The proposed legacy S&G would apply when the harvest levels in various planning units exceed set thresholds, much as it does under the existing marten and goshawk S&G. However, unlike the requirement for trees to be individually dispersed or clumped under the marten and goshawk S&G, the legacy S&G could result in trees being retained primarily along the back edges of cutting units. Following are our observations and uncertainties associated with replacing the existing marten and goshawk S&G with the proposed legacy S&G. These are follow-ups to two letters sent by ADF&G to the USFS on this subject during September, 2006.

1. To the best of our knowledge, there is no supporting science for adopting the legacy S&G. At the same time, it is our understanding that the proposed legacy S&G does not significantly benefit the timber industry. To better understand this, we encourage the USFS to include in the FEIS a scientific assessment for the proposed legacy alternative. Without that assessment, we have no information with which to assess any benefits of the S&G to marten or other wildlife populations. At the same time, because the legacy S&G provides less habitat value for martens, it cannot be considered a replacement that would maintain the same level of risk. We also encourage the USFS to include a quantitative analysis of how the marten and goshawk S&G has been applied, and the extent to which the existing S&G has impacted timber harvesting activities. Included in the analysis should be the number of units that have been harvested in a manner that results in retention of "individual trees" versus retention of "clumps" of trees; the average size of retained trees; the amount of retained timber that has been suitable and merchantable versus non-developable or non-merchantable; and how the implementation of the S&G has affected the design of safe and economically feasible timber sales. Also, we would appreciate clarification of the proposed legacy S&G relative to the amount of timber harvesting that would be allowed. As presented, it appears that there is no upper limit to the amount of harvesting that could occur within areas where this S&G would be applied. It seems to us that leaving 1/3 of the old-growth with each successive entry could result, in the extreme, in having only 3 trees left in a given area and still being able to harvest 2 of them. There should be a lower threshold for remaining old-growth within areas below which no more timber harvesting is allowed.

2. It is our understanding that the current marten and goshawk S&G includes flexibility to locate retention trees in ways that facilitate safe and economically feasible timber sales. For example, retention trees may be clumped to avoid conflicts with logical cable settings. We would appreciate affirmation or correction of this understanding. Additionally, we encourage the USFS to ensure that training and policy direction for unit lay-outs are clear and well understood so that available flexibilities can be used to better provide economically feasible timber sales.

3. The possibility of intensifying timber harvesting in some areas while avoiding or minimizing harvesting in other areas may require some level of flexibility within existing or newly-developed S&Gs. These flexibilities should be explored as a way to better provide economically feasible timber harvesting while also providing conservation of fish and wildlife habitats. We suggest that an interagency assessment of the implications of such action on marten, goshawk, and other wildlife be undertaken as part of this effort. This cooperative assessment should also include an effort to identify areas where concentrated timber harvesting may occur.

4. Regardless of what S&Gs are ultimately adopted, there should be an assurance that trees retained for wildlife should not be logged commercially or for personal use over the life of the rotation. With each new forest plan revision, the need for and amount of wildlife habitat retention should be re-evaluated. Moreover, efforts should be made to locate old-growth retention in places where it is not susceptible to catastrophic blow-down. Where feasible, in instances where blowdown, landslides, or disease kills >75% of retention trees, we suggest harvesting the downed trees and designating an equivalent amount of old-growth for retention elsewhere in

Endemic Species. [4] A considerable amount of new information about island endemic animal species, including new wildlife taxa and distribution information, was presented during the April 2006 CSR Workshop. This information has significant management implications for maintaining sustainable populations of wildlife and should be summarized and included in the TLMP amendment. The plan should include considerations for adjusting timber harvest on islands as more information becomes available about the habitat associations and population status of endemic species.

Fish passage. The DEIS states that the culvert replacement program declined in 2006 due to funding reductions and is projected to continue to decline in future years (DEIS, page 3 –55). This is a concern to us and we suggest that the culvert replacement program be given a higher priority to increase the possibility of funding. Culvert replacement and maintenance will only

[4] Endemic species are those that are prevalent in or peculiar to particular isolated localities.

become a greater issue in the future as more culverts are put in place and existing culverts continue to age and deteriorate, thereby further restricting fish passage.

Fish and Wildlife Management in Research Natural Areas and Experimental Forests. We request that the final plan amendment clarify that Research Natural Areas and Experimental Forests will not preclude the State's management responsibilities for fish and wildlife, including use of various facilities, such as weirs or radio towers, necessary for state wildlife or fisheries management purposes. ADF&G is the primary manager of fish and resident wildlife in Alaska, regardless of land ownership. Approval from the Director of the Pacific Northwest Research Station should not be required to conduct routine management responsibilities in these areas. The USFS has recognized the State's authorities regarding fish and wildlife through the USFS-ADF&G Master Memorandum of Understanding (MOU), which was re-signed in 2004. In addition, a national-level MOU between the Association of Fish and Wildlife Agencies and the Forest Service/Bureau of Land Management spells out respective responsibilities for fish and wildlife management in designated Wilderness

Fish management in Wild, Scenic, and Recreational Rivers. In Alaska, USFS management of potential wild, scenic, and recreational river corridors applies only to uplands. Restrictions on public use are subject to the Alaska National Interest Lands Conservation Act (ANILCA), including Section 1110(a). However, the proposed management prescriptions for scenic and recreational rivers contain language that appears to restrict activities below the ordinary high water mark. For example, we question language in the management prescriptions discouraging weirs from potential scenic and recreational rivers. Most weirs do not impede stream flow or river traffic and are temporary structures that are removed at the end of the project or season. Nothing in ANILCA or the National Wild and Scenic Rivers Act prevents use of temporary structures in designated or potential wild and scenic river corridors. For potential wild and scenic rivers in designated Wilderness, Section 1315(b) of ANILCA allows for improvements and facilities such as fish weirs and other structures to restore or maintain fish production on national forests.

In November 1982, the Alaska Land Use Council approved "A Synopsis for Guiding Management of Wild, Scenic, and Recreational Rivers in Alaska" (Appendix 1). The Department of Agriculture, along with the State of Alaska and the Department of the Interior approved the guidelines. We suggest reviewing these guidelines and revising the "Management Prescriptions for Wild, Scenic, and Recreational Rivers" section, as appropriate, to ensure management prescriptions are consistent with these approved guidelines.

Off-highway Vehicle Access for Subsistence. The proposed plan amendment is not consistent with ANILCA provisions for off-highway vehicle (OHV) access. Under the plan, trails and routes for off-highway vehicle use will be "closed unless opened" through a District access and transportation plan. Additionally, in some land use areas, OHV trails may only be designated where documented local traditional use has occurred and the route is compatible with the land use designation objectives.

ANILCA provisions require that subsistence and other ANILCA protected access "shall" be allowed, subject to "reasonable regulation." This "open until closed" approach is a cornerstone

of ANILCA and the USFS cannot supersede this legislative intent by a national policy document. The Department of the Interior adopted regulations at 43 CFR Part 36 that outline a specific closure process that includes public notice and hearings. The State of Alaska advocates that the USFS adopt parallel regulations for ANILCA-protected access and address the discrepancies between the national policy and ANILCA. We remain available to assist the USFS in this effort.

Section 811 of ANILCA ensures that rural residents engaged in subsistence uses "shall" have reasonable access to subsistence resources on all federal public lands in Alaska by use of snowmobiles, motorboats, and other means of surface transportation traditionally employed for subsistence purposes. Such access includes off-highway vehicles where such methods were used generally in the area prior to ANILCA.

We urge the USFS to work with the State of Alaska and affected subsistence users in all districts on the Tongass National Forest to identify trails, routes, and areas where subsistence off-highway vehicle access occurs to ensure subsistence access is not inappropriately closed. Any closure or restriction of OHV use for subsistence purposes must use a regulatory process as addressed in Section 811(b). Please note that our comments should not be construed as categorical opposition to all OHV closures. We know there are several compelling reasons to seek OHV closures, such as public safety or to protect resources. This does not absolve the USFS from adhering to the required processes under ANILCA.

Status of Appendices. Our understanding is that sections of the 1997 TLMP that are not specifically revised by this amendment remain in effect, including Appendix K (Old-growth Habitat Reserve Criteria) and Appendix N (Additional Evaluation of Wildlife Habitat Conservation Measures). These appendices contain procedures that are integral to implementation of the Conservation Strategy. We request that they be retained in the FEIS and plan amendment except where explicitly changed during the amendment process. Please clarify the status of these appendices.

Information needs for the Conservation Strategy were addressed in Appendix B of the 1997 TLMP. The limitation of this appendix is that it was created as a static list of studies that were priorities at the time the Plan was developed. Funding for research and monitoring is limited and we need a dynamic, well-defined process to identify and prioritize information needs, and compare results against original hypotheses. ADF&G is working with the USFS and USFWS to develop such a process. When complete, this process should be included in Appendix B of the Plan amendment and FEIS. The new process will be more practical and achievable than the past focus on just Management Indicator Species (MIS), although future monitoring will continue to address at least some of the existing MIS. With new DNA (Taberlet and Luikart 1999; Mills et al. 2000; Lukacs and Burnham 2005) and modeling (MacKenzie et al. 2006) techniques and capabilities, wildlife monitoring can now more efficiently and cost-effectively provide useful information about population sizes and trends. We recommend these alternative approaches to monitoring be incorporated into future interagency discussions and funding allocations.

Scenery and recreation guidelines

Scenic Designations. Restrictions on harvest (such as requiring helicopter yarding, tree selection harvests and other partial cutting prescriptions) in the Scenic Viewshed and Modified Landscape LUDs greatly reduce the volume of economic timber that can be produced from areas so designated. In fact, it is often questionable whether a timber sale in these LUDs will be capable of meeting a reasonable economic test. Therefore, the State is concerned about how much economic timber these areas can actually contribute to a sustainable timber industry. The State therefore urges the USFS to immediately convene a joint federal-state process to identify areas that can be re-designated from Scenic Viewshed and Modified Landscape to Timber Production. This process should incorporate information from affected parties, such as the cruise industry and other recreation businesses. The State's expectation would be that underlying requirements of the Conservation Strategy, that restrict or prevent timber harvesting (such as OGRs) would remain intact in these areas.

Karst and Cave resources. The proposed plan allows "limited recreation development" on sites that have been identified as "highly-vulnerable karst lands." Recreation development should not be allowed on highly-vulnerable karst land.

Funds for pre-commercial thinning are limited. The USFS should prioritize thinning on second-growth areas that will be available for future harvesting and can benefit wildlife, rather than on karst areas where timber harvest is not allowed.

Recreation and Tourism. The most significant growth in tourism and recreation activities within the Tongass National Forest over the past decade has been in the volume of cruise passengers. Shore-side tours and recreation activities have grown in abundance and focus in several communities, most notably Hoonah. Commercial sport fishing ventures continue to be a substantial part of the local economy in many Southeast Alaska communities.

None of the proposed alternatives is likely to have a significant impact on tourism and recreation activities over the life of the Plan. The niche market for eco-tourism is likely to remain unaffected, since Wilderness and LUD II designations remain unchanged and the Plan, in all its alternatives, would continue to set aside vast acreages for remote and semi-remote recreation.

Only road-based recreation opportunities are constrained by the proposed amendment of the Forest Plan in any of its iterations. These opportunities could be expanded under Alternatives 4, 5, 6, and 7. Contrarily, Alternatives 1, 2 and 3 would likely not provide for significantly expanded road-based recreation opportunities.

Recreation Opportunity Spectrum and Encounter Rates. It is unclear whether encounter rates set out under the proposed forest plan are a hard-line indicator of public use, where management action would be taken to reduce use if rates are exceeded, or if they are meant as guidelines for visitor expectations within a given land designation. We encourage the USFS to use encounters as guidelines for public expectations and not as firm indicators for measuring the satisfaction of recreation experiences.

Land management agencies often use encounter rates to measure solitude and visitor satisfaction. However, in many cases, solitude is not an important factor in determining satisfaction. Instead, surveyed users often cite other factors such as the weather or mosquitoes as more important factors in visitor studies. In addition, blanket encounter rates often do not take into account variability of terrain and vegetation. In areas of dense undergrowth, an encounter rate of three groups per day may cause a greater negative reaction from some users than in open terrain areas.

Economic diversity

Mining. Some alternatives would have a direct negative effect on future mineral development opportunities within Southeast Alaska. We note the following specifics gleaned from the DEIS pages 3-269 – 280.

1. Fifty-two areas totaling 589,000 acres within the Tongass contain identified mineral resources. Of these, 25% are in areas withdrawn from entry. Under the current Plan, 29% of the open areas are in Land Use Designations (LUDs) that result in higher cost of entry if these resources were to be developed. Under Alternatives 1-3 this percentage increases, with Alternative 1 being the highest at 41%; under Alternative 6 it would remain the same; and under Alternatives 4 and 7 it would decrease to 23% and 22%, respectively.

2. Of the identified mineral tracts, 377,000 acres are considered Rank 1, having a "high potential" for being developed. Fifteen percent of the area in Rank 1 tracts is withdrawn from entry. Of the acres open to mineral entry, the current Plan places 30% in LUDs that result in higher cost of entry. Under Alternatives 1-3 and 6, this percentage would increase. Under Alternative 4, it would decrease to 24%, and under Alternative 7 it would decrease to 22%.

3. There are 6.6 million acres of potential, but undiscovered mineral resources within the Tongass. Of these, 989,000 acres are estimated to have a high or moderate likelihood of yielding a mineral resource that could be developed. Thirty-eight percent of this acreage is withdrawn from entry. Of the lands that are open to entry, the current Plan allocates 39% to LUDs that result in higher cost of entry. Only Alternatives 4 and 7 would reduce the percentage significantly (to 28% and 26%, respectively), while Alternative 6 would reduce it slightly (to 38%). Under Alternative 3 it would remain unchanged from the current Plan, under Alternative 1 it would increase to 51%, and under Alternative 2 it would increase to 46%.

Some of these changes are likely to prove to be a disincentive for companies considering new mineral exploration and development investments in Alaska and are therefore of concern to the State of Alaska. Mineral exploration, development, and production can be a critical component of a vibrant economy in Southeast Alaska, as it is in other parts of the State. Mineral activity can also be done in an environmentally sound manner, as is the case at Greens Creek and in other parts of the State. The TLMP should encourage responsible mineral investment in Southeast, and the final alternative should minimize the amount of land with a higher cost of entry.

Community impacts. The DEIS section in Chapter 3 that covers effects on each community fails to mention the Icy Straits Lumber Company sawmill and its role in the economy of Hoonah (pp. 3-520 to 3-524). Please add this to the FEIS.

Impacts to state land

The State believes that the impacts to State lands under all of the alternatives have been adequately addressed in the DEIS. In addition, the State believes that the potential cumulative impacts to State lands have been adequately identified and discussed in the draft DEIS.

Sealaska Entitlement

The DEIS, particularly in Appendix C but reflected in several other sections, misrepresents Sealaska's ANCSA land entitlement and out of withdrawal selection proposal by exaggerating potential negative effects of the proposal and largely ignoring the benefits. The State believes that fulfilling the entitlement will yield overall net benefits for the Southeast economy, environment, and culture, and the potential adverse effects are not significant.

The State believes that Appendix C should recognize that completing conveyances of land to Sealaska in a sustainable configuration is an entitlement under ANCSA and a priority for stabilizing Tongass National Forest management as well as the broader Southeast Alaska economy. The Appendix should not treat Sealaska's land entitlement and adjustment proposal as a negative encumbrance on the USFS or the public interest.

APPENDICES

Appendix A - Industry needs for bridge timber
Appendix B - Changes in the Tongass National Forest Suitable Land Base through Project-level Changes since 1997
Appendix C - Species-specific comments on wildlife
Appendix D – Citations

Appendix A -- Industry Needs for Bridge Timber

This table was prepared by the Bridge Timber Committee of the Tongass Futures Roundtable. The TFR never adopted the Bridge Timber Committee report. This work was done at the committee level and presented at a work session in Juneau on July 12-13, 2006. Some Roundtable members do not agree with the report's finding concerning mill capacity, which is a controversial subject. The mention of the TFR is not meant to imply an endorsement of this statement, but rather cites the source that accomplished the work.

Sawmills	Total Volume Needs (MMBF) for bridge timber at 66% of mill capacity 1/	Total Volume Needs (MMBF) for bridge timber at full mill capacity 1/	Survival Volume Needs 3/ (MMBF)
Viking Lumber Company	53.0	80.0	25.0
Pacific Log and Lumber	22.0	33.6	22.0
Silver Bay Logging Company	43.0	65.0	25.0
Icy Strait Lumber Company	13.0	20.0	5.0
Small Sales	5.0	7.0	5.0
Micro Sales	1.5	1.5	1.5
Veneer Mill			
Ketchikan Veneer Mill 2/	30.0	30.0	25.0
Total	167.5	237.1	108.5

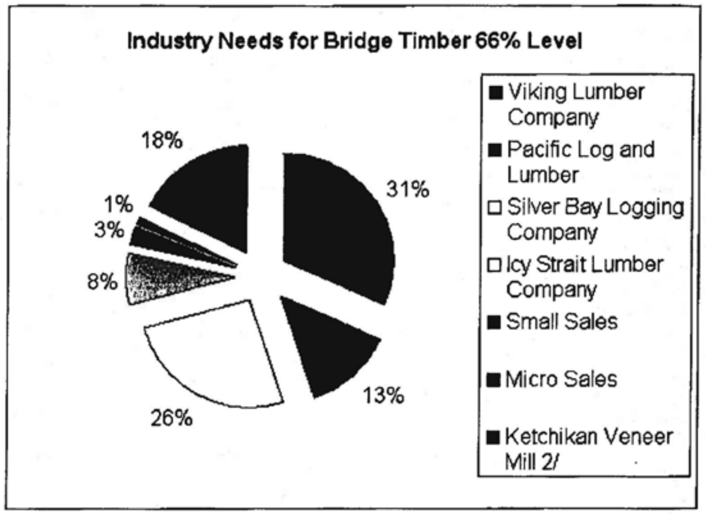
1/ Mill capacity needs from Juneau Economic Development Council (Dan Parrent).
See chart on following page.

2/ Estimate of need. Gateway Forest Products did not operate sufficiently to establish capacity.
3/ Milll survival capacity needs from phone conversations with mill owners 8/06 (C. Maisch)

Existing mills in operation can operate on a yearly flow of volume noted. Mills like Silver Bay (currently being considered for sale with no USFS timber under contract) and the Ketchikan Veneer Mill will need to acquire volume under contract prior to start-up operations. This volume is critical in order to obtain operating capital from lending institutions. Without volume under contract, mills will not be sold and can be expected to be dismantled to recoup some of current mill owner investment.

8/06 Notes: Volume for mills must be economical volume and is not considered the most efficient operating level by mill owners. For example, Viking Lumber would operate at a two shift level if volume was available and the veneer mill would run two shifts. Veneer mill would add a second shift approximately 3 months after resuming operations. The most efficient operating level for all mills is a 2 shift or higher basis.

Appendix A, cont.



Appendix B -- Changes in the Tongass Suitable Land Base through Project-Level Modifications of Old Growth Reserves since 1997[5,6]

Project Name	Non-developable area changed to suitable (acres)	Suitable area changed to non-developable (acres)	Net change in suitable area (acres, decreases in <brackets>)
Crystal Creek EIS 1998	481	1,152	<671>
Todahl Backline EA 1998	2	363	<361>
Nemo Loop EA 1998	177	932	<755>
Control Lake EIS 1998	446	142	304
Chasina EIS 1998	0	78	<78>
Canal Hoya EIS 1998	0	151	<151>
Sea Level EIS 1999	185	500	<315>
Kuakan EIS 2000	416	542	<126>
Doughnut EIS 2000	0	19	<19>
Luck Lake EIS 2000	257	794	<537>
Salty EA 2000	99	126	<27>
Polk Small Sales EA 2000	0	153	<153>
Fire Cove Salvage EA 2002	186	633	<447>
Woodpecker EIS 2003	180	130	50
Cholmondeley EIS 2003	894	6,873	<5,979>
Finger Mountain EIS 2003	0	593	<593>
Madan EIS 2003	377	1,501	<1,124>
Threemile EIS 2004	458	826	<368>
Kensington Gold EIS 2004	0	1,615	<1,615>
Couverden EIS 2005	0	790	<790>
Scott Peak EIS 2006	1,089	1,962	<873>
Overlook EA 2006	354	578	<224>
Tuxekan EIS 2006	431	1,614	<1,183>
Scratchings EIS 2007	460	1,519	<1,059>
Totals	6,492	23,586	**<17,094>**

[5] Prepared by Dept. of Commerce, Community, and Economic Development based on information provided by the USFS, including published accounts in project-level decision documents.

[6] The Cholmondeley project modified both a small and a medium OGR. All other changes affected small OGRs only.

Appendix C – Species-Specific Comments on Wildlife

Queen Charlotte Goshawk

Environment & Effect: We suggest that the USFS revise some of the background information, as portions of the species summary are inaccurate (DEIS, page 3-161). As currently portrayed in the proposed Plan, the understanding of the relationship between goshawk habitat and forest management is less now than when the 1997 plan was developed. However, the opposite is true. Both in Southeast Alaska and across their range, knowledge of goshawks and forest management has increased. The use of available literature in the DEIS, both unpublished and in journals, is poor or missing. None of the annual or final Southeast Alaska specific reports produced by ADF&G are referenced (e.g., Flatten et al. 2001) and none of the diet studies published by Lewis and colleagues (2006) are referenced. It is also unfortunate that none of the numerous and relevant goshawk studies published over the past decade were used in the plan amendment, particularly those from the Pacific Northwest.

Examples of mis-portrayed information include statements such as: "The northern goshawk inhabits forested lands throughout North America . . ." This statement is not accurate as many eastern forested lands do not have goshawks. In the next sentence, the background information notes that the Queen Charlotte goshawk is a distinct subspecies and cites Iverson et al. (1996) as the reference. Rather than citing Iverson et al. (1996), the document should list the primary references where the subspecies is described or its taxonomy is accepted (e.g., Taverner1940, AOU 1957, Whaley and White 1994).

The USFS should consider the habitat associations of key goshawk prey as a tool for sustaining goshawks (Reynolds et al. 1992, Reynolds et al. 2006). The first step in this process should be to use diet data from Lewis et al. (2006) and determine the habitat associations of key prey (for examples, see Reynolds et al. 1992, and Drennan 2006).

While some available information suggests that important goshawk prey species (e.g., grouse, red squirrels) can be negatively impacted by even-aged silvicultural practices (Doerr et al. 1984, Carey 1995, Russell 1999), there is a lack of information on how these practices specifically affect sooty (formerly known as blue) and spruce grouse, red squirrels, medium to large forest passerines (e.g., varied thrushes, Steller's jays), and woodpeckers. We recommend that studies of these prey species in Southeast Alaska focus on how alteration of forest structure and landscape patterns specifically affect their abundance and availability to goshawks. For goshawks, management should focus on their habitat needs and accompanying prey base for long-term viability and sustainability on the Tongass.

The paragraph starting on page 3-161 and ending on page 3-162 of the DEIS implies that findings from the analysis of goshawk telemetry data in Southeast Alaska produced similar results to those observed in the southwestern United States (Boyce et al. 2006, Reynolds et al. 2006). It is specifically stated that when mature forest habitats are not available, goshawks will nest in younger forests or in smaller patches of trees and forage in young forests as well as along edges and in openings (Boyce et al. 2006, Reynolds et al. 2006). However, this has not been observed with great frequency in Southeast Alaska. A few nests have been found in older

second-growth (~80-100 year old stands) and use of this type of habitat is known to have occurred in other areas (Squires and Kennedy 2006). Telemetry data from radio-tagged birds has been analyzed a number of times and consistently suggests strong selection for old-growth forest habitat. Past interagency attempts to evaluate habitat selection relative to edge have resulted in no detectable patterns, noting that the Tongass GIS layers are probably not well suited for such an analysis for goshawks.

Based on research conducted on the Tongass and multiple peer reviews related to the 1997 forest plan, we believe that conversion of mature forests to even-aged second-growth will negatively affect goshawks. Not only do dense second-growth habitats keep goshawks from entering them to hunt (affecting availability of prey to goshawks), but they likely affect the abundance of goshawk prey as well. For example, there is no information about goshawk numbers on Prince of Wales Island prior to the large-scale logging that took place in the last half of the 20th century; however, very few goshawks are now found on that island and nest failure has been documented there. This is likely due to an inability of goshawk pairs to capture and deliver sufficient food to their young (Lewis et al. 2006).

The USFWS is soon to rule on the remand of their decision not to list the Queen Charlotte Goshawk, and will be issuing a new 12-month finding. The goshawk is also listed as a threatened species in British Columbia. Given these conditions, the USFS should consider retaining all conservation guidelines for goshawks in the final TLMP amendment. The initial decision to not list the Queen Charlotte Goshawk was based on the conservation measures included for goshawks in the existing TLMP. ADF&G has consistently noted over the past decade that the science does not support listing the goshawk in Southeast Alaska. If the conservation measures are changed, it leaves open the possibility that any decision by the USFWS could again be remanded. Reference could be made to the results of the genetic study of goshawk relatedness in the west-coastal region of North America (Talbot 2006).

Standards and Guidelines: Most of our comments below suffer from not having a draft appendix to evaluate the context of the proposed S&G changes. We request that the USFS complete such a science-based management document for the proposed goshawk changes. All proposed S&G changes for goshawks have been discussed in an interagency context for at least the past three to four years.

K. 1. b. page 4-98 It is unclear why "alternate" is added and "inactive" is deleted. By definition, a nest that is an alternate in any given year, is an inactive nest. We have information from the Tongass and elsewhere indicating that some alternate nests are used in subsequent years.

K. Deletion of monitoring requirement. We support removal of the need to "monitor" known goshawk nests because of the extensive time and money needed to do so. However, the effect of this is confusing because of the word change from "alternate" to "inactive" as described above. We suggest the continuation of USFS inventories to determine the presence of nesting goshawks in proposed project areas unless and until an alternative approach is developed and described. We further suggest using the most current inventory protocols developed in cooperation with the appropriate State and Federal agencies (Woodbridge and Hargis 2006). We encourage the USFS to describe their approach for monitoring goshawks in the FEIS.

K. 1. d. page 4-98 The Goshawk S&G regarding nesting sites appears to be based on the USFS's need to incorporate flexibility into the S&Gs for goshawk nest sites. We agree that flexibility is useful for land managers; however, moving the decisions to a landscape assessment or some other mid-scale analysis process is vague. As mentioned above, the operating rules for this flexibility and the science behind the decisions and alternatives need to be defined in an appendix to the FEIS, rather than as part of a future planning effort. This appendix should include the variety of conditions that would bring about the "alternate management" of goshawk nest sites.

K. 1. e. As mentioned above, we request the inclusion of an appendix where these science-based management details are described. We recognize that flexibility regarding goshawk nests located in contracted timber sale areas is warranted. The loss of such nest areas is probably not critical to goshawk viability, depending on how many times this situation occurs. Unfortunately, the plan does not mention the fact that as monitoring declines, there is an ever increasing probability that active and inactive goshawk nest trees will be harvested. Even when pre-timber sale monitoring occurs, there is a high likelihood that active goshawks nesting areas will be missed. Therefore, finding goshawk nests in areas already under sale or contract, or proposed for sale, will decrease as monitoring decreases.

Forest Birds

The S&G entitled "Endemic Terrestrial Mammals" (TLMP, page 4-129) should be expanded and re-titled "Endemic Terrestrial Wildlife." It should include surveys for rare and endemic birds, as well as amphibians and insects that may represent unique populations with restricted ranges.

Surveys for other nesting raptors in proposed management areas should include forest owls, specifically western screech-owls, barred owls, and northern saw-whet owls.

Deer and Wolves (General Comments)

The TLMP amendment DEIS does not take into account scientific findings available after 1997. We request that it be revised to incorporate recent research based on a thorough literature review.

The deer Habitat Suitability Index (HSI) model presented on page 3-165 purports to estimate carrying capacity for deer during an average snow winter. However, this does not provide protection in the event of severe snow conditions. Severe winters may drive deer and predator-prey dynamics long after an event has occurred. For example, in Game Management Unit (Unit) 3 (i.e., Mitkof, Kupreanof, Etolin and Zarembo islands), the severe winters of 1969 and 1971 resulted in a major crash in the deer population. It has taken over 30 years for that population to recover, largely because predation retarded recovery long after the severe winters. Planning for severe winter events is the best policy when considering protection of winter habitat for deer. The deer HSI model fails to do this. Further, climate change predictions for Southeast Alaska indicate the likelihood of extremes of warm and cold during future winters, along with much greater precipitation. That may mean occasional extreme snowfalls, not unlike what was experienced during the 2006-2007 winter. It would be wise, therefore, to emphasize the need to

retain winter habitat for deer and calculate HSI under the assumption that all areas are at risk of deep snow. This would result in more scientifically credible evaluations.

Wolves (specific comments)

Page 3-169, first paragraph: The discussion of habitat use by wolves needs to refer to and summarize Person (2001), otherwise it is out of date.

Page 3-169, second paragraph: This information is incorrect and needs to be updated. Wolf numbers are limited by prey availability, not social interactions. This section should refer to and summarize the appropriate sections in Mech et al. (1998) and Fuller et al. (2003). The density limit of 10 wolves/ mi^2 is incorrect. For example, Isle Royale has had densities of wolves that substantially exceeded that limit.

Page 3-169, fourth paragraph: Units 2 and 3 support modest wolf densities compared to other areas where wolves prey on deer rather than moose, caribou, bison, and other larger prey. While wolf densities are high in Units 2 and 3 compared to the rest of Alaska (where deer are absent), they are not high when compared to other areas where deer are the principle prey (i.e., northern Minnesota, southeastern Ontario, and coastal British Columbia). More information on this is available in Person et al. (1996, 2001). The wolf population in Unit 2 is currently healthy but that does not imply it will be in the future when more of the landscape is in stem-exclusion forest. Current populations are not indicators of the future. Reference should be made to the concept of "succession debt," described by Person (2001).

The statement referring to a harvest objective of 39 wolves in Unit 2 is incorrect, and should actually be about 90 wolves, depending on available population estimates.

Page 3-170, first paragraph: The road density guideline in the TLMP amendment was purported to be based on analyses described in Person et al. (1996); however, the guideline has never been implemented in a manner consistent with Person et al. (1996). The 0.7 mi/mi^2 is to account for all open, closed, or overgrown roads in areas below 370 meters elevation, not simply open roads. This approach has been used because we have found it impossible to distinguish between open and closed roads, and further, the definition of what constitutes "open" versus "closed" roads is vague (i.e., some roads may be passable with snowmachines or ORVs). Even roads that are overgrown are used as hiking trails, providing easier access for wolf trapping and snaring. Additionally, the denominator should be land area below 370 meters because the vast majority of wolf activity occurs in this area (Person et al. 1996, Person 2001). The road density guideline should be applied at a scale equal to an average wolf pack home range (300 km^2) (Person et al. 1996). The incorrect use of the guideline has been brought up in numerous interagency meetings since 1997, but has never been corrected. We again recommend using the guideline described by Person et al. (1996).

The den buffer guideline has not been supported by scientific data. Information presented during the CSR Workshop indicated that the guideline needs revision. The guideline for roads is the most important because roads facilitate chronic disturbances long after timber harvesting activities are completed. Suitable areas for dens would only have a 45% probability of selection by wolves if a road was within 600 feet of the den (Person in prep, Conservation Strategy

Review Workshop). Moreover, as presented during the CSR Workshop, dens may be unused for up to 5 years before being used again.

Page 3-170, second paragraph: This paragraph implies that there is no established link between habitat changes and wolf populations. This is incorrect based on research findings (Person and Bowyer 1997, Person 2001, Mech et al. 1998, Fuller et al. 2003, and Fuller 1989). Wolf populations will increase and decline in response to changes in prey populations, and any habitat changes that affect prey will affect wolves. This has been modeled and presented in Person (2001) and Person and Bowyer (1997), along with projected effects of habitat change on wolves and deer in Unit 2. Additionally, Farmer et al. (2006) provide information on habitat features that influence predation. We recommend revising this paragraph to include information from the published literature identified in our list of references (see Appendix D).

Page 3-207, first paragraph under Alexander Archipelago wolf: Deer are not required for wolf persistence if other ungulate prey are present (i.e., moose, goats, or sheep). However, their densities will be much lower and home ranges much larger. Details on this are presented in Person et al. (2001) and other works such as Mech et al. (1998), Fuller et al. (2003), and Fuller (1989). Gaps in wolf distribution may occur, particularly on islands where deer numbers decline substantially, but the likelihood is that home ranges will get larger and wolf densities lower rather than experiencing local extirpations. That said, as deer numbers decline, there will likely be increased pressure from subsistence users to reduce wolves in an effort to protect deer. Under that circumstance, poorly managed hunting and trapping seasons and illegal killing could result in local extirpations. The implications of this are compounded because wolves in Southeast Alaska have low genetic diversity (e.g., the population in Unit 2 shares 1 mtDNA haplotype (Weckworth et al. 2005)). Lowering densities may therefore result in further reductions to genetic diversity. This would be especially true in small populations that are isolated on islands.

Page 3-207, second paragraph under Alexander Archipelago wolves: This section should be revised after referring to Person (2001). Specifically, reference should be made to the consequences of the non-linear density-dependent shape of change in deer populations in relation to carrying capacity (K) and how predation will affect deer numbers as K is reduced due to timber harvesting. This will lead to a better understanding and appreciation for how habitat changes will likely affect predator-prey dynamics. This is published in Bowyer et al. (2005), Person (2001), and Person et al. (1997), and much of it was presented during the CSR Workshop.

Pages 3-207 and 3-208: No mention is made of results from Person (2001) or Person and Bowyer (1997) concerning population viability and TLMP alternatives. That work provides insight concerning how the new alternatives might affect wolf-deer predator-prey dynamics. Results from wolf Population Viability Analysis (PVA) for Prince of Wales (POW) Island indicated that a substantial reduction of wolves and deer is likely under the current forest plan (Person 2001, Person et al. 1997). Any alternative that increases road development or logging from the current plan is likely to reduce the wolf population to very low levels. Add to that the higher risk of hunting and trapping mortality (legal and illegal) due to the perception that wolves are competing with hunters for deer, and the viability of wolf populations on POW could be compromised. Further, there is no mention of information provided at the CSR Workshop showing the relationship of undeveloped land with the ratio of recruitment to mortality of

wolves. Information presented during the workshop indicated that the ratio of recruitment to mortality approaches 1 for wolf packs occupying home ranges with < 44,000 undeveloped acres. That finding should be compared with existing OGRs to see how many may actually have a high probability of supporting source populations of wolves.

Page 4-127, TLMP: The new information provided at the CSR Workshop, along with findings published since 1997 have not been included in the S&Gs. The road guideline is still implemented incorrectly and the denning guideline is not consistent with available information. Given the noted disparity between the existing S&Gs and existing supporting scientific materials, we encourage the USFS, in consultation with the State, to consider revising the S&Gs in the Plan amendment or future Plan revisions.

Deer (specific comments)

Page 3-164, second paragraph under deer, fourth sentence: This sentence should read "The quantity, quality, distribution, and arrangement of winter habitat are considered the most important limiting factors for deer."

Page 3-165, first paragraph: It is unclear whether the USFS is using the deer HSI model correctly. The 1997 description of the model and its application was incorrect with respect to the deer multiplier. The highest HSI value (whether it is scaled to 1.0 or 1.3) should correspond to a density of 100 deer/mi^2.

Page 3-165, second paragraph: The first sentence states that the deer HSI model provides a tool for risk assessment. This is not true. There are no probabilities associated with the HSI index so it cannot be used to assess relative risk, only relative HSI values. For example, we do not know how much risk is associated with a difference in an HSI of 0.1. Further, as Bowyer et al. (2005), Person (2001), and Person et al. (1997) showed, an increment change in deer carrying capacity (which is what HSI supposedly represents) could lead to a much larger increment change in deer numbers due to the non-linear dynamics associated with predation. Therefore, there is no quantifiable risk associated with HSI values.

The paragraph describes the "FRESH" deer model but fails to include any mention of the other deer models presented at the CSR Workshop. The FRESH model cannot be extended from a stand level analysis to a landscape scale. It does not predict availability to deer due to patch size, location on the landscape, risk of predation, fragmentation, or connectivity. All of those features have a significant, if not primary, role in predicting habitat quality for deer (see Farmer et al. 2006, Kie et al. 2002). By itself, the FRESH model will be of very limited value as a replacement for the current deer HSI model.

Page 3-165, third paragraph: The statement on sources of predation should be clarified. Neonate fawns were not captured on Mitkof Island and bears were therefore not identified as a significant source of mortality to study animals. If neonates had been collared, the results would likely have shown substantial predation by black bears. Given their paucity on Heceta Island, black bears are not a major predator on fawns. However, on POW Island, where black bears are abundant, we observed significant black bear predation on neonate study animals (ADF&G, unpub. data).

We suggest deleting the last sentence in the paragraph because of its inaccurate context. That is, citing statistics for the Tongass as a whole (a forest of islands) is misleading given local differences in impacts. The amount of old-growth habitat remaining on POW Island, for example, will be substantially less than elsewhere on the forest and will thereby have more severe localized implications for wildlife and associated users.

Page 3-192, first paragraph under Sitka Black-Tailed Deer: It is inaccurate to say that the difference in magnitude of the HSI values when using the size-density forest classification versus the original classification is unimportant because only relative values are compared between alternatives. That is true only when the model is used to compare changes in HSI between alternatives. It is not true when applying the deer guidelines for wolves and subsistence. In those applications the magnitude of deer habitat capability is very important.

Page 3-194, third paragraph: This paragraph should discuss the effect of lowering K on deer populations exposed to wolf predation. Deer numbers likely will be reduced much more than predicted by changes in HSI because of the non-linear relation between K, deer recruitment, and predation. Please refer to Bowyer et al. (2005), Person (2001), and Person et al. (1997).

Page 3-194, last paragraph: The first sentence in this paragraph should note that there is great uncertainty about the effects of second-growth management on the availability of forage to deer. The value of treatments, the scale of treatment effects, and the potential of treatments to be implemented at scales meaningful to deer populations is unknown at this time. This paragraph makes no mention of Farmer et al. (2006). In that study, a positive relation was observed between risk of death of fawns and pre-commercial thinning. Also, Farmer et al. (2006) demonstrated that landscape level features play a large role in determining risks of death for deer. TWYGS and other studies do not address the scale, distribution, and arrangement of treatments on the landscape. Those factors will be as or more important than the amount of forage produced.

Elk

Page 3-179, fourth paragraph: Although a radio collared cow elk was located on Farm Island, at the mouth of the Stikine River, there is no evidence of any collared elk migrating up the Stikine River drainage (ADF&G, unpub. data).

Marbled Murrelets

The marbled murrelet should be identified as a Sensitive Species on the Tongass. We believe that the USFS would be remiss in not listing this species as part of the TLMP amendment given that they are known to be old-growth dependent for their nesting. Sensitive Species are defined as "those plant and animal species for which population viability is a concern on National Forest System (NFS) lands within the region. Either a significant current or predicted downward trend in population numbers or density, or a significant current or predicted downward trend in habitat capability that would reduce a species' existing distribution indicates a viability concern." The best available information suggests that marbled murrelets have declined by nearly 80% in Southeast Alaska since the early 1990s (Piatt et al. 2007).

The referenced literature on marbled murrelet ecology in Southeast Alaska should be updated. Cotter and Kirchhoff (2007) and Piatt et al. (2007) summarize existing data on marbled murrelets in Southeast Alaska, including new information on population status and trends, distribution, and habitat relationships.

The TLMP amendment should display the effects logging will have on marbled murrelet habitat under each of the alternatives. Preferred nesting habitat for marbled murrelets includes older trees, larger trees, and trees on steeper slopes (Schoen and Dovichin 2007, Appendix B). Habitat capability for marbled murrelets has declined significantly from past logging (Piatt et al. 2007), and will decrease further under the new Plan. These effects should be displayed in the FEIS.

Page 3-174: The Plan should show how much marbled murrelet habitat is protected by the OGR system. The Plan references the forest-wide system of OGRs as helping meet the conservation needs for marbled murrelets. Although any retention of old-age trees helps, a quantitative assessment of how effective these old-growth reserves might be is needed.

Page 3-174: "Uneven-aged management" should be specifically defined. Uneven-aged management "in many areas" is cited as mitigation for loss of marbled murrelet nesting habitat, yet the term is not specifically defined. To judge the effectiveness of this prescription for marbled murrelets, information on gap sizes and interspersion of individual trees or patches in the cutting units should be provided.

Page 4-128: Providing 600' buffer zones around discovered marbled murrelet nests (XVI. B.) provides no effective benefit. Marbled murrelet nests are extremely difficult to find because most are high up in old-growth trees, the birds are quiet on the nest, and they travel to and from nests in the dark. The fact that it was the last species in North America to have its nest discovered underscores the futility of an S&G that requires finding nests. We suggest dropping this S&G and re-establishing past murrelet surveys.

It is unclear what USFS supported marbled murrelet research and monitoring is ongoing. Appendix B (page B-11) lists a number of information needs for marbled murrelets (items 8, 13, and 15), and indicates the USFS is currently funding marbled murrelet studies. ADF&G has signed a cooperative agreement with the Juneau Ranger District to work together as opportunities present themselves. Beyond this, however, we are unaware of any USFS related marbled murrelet studies on the Tongass.

The USFS commitment to doing marbled murrelet surveys is unclear. In the early 1990s, the Ranger Districts across the Tongass embarked on rigorous training for doing at-sea surveys, and established numerous transect routes across the region (Piatt et al. 2007, Appendix M). Unfortunately, the surveys were not continued. This represents a big loss because it now appears from limited data that marbled murrelets are in serious decline. It is not clear whether identifying this as an "information need" in Appendix B constitutes a commitment to resume the surveys or not. We request that surveys be reinstated.

Martens

New information presented at the CSR Workshop indicated that two genetic lineages of martens occur on the Tongass NF (Cook et al. 2006). Based on genetic research, these authors suspect that the two lineages of marten found in Southeast Alaska actually represent two distinct species; *Martes americana* and *M. caurina*. If so, *M. caurina* has an extremely limited distribution in Southeast Alaska (Kuiu and Admiralty islands only) and globally (from northern California to Admiralty Island). Because of the limited distribution of *M. caurina*, these populations should be given special management consideration. Furthermore, given Flynn et al.'s (2004) finding of low marten populations on Kuiu Island, we encourage further research of marten on that island to better assess implications of forest practices and possible management measures (i.e., state and federal trapping seasons, federal habitat management).

Page 3-167. We suggest adding text (underlined) to the statement about marten habitat: The <u>larger-sized</u>, old-growth forest habitats have the highest value for marten.

In order to clarify the marten harvest for Kuiu Island, that island's harvest should be separated from harvests for the rest of Unit 3.

Page 3-168, last sentence. This statement needs clarification. We contend that the lack of any "clear correlation" between marten population trends and habitat changes reflects a lack of effort to study this dynamic rather than indicating no relationship. Determinations of population trends require long-term data sets, and these have not been collected. Consequently, modeling habitat changes is the best that can be done at this time.

Brown Bears

Substantial new information is available on the importance of riparian habitats for maintaining sustainable and high brown bear populations (Flynn et al. 2007). This new information is consistent with and further supports maintaining no-cut buffers along salmon spawning streams. The implementation of the current brown bear buffer was left to field reviews without easily measurable criteria. Recent research results indicate that field evaluations for identifying important brown bear feeding areas may be difficult to complete and will yield ambiguous results. Given the lack of mapping for lands buffered for brown bear foraging, it is difficult to evaluate the effects of implementing the current S&G.

Based on current information, the following recommendations are made regarding no-cut, riparian buffers for brown bears:

Page 4-124, TLMP, IX Bear Habitat Management: We suggest modifying the brown bear S&G to provide for no-cut buffers along all salmon spawning streams based on work conducted by Flynn et al. (2007) and presented at the CSR Workshop. This could be incorporated into section IX. B., as follows (replacement text is underlined):

> <u>B. Provide for</u> additional protection of important brown bear foraging sites in addition to the buffers already provided by the Riparian and Beach & Estuary Fringe Forest-wide Standards and Guidelines, and the old-growth Habitat and other natural setting Land Use Designations. Establish no-cut forested buffers, where available, of <u>at least</u> 500 feet from the stream at sites where additional protective measures are needed to provide cover among brown bears while feeding, or between brown bears and humans. This no-cut buffer should be applied more broadly than the current S&G which is unclear in application. In high density brown bear areas (e.g., ABC islands), all segments that support spawning salmon are important for foraging during the late summer and these need careful evaluation for protection. On the mainland, where brown bear numbers are lower and patchy in distribution, the no-cut buffers may be particularly important.

Page 3-168. We suggest revising this section to more accurately describe the distribution of brown bears north of Frederick Sound. For example, while it is true that brown bears occur on islands north of Frederick Sound, this is not all-inclusive (i.e., Douglas, Lincoln, Shelter islands do not currently support brown bears).

Reference is made to brown bear hunting being allowed in Unit 4. However, this statement needs to be expanded to reflect the fact that brown bear hunting is allowed throughout other parts of Southeast Alaska. Additionally, we suggest adding a statement or two about guide/outfitter uses of brown bears on the Tongass as well as available viewing opportunities (i.e., Pack Creek, Anan Creek).

The section suggests that the late summer season is the most critical time period for brown bears. No references are provided despite many available publications by ADF&G (i.e., Titus, Flynn, others), USFS researchers (i.e., Gende) and others (i.e., Ben-David). Some of these publications along with recent ADF&G experience suggest that spring is also a critical time for brown bears across Southeast Alaska. The estuarine beach and certain riparian habitats are key for providing certain sedges and grasses as the first food of the season for bears. Therefore, conservation of the beach buffer remains an important attribute of the forest plan for this species.

Preliminary results from an interagency, cooperative mainland brown bear study suggest differences between brown bear ecology on the mainland (e.g., Misty Fjords, Bradfield Canal) versus the very high density populations that have been well-studied in Admiralty and Chichagof islands. We suggest that the less abundant and patchy distribution of estuarine and salmon spawning habitat in the mainland may be very important for maintaining sustainable brown bear populations in these areas. ADF&G staff will work with USFS staff to help interpret results from this ongoing work for better, long-term management of mainland brown bears.

Fish

Page 3-56: The information used to characterize sport fisheries and the data used to describe fishing effort and demand appears to be rather dated. We recommend that the most recent information available from the ADF&G Statewide Harvest Survey (SWHS) be used.

Page 3-52: The table of fish species important for sport, subsistence, and commercial fisheries does not include Dolly Varden char and cutthroat trout as being important for subsistence (Table 3.6-1). These should be included here.

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THE SEAL OF THE STATE OF ALASKA

Alaska State Legislature

Representative Peggy Wilson
House District 2
Putting Alaska's Families First

RECEIVED
MAR 27 2007
11 MS

March 26, 2007

Forrest Cole
Forest Supervisor
Tongass National Forest
Attn: Forest Plan Adjustment
648 Mission Street
Ketchikan, AK 99901

Dear Mr. Cole,

The 1997 TLMP Revision is hurting the communities of Southeast Alaska. Since the revision, Wrangell, my hometown, has suffered a 20 percent decline in population due to the suppression the timber industry has faced. The residents who have chosen to stay in Wrangell have faced layoffs and serious financial hardship because the resource that they have depended upon for their livelihood has been taken away from them.

The industry decline is due primarily to the drastic restriction of the timber supply from the Tongass. The markets for lumber have been very good over most of the last decade, and the timber production has never once exceeded the market demand.

The timber supply constraints take two forms:

1. Not enough timber volume is planned and prepared and,
2. Most of the timber sale volume that has been prepared is too costly to be profitable despite the good markets the industry has experienced.

The industry has studied their timber volume needs and reaffirmed those estimates with independent economists. The consensus is that about 360 million board feet of timber is needed from the Tongass to support a sustainable, fully-integrated manufacturing industry.

I have discovered four elements of the 1997 TLMP conservation strategy that are causing most of the high cost:

1. The old-growth reserve strategy, which sets-aside the lowest cost, highest value timber in every harvest area

Jan-May, Juneau: State Capitol • Juneau, AK 99801-1121 • *ph:* (907) 465-3824 • *fax:* (907) 465-3175
June-Dec, Wrangell: PO Box 109 • Wrangell, AK 99929 • *ph:* (907) 874-3088 • *fax:* (907) 874-3055
Rep.Peggy.Wilson@legis.state.ak.us • http://www.akrepublicans.org/wilson/ • 1-800-686-3824

2. The marten and goshawk Standard and Guidelines which require that we leave 30% to 50% of the timber standing in every harvest unit in most of the previously developed areas
3. The beach-fringe buffers which were increased from 500-feet to 1,000-feet in 1997
4. The blanket application of class-3 (non-fish) stream buffers

Alternative 7 for the TLMP Amendment is the option that makes the most sense, and I urge you to adopt it. It is the only option that supplies the necessary volume and incorporates a conservation strategy that does not have the devastating economic consequences of the 1997 conservation strategy.

Sincerely,

Peggy Wilson

Representative Peggy Wilson
Alaska House District 2

CC:

Mark Rey
Department of Agriculture
Undersecretary for Natural Resources
1400 Independence Ave. SW
Stop Code 0108, Wash. DC 20250

Governor Sarah Palin
PO Box 110001
Juneau, AK 99811

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Alaska State Legislature

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THE SEAL OF THE STATE OF ALASKA

John Harris
Speaker of the House

RECEIVED
APR 16 2007
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4-16-07

Tongass National Forest
Attention: Forest Plan Adjustment
648 Mission Street
Ketchikan, AK 99901

I am writing to express my concerns and provide comment on the Tongass Land Management Plan Amendment Draft EIS. There are several issues regarding the Tongass National Forest that are important to Alaska and her citizens that I wish to address in the following comments.

The timber industry was once a vital economic engine for the State of Alaska and Southeast Alaska in particular. It is no longer the predominant factor it once was, but due to a variety of circumstances, it is our concern in the Alaska Legislature that we explore all possible avenues as we move forward with our efforts to diversify Alaska's economy. A rejuvenated forest products industry in Southeast Alaska could play a significant role in our efforts along those lines.

In searching for a meaningful proposal to invigorate the timber industry within the Tongass, it is important to note that we do not endorse any reduction in the effort to maintain a viable and healthy forest for the many other uses engaged in by the citizens of Alaska, or of the rest of the nation. We encourage the Forest Service to continue important protections for fish and wildlife habitat, as well as the recreational opportunities those resources supply.

With the above general thoughts and points in mind, I would like to highlight a few more specific, salient points that I believe should be considered as this process moves forward. First, I would like to say that the Tongass Futures Roundtable discussions hosted by the Nature Conservancy and the National Forest Foundation should be allowed to move forward with some assurance that the solutions they are able to conceive may be incorporated into this plan. Although the comment period is ending it seems that a stipulation allowing for further adjustments would be in order considering the level of community participation in the Roundtable.

The current allowable sales quantity (ASQ) appears to be sufficient considering the amount being accessed by existing timber operations. However, it would seem prudent to build some flexibility into the plan. It should be imperative to provide an alternative that has the greatest opportunity for the Forest Service to react to changing conditions. It may be for the time being that an ASQ of 200 to 300 mmbf is adequate, but if market conditions are such that a greater volume is necessary, then the plan ought to be open to increases in market demands.

Careful consideration must also accompany strategies that are based on less than sound science. If there is incontrovertible evidence that conservation imperatives are necessary to sustain species within the forest then accommodations should be made for those strategies that will provide viable options for sustaining and recovering such species. However, the Forest Service and the Congress should seek legislative and regulatory parameters that bar the use of strategies that hamper sound economic and recreational uses by those who oppose multiple uses of our forest for philosophical reasons.

It appears there are recognized conservation needs resulting from some uses practiced in the past. It is my understanding that there may be cases where corrective measures to restore habitat to functionally productive states provides alternative economic opportunities for contractors. If that is the case, the plan should make use of those companies that are actively engaged in the forest products industry to provide man power and machinery to such recovery efforts. Such a strategy would enhance the economic viability of our existing logging companies.

I realize this is a major planning process with many intricate relationships between the forest itself and the various user groups among the public. That being the case, it seems the best interests of most people would be accommodated with a plan that supplied an adequate supply of timber to maintain current operations while holding the door open for changing market demands which may increase or decrease. The plan should carefully structure any use or activity so as to provide the best options to sustain the forest habitat and associated fish and wildlife populations. Last of all, the plan should accommodate reasonable economic and recreational activities as closely as possible to a multiple use framework.

I would like to thank the Forest Service for this opportunity to express my views on this important subject to Alaska. I hope my comments offer some constructive views as you work toward formulating an acceptable working plan for the Tongass. If you have any questions or would like to discuss further any of the comments reflected in this letter, please do not hesitate to contact my office.

Sincerely,

John Harris
Speaker of the House

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ALASKA STATE LEGISLATURE

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SENATOR BERT K. STEDMAN

April 30, 2007

Mr. Forrest Cole
Forest Supervisor
Tongass National Forest
Federal Building
Ketchikan, AK 99901

Dear Supervisor Cole:

I appreciate the opportunity to comment on the draft Tongass National Forest Plan Adjustment.

It's obvious that your team put a great deal of work into this adjustment to bring it into compliance with recent court orders. I have comments I would like you to consider in finalizing the plan.

For over a century, the United States Forest Service has managed our national forests and grasslands to provide for multiple uses. The Tongass National Forest provides recreational, mining, logging, hunting, and tourism opportunities, as well as providing the spawning grounds for one of the best fisheries in the country. It is important that all of these uses receive equal consideration under the new management plan.

In recent years, timber has not received this equal consideration. Since long before statehood, timber has been a mainstay of the Southeast economy, providing steady, well-paying and, most importantly, year-round jobs to many residents. In addition to the good jobs, communities benefited from the shared revenue generated by timber sales.

There are a dozen sawmills operating in Southeast employing over 150 residents and providing significant stimulus to the region's economy.

DISTRICT A
Ketchikan • Sitka • Petersburg • Wrangell
Pelican • Elfin Cove • Port Alexander • Saxman • Myers Chuck • Thorne Bay • Coffman Cove • Hollis

April 5, 2007
Page 2

However, they are woefully under capacity. In order for these mills to survive and compete effectively on the world market, a stable and sufficient timber supply is vital.

I realize that you must balance many interests as you move carefully towards an acceptable management plan. I firmly believe that timber harvesting can coexist with other activities in the Tongass and ask that you recognize the great benefits of a healthy wood products industry in Southeast when setting the final timber harvest levels.

Best regards,

Bert K. Stedman

Bert Stedman

994

STATE OF ALASKA

DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

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APR 30 2007
Rao 4-30-07

April 25, 2007

Tongass National Forest
Attn: Forest Plan Adjustment
648 Mission Street
Ketchikan, AK 99901

RE: Corridor Omissions from the Tongass Land and Resource Management Plan

Dear Plan Preparers,

The Draft Environmental Impact Statement for the Tongass Land and Resource Management Plan is incomplete. It does not include eight Essential State Transportation and Utility Corridors listed in the Southeast Alaska Transportation Plan. Omitting these corridors is not an acceptable outcome to the State of Alaska.

Background

In 2004, the Southeast Alaska Transportation Plan was adopted as a component of the Alaska Statewide Transportation Plan. It identifies a total of 34 Essential Transportation and Utility Corridors that must be reserved and protected to meet future transportation needs. The Executive Summary of the plan specifically requests that the Forest Service incorporate each corridor into the Tongass Land and Resource Management Plan.

Affected Environment discussion

The text of pages 3-229 and 3-230 fails to explain how only a subset of the 34 corridors were incorporated into the Tongass Land and Resource Management Plan. Apparently, the Forest Service is confused because a subsequent Memorandum of Understanding did not include all 34 corridors.

Remedy

Revise the Tongass Land and Resource Management Plan so that the management prescription includes the Transportation and Utility overlay for each of the 34 corridors. Depict all 34 corridors on alternative maps. Revise the discussion of Affected

25A-T34LH

Environment to specify the preeminence of the entire set of 34 corridors with respect to the subsequent Memorandum of Understanding.

In conclusion, please revise the Tongass Land and Resource Management Plan per the above.

Thank you for the opportunity to comment.

Sincerely,
DOT&PF Southeast Region

Malcolm A. Menzies, P.E., L.S.
Regional Director

cc: Andy Hughes, Regional Planning Chief

APPENDIX A. ESSENTIAL STATE TRANSPORTATION AND UTILITY CORRIDORS

Essential Transportation and Utility Corridors

The Southeast Alaska Transportation Plan (SATP) identifies 34 essential highway and utility corridors to be reserved and protected to meet future transportation needs. These corridors are required to connect communities to the regional transportation system and to establish a regional power grid. The state requests that the Forest Service incorporate all of these highway and utility corridors into the Tongass Land Management Plan and reserve and protect these corridors for these purposes. Adoption of this plan is an official expression of state policy that no other action by any other party should be taken (such as designations of wilderness areas) that would interfere with public use of any of the mapped corridors. In addition, the state requests that the Forest Service contribute to state efforts by improving and connecting forest roads that are located within essential road corridors identified by the state. Corridors of particular interest are Kake - Petersburg, Kake - Totem Bay, and North Prince of Wales Island Road - Red Bay.

In a region as rugged as Southeast Alaska, valleys and mountain passes represent invaluable corridors for highway routes and utility transmission lines. Maps 16 to 23 identify the transportation and utility corridors considered essential to the state. These corridors are identified below.

Corridor Descriptions

Lynn Canal Corridors — Juneau to Haines and Skagway

1. From Echo Cove northerly along the shore of Berners Bay and Lynn Canal to Skagway with a ferry terminal near the mouth of the Katzhin River.

2. From Skagway southerly along Taiya Inlet to Taiya Point, then northwesterly along Lutak Inlet to Haines.

3. From Haines across the Chilkat River/Inlet at or above Pyramid Island, then southerly along the west shore of Lynn Canal to a suitable ferry terminal site on William Henry Bay.

Taku River Corridors

4. From Thane Road southeasterly along Gastineau Channel to Bishop Point, then northeasterly along Taku Inlet to a suitable bridge crossing at Grizzly Bar.

5. From Jaw Point northeasterly along the southeast shore of Taku Inlet and River to the Canada border to provide ferry crossing options.

Mansfield Peninsula Crossing, Admiralty Island, Corridor

6. From Young Bay to Greens Creek, Hawk Inlet.

Chichagof Island Corridors

7. From a suitable ferry terminal site on Whitestone Harbor to Hoonah.

8. From Hoonah to a suitable ferry terminal site on Tenakee Inlet.

9. Pelican cut-off road from Tenakee Inlet Road to Pelican.

10. Kadashan Road from a suitable ferry terminal site on Tenakee Inlet southeasterly along the Kadashan River to a suitable ferry terminal site on the north shore of Peril Strait across from Rodman Bay.

Baranof Island Corridors

11. From the end of Halibut Point Road to a suitable ferry terminal site on Rodman Bay.

12. From the end of Sawmill Creek Road to a suitable ferry terminal site on Warm Springs Bay.

Kuiu Island Corridor

13. From a suitable ferry terminal site on Security Bay to a suitable ferry terminal site on Reid Bay for crossing Sumner Strait to Labouchere Bay on Prince of Wales Island.

Kupreanof Island Corridors

14. From Kake to a suitable ferry terminal site in Kupreanof for crossing the Wrangell Narrows.

15. From Kake to a suitable ferry terminal site in Totem Bay for crossing Sumner Strait to Red Bay on Prince of Wales Island.

Prince of Wales Island Corridors

16. North Prince of Wales Island Road from the intersection with Coffman Cove Road to a suitable ferry terminal site in the vicinity of Red Bay on Sumner Strait.

17. Neck Lake Road from North Prince of Wales Island Road easterly along Neck Lake to Wale Pass.

18. Cavern Lake Road from Wale Pass westerly to North Prince of Wales Island Road.

19. Caulder Road from North Prince of Wales Island Road near El Capitan northwesterly to a suitable ferry terminal site on Labouchere Bay.

20. North Prince of Wales Island Road north, then west from Cavern Lake Road to a suitable ferry terminal location on Labouchere Bay.

21. Sandy Beach Road from Thorne Bay north to Ratz Harbor, then along the east shore of Prince of Wales Island to Coffman Cove.

Mid-Region Access Corridors

22. Stikine Delta Causeway to South Mitkof Island to Rynda Island to Kadin Island to mainland, near Green Point, then along the eastern side of Eastern Passage to a bridge crossing point at "the Narrows."

23. Stikine River Corridor (according to the Alaska National Interest Lands Conservation Act [ANILCA], Section 1113).

24. A bridge crossing Eastern Passage at the Narrows between Wrangell Island and the mainland.

25. East side of Eastern Passage from the Narrows south to Bradfield Canal, then east along the north side of Bradfield Canal to the Bradfield River at the head of the Bradfield Canal.

26. Bradfield Road from the head of the Bradfield Canal along the North Fork of the Bradfield River to the Canada border at the Craig River.

27. From the head of Bradfield Canal along the south side of the Bradfield Canal west to Duck Point (or other suitable ferry terminal site on the Bradfield Canal).

Wrangell Island Corridors

28. From Zimovia Highway easterly along McCormack Creek, to Eastern Passage, then southerly to a suitable ferry terminal site on Fools Inlet.

29. From Zimovia Highway easterly along McCormack Creek to Eastern Passage, then to the Narrows bridge crossing site.

Cleveland Peninsula Corridors

30. Upper Cleveland Peninsula crossing from Bradfield Canal southeasterly along Eagle River to Point Lees to a suitable ferry terminal on the Behm Canal.

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Lower Cleveland Peninsula crossings:

31. From a suitable ferry terminal site on Santa Anna Bay southeasterly to a suitable ferry terminal site on Spacious Bay.

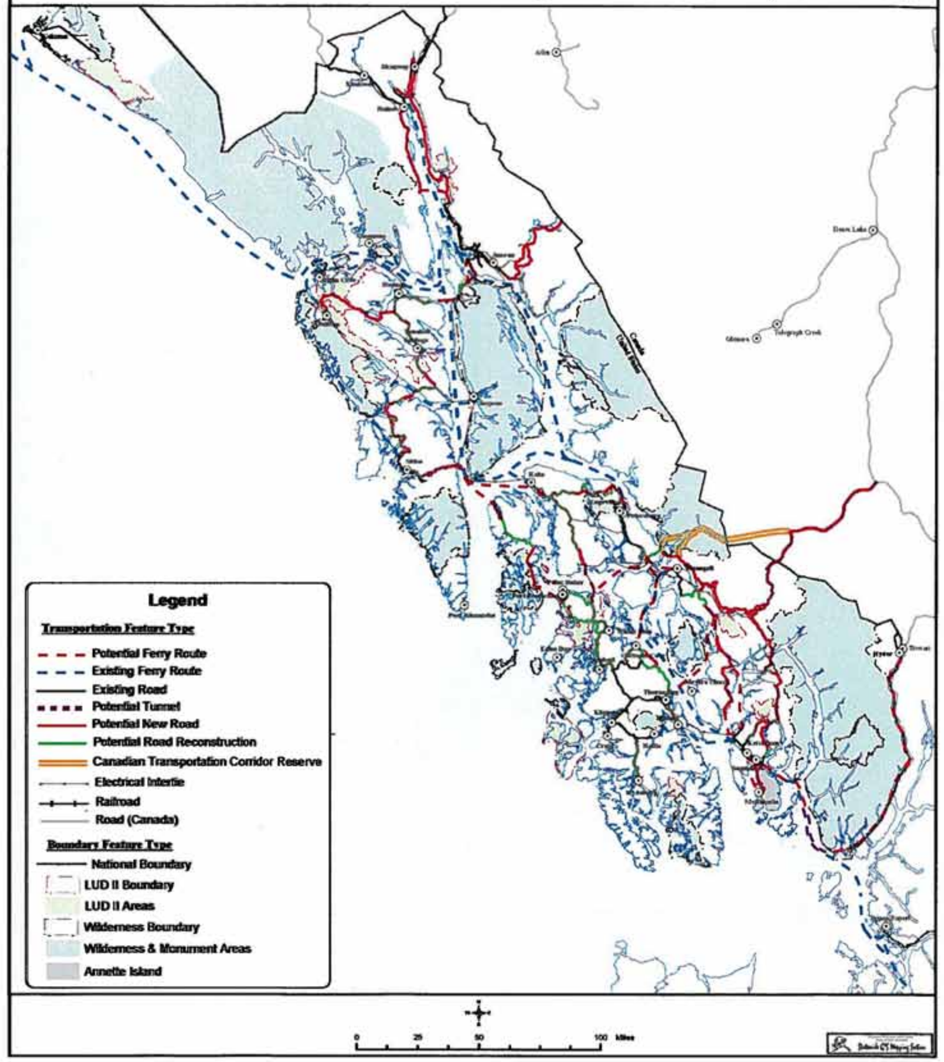
32. From a suitable ferry terminal site on Frosty Bay south to Santa Anna Bay, then southeasterly to Spacious Bay, then south to Port Stewart and along the southwest shore of Port Stewart to a suitable ferry terminal site on Helm Bay.

Revillagigedo Island Corridors

33. From a suitable ferry terminal site at or near Claude Point, then southwesterly via Benrer and Klam creeks to Shrimp Bay, then easterly to Cedar Lake and Orchard Creek, then southeasterly along Orchard Creek to a south branch extending toward Carroll Creek, then south to Carroll Inlet, then south along the west shore of Carroll Inlet to Shelter Cove, then westerly to the head of George Inlet to Ward Lake Road.

34. From the head of George Inlet south along the west shore of George Inlet to the end of South Tongass Highway.

Map 7
Essential State Land and Marine Transportation & Utility Corridors



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TONGASS NATIONAL FOREST
2007 DRAFT ENVIRONMENTAL IMPACT STATEMENT
AND
TONGASS LAND AND RESOURCE MANAGEMENT PLAN AMENDMENT

COMMENTS SUBMITTED BY ALASKA ENERGY AUTHORITY

1. INTRODUCTION

A Ninth Circuit Court ruling in 2005 and the January 2005 "5 Year Plan Review" set the stage for the amendment to the 1997 Tongass National Forest Land and Resource Management Plan. The Draft Environmental Impact Statement (DEIS) responds to the 2005 Court decision[1] and adjustments recommended during the recent 5-Year Review of the Forest Plan. A companion document, Proposed Land and Resource Management Plan represents the complete Forest Plan including all proposed amendments. Land and Resource Management Plans are required by the National Forest Management Act (NFMA) of 1976.

The Alaska Energy Authority (AEA) is pleased to provide comments on the DEIS and Proposed Tongass Land and Resource Management Plan (Tongass Land Management Plan or TLMP) dated January 2007.

The AEA, created by in 1976 by the Alaska Legislature, is a public corporation of the state of Alaska with a separate and independent legal existence. The agency is responsible for the administration of various state power projects and programs.

AEA Mission: Reduce the cost of energy in Alaska.

"AEA projects and programs support its mission by 1) providing for the operation and maintenance of existing Authority-owned projects with maximum utility control, 2) assisting in the development of safe, reliable, and efficient energy systems throughout Alaska, which are sustainable and environmentally sound, 3) reducing the cost of electricity for residential customers and community facilities in rural Alaska, and 4) responding quickly and effectively to electrical emergencies." (Emphasis added)

AEA Interest in the DEIS and Tongass Land Management Plan

The 16.8-million acre Tongass National Forest is the largest forest in the National Forest System (NFS) and remains for the most part wild and undeveloped. Approximately 71,000 people live in 32 communities and other areas located on islands or on the mainland coast. Developed areas cover about 1.50 million acres, or about 9% of the Forest. Only 8 of the 32 communities have populations greater than 1,000 persons. The economies of SE Alaskan communities rely on the Tongass National Forest to provide natural resources to support local sustainable economies: fishing, timber harvesting, recreation, tourism, mining, and subsistence activities.

[1] Ninth Circuit Court's decision in *Natural Resources Defense Council vs. U.S. Forest Service* (421 F.3d 797, August 5, 2005)

Most of the communities in Southeast (SE) Alaska are dependent on isolated sources of electricity; only Haines and Skagway, Petersburg and Wrangell, and several communities on Prince of Wales Island enjoy electric transmission interconnections.

Most existing and proposed transmission lines in SE Alaska are and/or would be located on lands within the Tongass National Forest, thereby requiring federal approval to site, construct, and operate proposed facilities. Exceptions include line segments located in the Metlakatla Indian Community on Annette Island, a federal reservation, and certain lands that have been conveyed to the state of Alaska and Native Alaska Corporations.

Since July 2006 AEA is participating actively with communities and electric utilities in SE Alaska through the AK-BC Intertie Steering Committee, Work Group, and Technical Group (AK-BC Intertie Committee/Groups) to conduct investigations and develop information in support of the proposed southern SE Alaska Intertie Plan, including the export line to British Columbia. An overarching goal of the interconnected electric transmission system is to provide least cost alternatives to diesel-generated electricity and to allow communities to remain economically sustainable, resulting in jobs for Alaskans.

In November 2006 AEA contracted with Hatch Acres Corporation to evaluate engineering, economic and political factors for development of a transmission interconnection from SE Alaska to British Columbia (AK-BC Intertie).

Several meetings were held in Ketchikan, Anchorage, and Juneau with the AK-BC Intertie Work Committee/Groups for the purpose of discussing potential future scenarios for an interconnected system within southern SE Alaska and the viability of the proposed AK-BC Intertie. Consultations have been ongoing with the Forest Service during development of the proposed system and AEA expresses its appreciation for the information provided by Forest Service staff throughout preparation of reports.

On April 6, 2007, AEA issued the Draft Final Report of the Alaska-British Columbia (AK-BC) Feasibility Study prepared by Hatch Acres Corporation under contract to AEA (2007 AK-BC Intertie Draft Final Report). AEA expects to issue the final report in June 2007.

The purpose of the AK-BC Intertie Project is twofold:

- To facilitate the development of the Southeast Alaska Electrical Intertie System[2] to interconnect communities, encourage development of new renewable electricity generating facilities, and through interconnections reduce the current level of diesel generation and reduce emissions that affect air quality and contribute to climate change. Providing access to low-cost renewable electric power to currently isolated communities solely reliant on diesel generated power will reduce emissions and allow communities to remain economically sustainable.
- To facilitate development of the AK-BC Intertie and encourage new renewable electricity generation facilities for energy export. The proposed interconnection

[2] The concept of the Southeast Alaska Electrical Intertie System is set forth in Report #97-01 prepared by Acres International Corporation for the Southeast Conference. This Report is incorporated by reference in these comments on the DEIS and Proposed Land and Resource Management Plan.

with British Columbia will provide enhanced reliability to the Southeast Alaska Electrical Intertie System and provide additional revenue to SE Alaska through sales of Alaskan-generated power.

Currently several communities are served with clean renewable energy from existing hydro projects. In addition to encouraging new projects, the completion of an interconnected electric transmission system within SE Alaska would encourage upgrades to existing hydro facilities.

Energy export could lead to the development of a number of new renewable[3] electricity generating facilities in Southeast Alaska meeting domestic power needs and providing a surplus for export.

AEA requests that transmission corridors identified in the ongoing AK-BC Intertie Feasibility Study and corridors identified in an earlier comprehensive evaluation of an interconnected system for SE Alaska, the Southeast Alaska Electrical Intertie System Plan, Report #97-01, prepared by Acres International Corporation for the Southeast Conference dated January 1998 (1998 SE Alaska Intertie System Plan), be included on maps included in the DEIS and the Tongass Land Management Plan.

AEA requests the Forest Service to incorporate by reference the 2007 AK-BC Intertie Draft Final Report and a companion report, 1998 SE Alaska Intertie Plan. These reports are available on the AEA website www.akenergyauthority.org/AlcanProjectPage.

AEA has reviewed the DEIS and Tongass Land Management Plan and understands that the Proposed Action alternative (Alternative 6) and related management prescriptions appear to allow implementation of the proposed electric transmission interconnections as included in the 2007 AK-BC Intertie Draft Final Report and the 1998 SE Alaska Intertie Plan. The following sections of AEA's comments provide detailed information regarding AEA's interests in assuring that these essential electric connections among communities in SE Alaska are considered in the DEIS and the Tongass Land Management Plan.

AEA has reviewed the map included in Alternative 6 Draft EIS and notes that two proposed segments are not currently identified: a line from Coffman Cove to the Four Dam Pool Power Agency (FDPPA) transmission line between the Tyee Lake Project and Wrangell/Petersburg. These line segments are shown on Figure 1 Additional Transmission Line Segments is provided in Section 6 of these comments.

[3] Renewable electricity generating facilities includes hydro, tidal energy, geothermal, and wind.

2. STATE OF ALASKA EXPLANATORY STATEMENT

2.1 Importance of Utility System Corridors

Electricity is the universal energy form. Virtually every home, institution, office, business, and industry in the nation use electricity and all are directly affected by its price and availability. Utility rates and services affect the quality of life for residents, influence economic development in communities within the study area, and shape future opportunities in all sectors of the economy. Significant disparities in the cost of power for SE Alaska communities exist today.

Most electric systems in SE Alaska are community-based and serve isolated load centers. With the exception of the below-listed existing transmission lines, there are no interconnections to import or export power among the communities and electric utilities.

- Haines to Skagway - transmits hydropower generated near Skagway – Alaska Power & Telephone (AP&T)
- Tyee to Petersburg and Wrangell - Four Dam Pool Power Agency (FDPPA) line delivers power from the Tyee Lake Hydroelectric Plant
- Line linking several communities on Prince of Wales Island (POW) to the Black Bear Lake and South Forks Hydroelectric projects – AP&T

Lacking transmission interconnections to other electric systems, each utility must plan independently to provide full power requirements to meet customer needs. This results in many communities reliance on higher cost diesel-generated power and related emissions adversely affecting ambient air quality and contributing to global warming in SE Alaska. As noted above, with few exceptions, most existing and proposed new transmission lines are/would be constructed on lands within the Tongass National Forest.

AEA notes that the Forest Service includes "the social and economic well-being of the communities of Southeast Alaska" as one of the public issues considered in the 2003 Supplemental EIS. AEA does not see this concern brought forward as one of "The Three Focus Issues" in the 2007 DEIS. However, AEA notes that the social and economic well being in SE Alaska is woven into some of the discussion in the DEIS.

AEA notes that Land Use Designations (LUDs) specify ways of managing areas and resources within the forest. LUD's are assigned, or allocated, to specific areas of land and given areas have one LUD assigned. Transportation and Utility System LUDs are defined as "overlay LUDs and can apply to a given piece of ground when and if…transportation/utility systems are to be developed on that piece of ground." With certain exceptions, transportation and utility systems are allowed throughout the Tongass as directed by Title XI of the Alaska National Interest Lands Conservation Act of 1980 (ANILCA).

AEA notes that the Draft Proposed Tongass Forest Plan at Section 4 Standards & Guidelines does not include a section on Utility Systems. See specific comments and recommendations at sections 4 and 5 of these comments.

The following proposed transmission segments would fall within the definition of Transportation and Utility System LUDs. Many of the line segments currently under consideration are included in the list of Power Transmission Lines in the DEIS (page 3-233). The following list presents the complete list of line segments under consideration. These line segments are also depicted on the Maps at Section 6 within these comments.
Proposed Transmission Segments within SE Alaska

Proposed connections in process at this date include:

- Juneau to Hoonah (the Juneau to Greens Creek portion is completed) - Kwaan Electric Transmission Intertie Cooperative, Inc. (KWETICO)
- Swan-Tyee Intertie (STI) that would interconnect Petersburg/Wrangell with Ketchikan and serve Ketchikan with current excess available energy at the Tyee Lake Hydroelectric Plant. – FDPPA
- Thayer Creek to Angoon - Kootzoowoo Inc., a Native village cooperative, proposed line from a new hydro project

Future proposed transmission segments and connections include:

- Juneau to Skagway
- Lake Dorothy to Juneau (AEL&P)
- Otter Creek to Skagway (AP&T)
- Hoonah to Tenakee Springs
- Tenakee Springs to Angoon
- Angoon to Sitka
- Takatz Lake to Kake
- Kake-Petersburg Transmission Intertie (KPTI)
- Sunrise Lake to Wrangell
- Metlakatla to Ketchikan – Metlakatla Power & Light Prince of Wales (POW) Island – segment to connect Coffman Cove and Naukati to southern POW communities. (not included in the list on page 3-223)
- Prince of Wales Island to FDPPA line near Wrangell – AP&T (not included in the list on page 3-233. This is an alternative to the line between Thorne Bay and Ketchikan included on the list)
- Thomas Bay to FDPPA line near Petersburg (not included in the list on page 3-233)

Proposed International Interconnection

- AK-BC Intertie

2.2 Benefits to the State and to Southeast Alaska

SE Alaska decision-makers have an opportunity to engage in joint planning to develop an interconnected electric transmission system within SE Alaska and the potential to expand that concept to include an interconnection with BC. AEA requests that the Forest Service include the identified transmission segments in the DEIS and Tongass Land Management Plan (see Map – Figure 1 Additional Transmission Line Segments in Section 6 of these comments)

Implementation of joint planning and system operation are proposed in the AK-BC Intertie Draft Final Report and the 1998 Southeast Alaska Electric Intertie System Plan and will facilitate open access to regional system facilities at just and reasonable non-discriminatory rates. An interconnected electric transmission system will facilitate joint planning and shared use of existing and proposed new renewable electric generation projects.

Significant disparities in cost of power in SE exist today, in part related to availability of low-cost hydropower. Many isolated load centers are currently served by diesel generation.

SE Alaska communities have experienced slow population growth for decades. The economy is in transition from a commodity resource-based economy to one where the economy is mixed, with increasing development in service-oriented businesses including government services, recreation and tourism.

Completion of the STI and development of proposed transmission lines to interconnect submarkets, and a future interconnection with BC, will encourage new sustainable economic development in currently isolated load centers and improve quality of life for residents currently encumbered with high cost energy from diesel generation.

2.3 Benefits to the Tongass National Forest

Completion of an interconnected electric transmission system will reduce reliance on diesel generation in SE Alaska and facilitate switching from fuel oil to electric heat for residential, government, and commercial customers. Reduced diesel generation and fuel oil use in SE Alaska will result in reduced adverse environmental effects that occur with transport, storage, and end-use of diesel and fuel oil.

AEA presents in the following section detailed information regarding avoided emissions that could result when individual load centers and systems are interconnected in southern SE Alaska, including completion of the Swan-Tyee Intertie and connections between Kake and Petersburg and Metlakatla and Ketchikan. Similar results can be anticipated in other areas throughout SE Alaska as transmission line segments are completed.

The United States Environmental Protection Agency (EPA) is mainly concerned with emissions which are or could be harmful to people. EPA calls this set of principal air pollutants, criteria pollutants. The criteria pollutants are carbon monoxide (CO), lead (Pb), nitrogen dioxide(NO_2), ozone (O_3), particulate matter (PM), and sulfur dioxide (SO_2).

Four of the criteria pollutants related to diesel generation and household oil-fired furnaces with/without interconnections were examined in this analysis – CO2, SOx, CO, and NOx.

With completion of the STI in 2010, conversion of a portion of oil fired furnace load could reduce CO2 and SOx emissions by 795,155 and 5,074 tons or some 47.7% and 45.5% respectively over the period from 2007 to 2046 or 485,996 and 3,150 tons or some

53.3% and 51.5% respectively over the period from 2007 to 2031 when compared with the isolated case without conversion. Over the period from 2007 to 2046, emissions of CO and NOx would be increased by 348 and 1673 tons or about 9.2% and 10.2% respectively due to the corresponding high emission factors of diesel engines.

Detailed information is presented in the following section in response to the DEIS.

3. SPECIFIC COMMENTS - DEIS

3.1 Climate and Air (pages 3-11 – 3-15

One of the goals common to all alternatives stated in the DEIS is: "Air. Maintain the current air resource condition to protect the Forest's ecosystems from on- and off- Forest air emission sources." (Page 2-7 DEIS)

Section 3 of the DEIS includes a description of the affected environment and related environmental effects. AEA notes several references to diesel power plants as a source of air pollution. The proposed interconnected electric transmission system presented in the recently issued AK-BC Intertie Feasibility Study Draft Final Report would result in decreased diesel generation in southern SE Alaska and would facilitate switching from fuel oil to electric heat in several communities.

AEA requested Hatch Energy to perform an analysis of avoided emissions that could result when individual load centers and systems are interconnected in southern SE Alaska. The following section "Estimated Avoided Emissions" of AEA's comments presents the results of that analysis as it would relate to the goal staed in Chapter 2 of the Draft Proposed Tongass Forest Plan: *"Maintain the current air resource condition to protect the Forest's ecosystems from on- and off- Forest air emission sources."* And the related objective: *"Attain national and state-ambient air quality standards forest-wide."*

ESTIMATED AVOIDED EMISSIONS

Two load growth scenarios were investigated:

- Include conversion of a portion of heating supplied by oil fired heating furnaces to loads supplied by electrical heaters (case with conversion)
- Consider that heating would continue to be supplied by oil fired heating furnaces (case without or no conversion).

In the case with conversion of oil fired heating furnaces, the annual expected displaced oil consumption of these furnaces was estimated and the expected amount is discussed in this section.

For each of the two load growth scenarios, the generation for three system development cases was determined in order to calculate the avoided emissions. These cases are::

1) Isolated -- Swan-Tyee Intertie is not implemented and both Kake and Metlakatla remain isolated;
2) Isolated With STI -- Swan-Tyee Intertie is commissioned in 2010 but both Kate and Metlakatla remain isolated;
3) Interconnected With STI -- Swan-Tyee Intertie is commissioned in 2010, Kate is interconnected with Petersburg and Metlakatla is interconnected with Ketchikan.

Emission Factors

Four emission pollutants - CO2, SOx, CO and NOx - were examined in this study. The emission factors used were obtained from AP 42, Volume I, Fifth Edition published by the Environmental Protection Agency (EPA) of the USA in 1995. These factors are summarized as follows:

Pollutant	Diesel Engine	Furnace
Emission Factors in Pounds Per Horsepower-Hour (lb/hp-hr)		
CO2	1.16	
SOx	0.00809	
CO	0.0055	
NOx	0.024	
Emission Factors in Pounds Per Thousand Gallons of Fuel (lb/1000-gal)		
CO2	22,548	22,300
SOx	157	144
CO	107	5
NOx	467	18

It is important to note that the emission factors in lb/hp-hr for diesel engines shown in the table above are the average values for large diesel engines (greater than 600 hp). The factors in lb/1000-gal for the diesel engines are calculated based on the values in lb/hp-hr, heat rate of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb and diesel density 7.05 lb/gal. It is also assumed that the diesel used contains 1% of sulfur.

It can be seen from these emission factors that for the same amount of liquid fuel consumed by the diesel engines and furnaces, the two types of facilities emit similar amounts of CO2 and SOx but diesel engines emit much more CO and NOx than furnaces. CO and NOx emissions from diesel engines are about 21 times and 26 times of those from furnaces.

2 Electricity Required for Conversion of Oil Fired Heating Furnaces

In this analysis, five load centers were considered - Ketchikan, Metlakatla, Wrangell, Petersburg and Kake. The estimated additional annual electrical energy required to supply the loads that would be converted from oil fired heating furnaces assumed as well as the displaced oil consumption in the case with conversion are summarized as follows:

Year	Additional Electricity Required (MWh)	Displaced Oil Consumption (US Gallon)
2007	2,759	108,375
2008	5,433	213,377
2009	8,016	314,846
2010	11,728	453,163
2011	18,962	707,095
2012	28,600	1,039,909
2013	30,889	1,129,792
2014	39,194	1,417,705
2015	41,449	1,506,298
2016	43,641	1,592,398
2017	45,765	1,675,796
2018	47,841	1,757,324
2019	49,874	1,837,193
2020	51,891	1,916,396
2021	53,860	1,993,728
2022	55,781	2,069,190
2023	57,660	2,142,990
2024	59,492	2,214,920
2025	61,286	2,285,395
2026	63,058	2,354,991
2027	64,793	2,423,133
2028	66,496	2,490,028
2029	68,168	2,555,676
2030	69,802	2,619,869
2031	71,425	2,683,600
Total	**1,117,863**	**41,503,183**

With conversion of each MWh of furnace load to electrical load, about 37 gallons of heating oil can be displaced. Based on a heat rate 7,000 Btu/hp-hr, a heating value of 19,300 Btu/lb and a density of 7.05 lb/gal as mentioned earlier, diesel engines would use about 69 gallons of diesel to generate one MWh. This implies that diesel engines have lower efficiency than heating furnaces. If the additional load for heating was produced by diesel engines, there would be more oil consumption and more pollution than in the case of supply from heating furnaces. I important to note that most of the additional or displaced heating furnace load is expected to be produced by unused hydro generation.

3 Estimated Avoided Emissions

The following tables present total and avoided emissions over the periods from 2007 to 2041 and from 2007 to 2031. Tables showing detailed information from which these summary tables were developed is attached at the end of this section of the comments.

Summary Table - Total Emissions

Theme	Case	CO2 (ton)	SOx (ton)	CO (ton)	NOx (ton)
		2007-2046			
No-Conversion	Isolated	1,667,754	11,160	3,790	16,381
	Isolated-STI	1,485,993	9,892	2,928	12,620
	IC-STI	1,383,714	9,179	2,443	10,504
Conversion	Isolated	1,424,535	9,935	6,754	29,473
	Isolated-STI	956,242	6,669	4,534	19,784
	IC-STI	872,599	6,086	4,137	18,054
		2007-2031			
No-Conversion	Isolated	912,198	6,123	2,235	9,672
	Isolated-STI	829,041	5,543	1,840	7,952
	IC-STI	770,639	5,135	1,564	6,743
Conversion	Isolated	754,157	5,260	3,576	15,603
	Isolated-STI	471,672	3,290	2,236	9,759
	IC-STI	426,202	2,972	2,021	8,818

It can be seen from the above table that in the interconnected case with the Swan-Tyee interconnection commissioned in 2010, conversion of a portion of oil fired furnace load could reduce CO2 and SOx emissions by 795,155 and 5,074 tons or some 47.7% and 45.5% respectively over the period from 2007 to 2046 or 485,996 and 3,150 tons or some 53.3% and 51.5% respectively over the period from 2007 to 2031 when compared with the isolated case without conversion. Over the period from 2007 to 2046, emissions of CO and NOx would be increased by 348 and 1673 tons or about 9.2% and 10.2% respectively and this is due to the corresponding high emission factors of diesel engines.

Summary Table - Avoided Emissions

Theme	Case	CO2 (ton)	SOx (ton)	CO (ton)	NOx (ton)
		2007-2046			
No-Conversion	Isolated	--	--	--	--
	Isolated-STI	181,762	1,268	862	3,761
	IC-STI	284,040	1,981	1,347	5,877
Conversion	Isolated	243,219	1,225	-2,965	-13,093
	Isolated-STI	711,513	4,491	-744	-3,404
	IC-STI	795,155	5,074	-348	-1,673
		2007-2031			
No-Conversion	Isolated	--	--	--	--
	Isolated-STI	83,156	580	394	1,720
	IC-STI	141,559	987	671	2,929
Conversion	Isolated	158,041	863	-1,341	-5,931
	Isolated-STI	440,525	2,833	-2	-87
	IC-STI	485,996	3,150	214	854

The following Tables 1 and 2 present detailed information regarding the estimated annual emissions in short tons (2000lb/short ton) for each of the two load growths studied.

Table 1: Estimated Emissions for Cases Without Conversion of Oil Fired Heating Furnaces

Isolated Case					Isolated Case With STI					Interconnected Case With STI				
Year	CO2 (ton)	SOx (ton)	CO (ton)	NOx (ton)	Year	CO2 (ton)	SOx (ton)	CO (ton)	NOx (ton)	Year	CO2 (ton)	SOx (ton)	CO (ton)	NOx (ton)
2007	28,036	195	127	556	2007	28,036	195	127	556	2007	28,036	195	127	556
2008	31,890	221	140	612	2008	31,890	221	140	612	2008	31,890	221	140	612
2009	34,217	237	146	638	2009	34,217	237	146	638	2009	34,217	237	146	638
2010	26,217	180	101	442	2010	13,592	92	42	181	2010	13,592	92	42	181
2011	18,520	125	52	226	2011	17,134	115	46	198	2011	15,153	102	36	157
2012	22,891	154	56	243	2012	22,221	149	53	229	2012	20,228	135	44	188
2013	24,458	164	59	256	2013	23,907	160	56	244	2013	21,715	145	46	199
2014	28,625	191	64	278	2014	28,900	193	66	284	2014	23,336	155	39	169
2015	30,262	202	68	292	2015	27,377	182	54	232	2015	24,900	165	42	181
2016	31,898	213	71	307	2016	28,969	193	57	246	2016	26,431	175	45	194
2017	33,551	224	75	323	2017	30,532	203	60	260	2017	27,930	185	48	206
2018	35,193	235	78	339	2018	32,075	214	64	274	2018	29,548	196	52	222
2019	36,829	246	82	355	2019	33,606	224	67	288	2019	31,402	208	56	242
2020	38,466	257	86	371	2020	35,377	236	71	307	2020	33,416	222	62	267
2021	40,087	268	90	387	2021	37,279	249	76	329	2021	35,414	235	67	291
2022	40,288	269	87	375	2022	37,777	252	75	323	2022	37,396	249	73	315
2023	41,910	280	91	392	2023	39,664	264	80	346	2023	35,394	234	60	257
2024	43,693	292	96	413	2024	41,528	277	85	368	2024	37,314	247	65	281
2025	42,179	281	85	366	2025	43,375	289	91	391	2025	39,230	260	71	305
2026	43,638	291	88	381	2026	36,848	243	56	240	2026	33,952	223	42	180
2027	45,128	301	92	397	2027	38,154	252	59	252	2027	35,250	232	45	192
2028	46,731	312	96	415	2028	39,488	261	62	265	2028	36,568	241	48	205
2029	48,418	323	101	435	2029	40,935	271	65	280	2029	38,014	250	52	220
2030	48,704	325	99	427	2030	42,365	280	69	296	2030	39,443	260	55	235
2031	50,370	336	104	447	2031	43,797	290	72	311	2031	40,872	270	59	251
Total	912,198	6,123	2,235	9,672	Total	829,041	5,543	1,840	7,952	Total	770,639	5,135	1,564	6,743

Table 2: Estimated Emissions for Cases With Conversion of Oil Fired Heating Furnaces

Isolated Case					Isolated Case With STI					Interconnected Case With STI				
Year	CO2 (ton)	SOx (ton)	CO (ton)	NOx (ton)	Year	CO2 (ton)	SOx (ton)	CO (ton)	NOx (ton)	Year	CO2 (ton)	SOx (ton)	CO (ton)	NOx (ton)
2007	27,962	195	133	579	2007	27,962	195	133	579	2007	27,962	195	133	579
2008	31,980	223	152	662	2008	31,980	223	152	662	2008	31,980	223	152	662
2009	34,618	241	164	716	2009	34,618	241	164	716	2009	34,618	241	164	716
2010	25,086	175	119	519	2010	7,369	51	35	152	2010	7,369	51	35	152
2011	14,202	99	67	294	2011	8,514	59	40	176	2011	6,616	46	31	137
2012	18,331	128	87	379	2012	10,939	76	52	226	2012	9,168	64	43	190
2013	19,657	137	93	407	2013	12,161	85	58	252	2013	9,885	69	47	205
2014	23,868	166	113	494	2014	9,154	64	43	189	2014	6,120	43	29	127
2015	22,343	156	106	462	2015	10,102	70	48	209	2015	6,867	48	33	142
2016	23,893	167	113	494	2016	11,068	77	52	229	2016	8,080	56	38	167
2017	25,625	179	121	530	2017	12,432	87	59	257	2017	9,653	67	46	200
2018	27,362	191	130	566	2018	12,006	84	57	248	2018	9,026	63	43	187
2019	29,106	203	138	602	2019	13,646	95	65	282	2019	10,590	74	50	219
2020	29,481	206	140	610	2020	15,383	107	73	318	2020	12,175	85	58	252
2021	31,215	218	148	646	2021	17,112	119	81	354	2021	13,789	96	65	285
2022	29,803	208	141	617	2022	15,702	110	74	325	2022	15,595	109	74	323
2023	31,323	218	149	648	2023	17,233	120	82	357	2023	17,571	123	83	364
2024	32,858	229	156	680	2024	18,999	133	90	393	2024	19,542	136	93	404
2025	34,413	240	163	712	2025	20,824	145	99	431	2025	21,505	150	102	445
2026	35,980	251	171	744	2026	22,680	158	108	469	2026	19,778	138	94	409
2027	37,540	262	178	777	2027	24,551	171	116	508	2027	21,701	151	103	449
2028	39,127	273	186	810	2028	26,418	184	125	547	2028	23,648	165	112	489
2029	40,906	285	194	846	2029	28,310	197	134	586	2029	25,615	179	121	530
2030	42,787	298	203	885	2030	30,207	211	143	625	2030	27,588	192	131	571
2031	44,692	312	212	925	2031	32,305	225	153	668	2031	29,760	208	141	616
Total	754,157	5,260	3,576	15,603	Total	471,672	3,290	2,236	9,759	Total	426,202	2,972	2,021	8,818

H-A60

3.2 Human Uses and Land Management (pages 3-219 – 3-403

Transportation and Utilities

Power Transmission Lines

Page 3-233 – paragraph should include the following segments:

Proposed Transmission Segments within SE Alaska

Proposed connections in process at this date include:

- Juneau to Hoonah (the Juneau to Greens Creek portion is completed) - Kwaan Electric Transmission Intertie Cooperative, Inc. (KWETICO)
- Swan-Tyee Intertie (STI) that would interconnect Petersburg/Wrangell with Ketchikan and serve Ketchikan with current excess available energy at the Tyee Lake Hydroelectric Plant. – FDPPA
- Thayer Creek to Angoon - Kootzoowoo Inc., a Native village cooperative, proposed line from a new hydro project

Future proposed transmission segments and connections include:

- Juneau to Skagway
- Lake Dorothy to Juneau (AEL&P)
- Otter Creek to Skagway (AP&T)
- Hoonah to Tenakee Springs
- Tenakee Springs to Angoon
- Angoon to Sitka
- Takatz Lake to Kake
- Kake-Petersburg Transmission Intertie (KPTI)
- Sunrise Lake to Wrangell
- Metlakatla to Ketchikan – Metlakatla Power & Light (not included in the list on page 3-223
- Prince of Wales (POW) Island – segment to connect Coffman Cove and Naukati to southern POW communities. (not included in the list on page 3-223)
- Prince of Wales Island to FDPPA line near Wrangell – AP&T (not included in the list on page 3-233. This is an alternative to the line between Thorne Bay and Ketchikan included on the list)
- Thomas Bay to FDPPA line near Petersburg (not included in the list on page 3-233)

Proposed International Interconnection

- AK-BC Intertie

Economic and Social Environment

Introduction (page 3-403)

Note that the Tongass National Forest is the primary land-owner in SE Alaska. DEIS states that "Appropriate management of the Tongass' natural resources, is, therefore, extremely important for local communities and the overall regional economy."

Adequate infrastructure is an essential element of a healthy economic and social environment. As noted earlier in these comments, electricity is an essential service and electric transmission infrastructure is the delivery system. The introduction section should recognize the importance of this element.

Cumulative Effects (page 3-470)

"Other reasonably foreseeable actions include transportation and utility developments." While paragraph includes "utility developments", text solely relates to roads. Section should include reference to electric transmission line segments identified above under "Power Transmission Lines."

H-A61

4. SPECIFIC COMMENTS – Proposed Land and Resource Management Plan

Chapter 2 Goals and Objectives

Forest-wide Multiple-use Goals and Objectives (pages 2-2 through2-5)

Resource	Goal Statement from Plan	Objective Statement from Plan	AEA Comments
Air	*"Maintain the current air resource condition to protect the Forest's ecosystems from on- and off- Forest air emission sources."*	*"Attain national and state-ambient air quality standards forest-wide."*	Implementation of the proposed SE Alaska Electrical Intertie System will reduce current levels of emissions associated with diesel-generation (transportation & delivery, storage, end-use) and potential for spill. Reduction of current level of heating oil and associated emissions and potential for spill will occur as conversion to electric heat becomes an option.
Local and Regional Economies	*"Provide a diversity of opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska."*	*"Work with local communities to identify rural community assistance opportunities and provide technical assistance in their implementation. Support a wide range of natural-resource employment opportunities within Southeast Alaska's communities."*	Implementation of the proposed SE Alaska Electrical Intertie System will provide access to lower cost electricity from renewable electricity generating facilities to currently isolated communities solely dependent on diesel-generated electricity. Access to lower cost power will enhance the ability of communities to attain economic sustainability and increase employment opportunities in isolated rural communities.
Transportation	*"Develop and manage roads and utility systems to support resource management activities; recognize the potential for future development of major Transportation ~~and Utility Systems~~."*	*"Provide access for forest users. In support of forest resource management activities, design and construct up to an average of 61 miles of roads annually. Manage and maintain roads to protect water, soil, fish, and wildlife resources."*	AEA notes that this section includes Utility Systems, however the Objectives solely relate to Transportation. AEA recommends a separate section "Utility Systems" be included in the Final TLMP Plan at page 2-5. See next section of this table.
Utility Systems (new resource category)	AEA recommended goal: "Develop and manage utility systems to support resource management activities; recognize the potential for future development of Utility Systems, including the proposed SE Alaska Electrical Intertie System."	AEA recommended objectives: "Provide access to the Forest for purposes of constructing and operating electric transmission lines and related facilities to reduce current levels of air emissions associated with diesel generation and provide communities with access to low-cost power to facilitate economically sustainable communities."	AEA recommendation for addition to current list of Resources and related Goals and Objectives. Page 2-5 Draft TLMP Plan.

Management Prescriptions 3

Transportation and Utility System
Land Use Designation TUS

See page 3-144: AEA requests that the Table "Transportation and Utility Systems Land Use Designation add a row below Transportation to include "Utility Systems" and that the Forest-wide Standards & Guidelines in Chapter 4 be expanded to include "Utility Systems."

See page 3-148: AEA requests that the list of LUD Standards and Guidelines include reference to "Utility Systems." Currently the text refers to Utility Systems, however the title is restricted to "TRANSPORTATION Transportation Operations: TRAN1.

Standards & Guidelines 4

LANDS
Forest-wide Standards & Guidelines

See page 4-32: VII. Right-of-Way Grants, D. States applicability of standards and guidelines to Transportation and Utility Systems. Note that powerlines may be installed to operate above 66kV, but in some instances are initially operated at 34.5kV. Some line segments (e.g. line from Metlakatla to Ketchikan) will be constructed at 34.5kV. These line segments play an important role in the overall plan to electrically interconnect SE Alaska and should be included within eligible facilities in the Transportation and Utility System (TUS) Land Designation (LUD).

See pages 4-110 through 4-117 TRANSPORTATION Forest-wide Standards and Guidelines. AEA notes that this section is referred to as the Forest-wide Standards and Guidelines for Transmission and Utility Systems. However, the current Draft Proposed Tongass Forest Plan does not include Standards and Guidelines applicable to Utility Systems.

5. RECOMMENDATIONS

This section of AEA's comments provides recommendations for the Final EIS and Final Proposed Tongass Forest Plan. These recommendations are discussed in the preceding sections of these comments and are compiled within this section 5 to facilitate Forest Service consideration and response in the Final EIS and Final Proposed Tongass Forest Plan. The above sections of these comments provide the background and basis for these recommendations.

5.1 DRAFT EIS

1. Purpose and Need

Add the social and economic well-being of the communities of Southeast Alaska as a Key Issue in the Final EIS. (Page 1-6 The Three Focus Issues – Key Issues) Presently the social and economic well-being relates solely to timber management. AEA notes that the electric transmission infrastructure that will occupy National Forest lands is a critical element to future social and economic well-being in the region.

3. Environment and Effects

Transportation and Utilities

Power Transmission Lines (Page 3-233)
Power Transmission Lines

Page 3-233 – paragraph should include the following segments:

Proposed Transmission Segments within SE Alaska

Proposed connections in process at this date include:

- Juneau to Hoonah (the Juneau to Greens Creek portion is completed) - Kwaan Electric Transmission Intertie Cooperative, Inc. (KWETICO)
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- AK-BC Intertie

Economic and Social Environment

Introduction (page 3-403)

Note that the Tongass National Forest is the primary land-owner in SE Alaska. DEIS states that "Appropriate management of the Tongass' natural resources, is, therefore, extremely important for local communities and the overall regional economy."

Adequate infrastructure is an essential element of a healthy economic and social environment. As noted earlier in these comments, electricity is an essential service and electric transmission infrastructure is the delivery system. The introduction section should recognize the importance of this element.

Cumulative Effects (page 3-470)

"Other reasonably foreseeable actions include transportation and utility developments." While paragraph includes "utility developments", text solely relates to roads. Section should include reference to electric transmission line segments identified above under "Power Transmission Lines."

Alternative 6 Draft EIS Map

Add the following segments:

- Prince of Wales Island to FDPPA line near Wrangell – AP&T (not included in the list on page 3-233. This is an alternative to the line between Thorne Bay and Ketchikan included on the list)
- Thomas Bay to FDPPA line near Petersburg (not included in the list on page 3-233)

Map showing location of these segments is included in Section 6. Maps of these comments.

5.2 Draft Proposed Tongass Forest Plan

Chapter 2 Goals and Objectives

Table - Forest-wide Multiple-use Goals and Objectives (pages 2-2 through 2-5)

Resource category "Transportation" includes reference to utility systems in the goal statement, however the objectives relate solely to roads.

AEA recommends that the table include a new resource category "Utility Systems":

Resource	Goal Statement from Plan	Objective Statement from Plan	AEA recommendation
Utility Systems (new resource category)	AEA recommended goal: "Develop and manage utility systems to support resource management activities; recognize the potential for future development of Utility Systems, including the proposed SE Alaska Electrical Intertie System."	AEA recommended objectives: "Provide access to the Forest for purposes of constructing and operating electric transmission lines and related facilities to reduce current levels of air emissions associated with diesel generation and provide communities with access to low-cost power to facilitate economically sustainable communities."	AEA recommendation for addition to current list of Resources and related Goals and Objectives. Page 2-5 Draft TLMP Plan.

Management Prescriptions 3

Transportation and Utility System Land Use Designation TUS

See page 3-144: AEA requests that the Table "Transportation and Utility Systems Land Use Designation add a row below Transportation to include "Utility Systems" and that the Forest-wide Standards & Guidelines in Chapter 4 be expanded to include "Utility Systems."

See page 3-148: AEA requests that the list of LUD Standards and Guidelines include reference to "Utility Systems." Currently the text refers to Utility Systems, however the title is restricted to "TRANSPORTATION Transportation Operations: TRAN1.

Standards & Guidelines 4

LANDS
Forest-wide Standards & Guidelines

See page 4-32: VII. Right-of-Way Grants, D. States applicability of standards and guidelines to Transportation and Utility Systems. Note that powerlines may be installed to operate above 66kV, but in some instances are initially operated at 34.5kV. Some line

segments (e.g. line from Metlakatla to Ketchikan) will be constructed at 34.5kV. These line segments play an important role in the overall plan to electrically interconnect SE Alaska and should be included within eligible facilities in the Transportation and Utility System (TUS) Land Designation (LUD).

See pages 4-110 through 4-117 TRANSPORTATION Forest-wide Standards and Guidelines. AEA notes that this section is referred to as the Forest-wide Standards and Guidelines for Transmission and Utility Systems. However, the current Draft Proposed Tongass Forest Plan does not include Standards and Guidelines applicable to Utility Systems. AEA recommends that an additional category UTILITY SYSTEMS be prepared and provided in the Final Proposed Tongass Forest Plan.

This new section could contain information relating to the coordination of federal agency approvals for electric transmission established in the August 8, 2006 "Memorandum of Understanding on Early Coordination of Federal Authorizations and Related Environmental Reviews Required in Order to Site Electric Transmission Facilities" (MOU)[4] signed. by the departments of Energy (DOE), Agriculture (USDA – includes the Forest Service), Defense (DOD – includes the Corps of Engineers (COE)), Interior (DOI – includes the Fish and Wildlife Service (FWS)), Commerce (includes the National Marine Fisheries Service (NMFS)); and the Federal Energy Regulatory Commission (FERC), the Environmental Protection Agency (EPA), the Council on Environmental Quality (CEQ), and the Advisory Council of Historic Preservation with the commitment to work together to meet each Agency's obligations. The purpose of the MOU is to establish a framework for early cooperation and participation that will enhance coordination of all applicable land use authorizations, related environmental, cultural, and historic preservation reviews, and any other approvals that may be required under Federal law in order to site an electric transmission facility. Central to this MOU is compliance with NEPA and preparation of related environmental documents, including the EA or EIS.

[4] The MOU was developed in response to requirements of the Energy Policy Act of 2005 that amended the Federal Power Act; codified at USC 824p.

6. MAPS

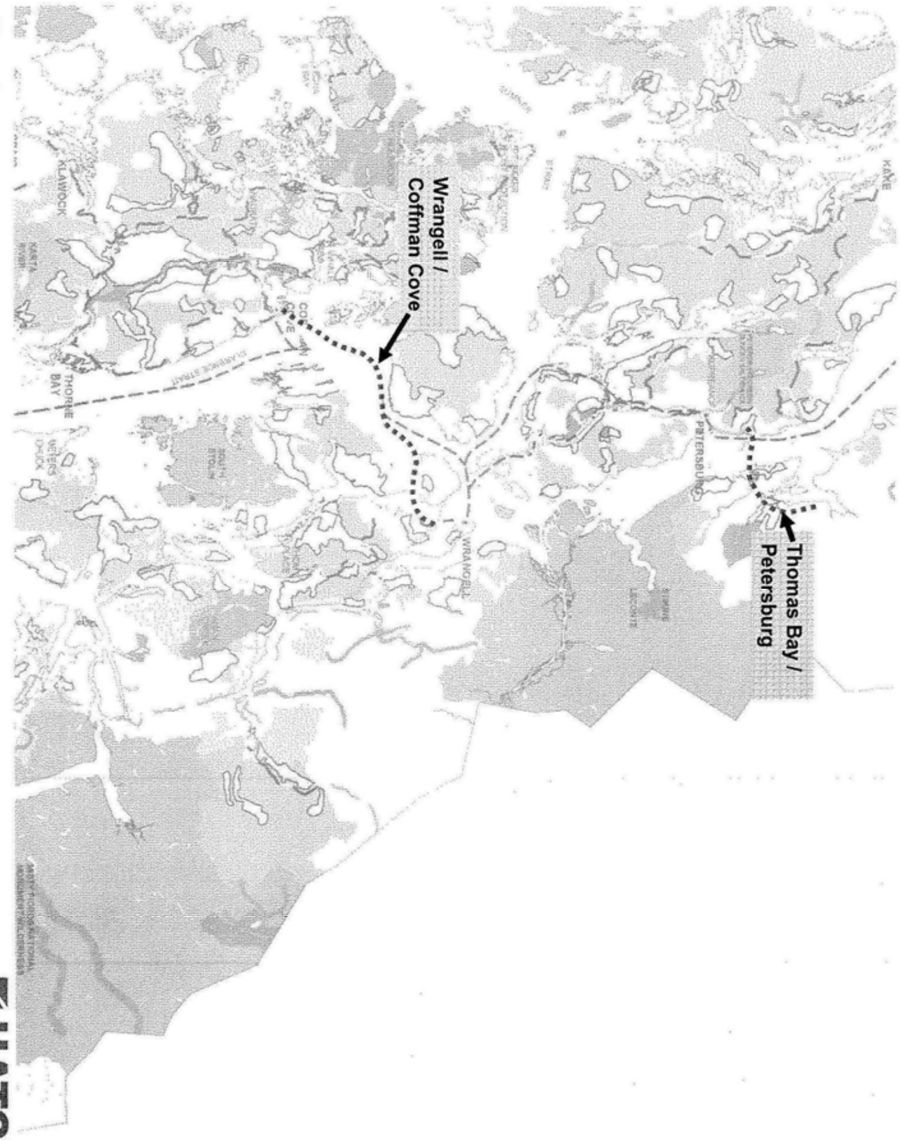

Figure 1
Additional Transmission Line Segments

Central Council
Tlingit and Haida
Indian Tribes of Alaska

CENTRAL COUNCIL
tlingit and haida indian tribes of alaska
ANDREW P. HOPE BUILDING
320 West Willoughby Avenue • Suite 300
Juneau, Alaska 99801-9983

997

April 27, 2007

RECEIVED
APR 30 2007
RAP 4-30-07

Forrest Cole, Supervisor
Tongass National Forest
648 Mission Street
Ketchikan, AK 99901

Dear Mr. Cole,

On behalf of Central Council Tlingit & Haida Indian Tribes of Alaska (CCTHITA) and our 26,000 members worldwide, we are submitting the following comments on the Tongass Land Management Plan (TLMP) Amendment Draft Environmental Impact Statement (DEIS) 2007.

Our stewardship concerns are for our entire tribal membership but more specifically for those 13,500 living in direct proximity to the Tongass National Forest in Southeast Alaska. As part of the responsibility to our members, we are compelled to address the issues regarding the forest. The interests of tribal members and governments extend beyond mere use of forest resources. We have additional responsibilities as *stewards of the air, land, and sea* to ensure a balance is maintained in the use of natural resources.

After much deliberation on defining the balance between sustainable use and conservation of available resources we support, in principle, **Alternative 5** as proposed by the US Forest Service. Through our participation in groups (Tongass Futures Roundtable and Southeast Conference) working on the same forest related issues in the Tongass, we have come to the conclusion that <u>prudent use as well as prudent conservation of forest resources is necessary even in economically challenging times. Short-term gain at the expense of long-term stability is careless choice.</u>

It is for this reason that we support Alternative 5 with the inclusion of our concerns that any development of forest resources take into account: 1) Protection of Native Sacred Sites within the forest, 2) Protection of intact watersheds of importance to habitat, fisheries, and subsistence, 3) Promotion and funding of a forest and riparian restoration program, 4) Provision of sufficient forest resources to support a sustainable level of economic activity in forest related industries, 5) Slow and controlled transition from old growth to second growth in limited areas.

In addressing the conditional support of Alternative 5, the protection of Native Sacred Sites should be paramount in any decision about the development of Tongass resources.

TEL. 907/586-1432 www.tlingit-haida.org FAX 907/586-8...

Native Alaskan peoples have been in the forest for longer than recorded history. The preservation of sacred sites is essential. The disruption or destruction of any of these sites without explicit approval of proper tribal authorities is not acceptable.

Concern two in our support of Alternative 5 reflects the importance of the whole ecosystem to Native Alaskans. The very existence of many tribal members depends on the quality, quantity, and distribution of wildlife and fishery resources. Subsistence resources are of extreme importance to our culture and well being. Disruption, destruction, and/or contamination of these resources are of intense concern to us in any changes to the forest ecosystem. All proposed changes in areas, methods, and levels of resource development should reflect this concern.

Concern number three is a need for a substantive program put in place to promote, support, and fund a riparian and forest restoration program. Resource development in Tongass ecosystem over the past decades has had noticeable impact. Past and future development can be ameliorated through such a program. This program will be most successful with a dedicated funding source such as a federal trust fund. A program without a dedicated funding source is too unreliable.

Concern four addresses the actual use of Tongass Forest resources. Forest resources should be viewed in light of sustaining and preserving not stripping and abandoning. As stewards of the forest, we believe in the thoughtful use of its resources. The balancing of sustaining the forest and economic development is a tentative but essential one. A long term plan for value-added use of forest resources is much preferred to one on stripping and selling the resource at its lowest value point. In other words, use of forest resources should be vertically integrated on a local level in Southeast Alaska as to provide the largest positive economic impact for the resource being used. Federal policies dedicated toward these ends should be pursued. These policies allow for sufficient access to renewable forest resources to sustain local vertically integrated value added forest product industries. Access to non-renewable forest resources should be limited and closely controlled.

And finally, concern number five, transition from old growth to new growth is a natural cycle of life. To the best ability of the forest management team, this transition should take place in an orderly least disruptive process. Destruction of entire portions of the Tongass ecosystem as a method of harvesting should be considered a last resort not a preferred practice. Forest stewardship should be based on sustainable forestry practices and not extractive resource practices. The environmental and lost opportunity costs should be included in the overall economic feasibility evaluations of opening any new areas to resource development.

In conclusion, we understand that the review process for the TLMP is a long and sometimes contentious time for Southeast Alaska. At CCTHITA, we choose the path of sharing our concerns and support with you as your review process comes to another milestone. We felt it was more valuable to share with you our reasons based in our traditional values. If there is anything we can do to support your efforts as they address our concerns, please feel free to call on us.

Best regards,

William E. Martin
President

ADOPTED this 27th day of April 2007, by the Executive Council of the Central Council of Tlingit and Haida Indian Tribes of Alaska, by a vote of 6 yeas, 0 nays, 0 abstentions and 0 absence(s).

CERTIFY

President William E. Martin

ATTEST

Shyina Brown

for Tribal Secretary Dana Leask Ruaro

CC: Alaska Regional Forester, Danny Bschor
Alaska Governor, Sarah Palin
US Senator, Ted Stevens
US Senator, Lisa Murkowski
US Congressman, Don Young
USFS Chief, Gail Kimbell
USDA, Under-secretary Mark Rey

1387

Central Council Tlingit and Haida Indian Tribes of Alaska

CENTRAL COUNCIL
tlingit and haida indian tribes of alaska
ANDREW P. HOPE BUILDING
320 West Willoughby Avenue • Suite 300
Juneau, Alaska 99801-1726

April 30, 2007

Mr. Denny Bschor
Alaska Regional Forester
US Forest Service
P.O. Box 21628
Juneau, AK 99802-1628

RECEIVED
MAY 0 1 2007
Regional Forester's Office

Dear Mr. Bschor,

Enclosed, please find a copy of the comments submitted by Central Council Tlingit & Haida Indian Tribes of Alaska as part of the Tongass Land Management Plan review.

The policy statement was developed as a cooperative effort of our Business & Economic Development and Native Lands & Resources Departments. Our efforts are in support of a policy of sustainable development of one of the most valuable cultural and economic assets in the United States. We believe ours is a sound and sensible approach to preservation and development of this resource for all citizens.

Thank you for your efforts on behalf of the residents of Alaska.

Best regards,

Andrei Chakine
Manager
achakine@ccthita.org
(907) 463-7121

Steve Wade
Economic Development Specialist
swade@ccthita.org
(907) 463-7724

Enclosures: 1

Central Council
Tlingit and Haida
Indian Tribes of Alaska

CENTRAL COUNCIL
tlingit and haida indian tribes of alaska
ANDREW P. HOPE BUILDING
320 West Willoughby Avenue • Suite 300
Juneau, Alaska 99801-9983

April 27, 20

Forrest Cole, Supervisor
Tongass National Forest
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TEL. 907/586-1432 www.tlingit-haida.org FAX 9...

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And finally, concern number five, transition from old growth to new growth is a natural cycle of life. To the best ability of the forest management team, this transition should take place in an orderly least disruptive process. Destruction of entire portions of the Tongass ecosystem as a method of harvesting should be considered a last resort not a preferred practice. Forest stewardship should be based on sustainable forestry practices and not extractive resource practices. The environmental and lost opportunity costs should be included in the overall economic feasibility evaluations of opening any new areas to resource development.

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CERTIFY

President William E. Martin

ATTEST

Tribal Secretary Dana Leask Ruaro

CC: Alaska Regional Forester, Danny Bschor
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US Senator, Ted Stevens
US Senator, Lisa Murkowski
US Congressman, Don Young
USFS Chief, Gail Kimbell
USDA, Under-secretary Mark Rey

1389

Douglas Indian Association Tribal Government

1107 West 8th St. #3 Juneau, Alaska 99801-1802
Phone: (907) 364-2916 Fax (907) 364-2917

RECEIVED
MAY - 4 2007

April 29, 2007

USDA FS Tongass NF
Federal Building
648 Mission Street
Ketchikan, Alaska 99901

To Whom It May Concern,
We would like to thank Peter Griffin, Juneau Ranger District for taking the time to meet with Douglas Indian Association staff members Scott Sloane and myself to discuss the 7 Alternatives of the Draft Tongass land and Resource Management Plan (Forest Plans) as they pertained to the Douglas Indian Association and its Tribal members Traditional Lands.

Douglas Indian Association is a federally recognized tribal government established under the authority of the Indian Reorganization Act (IRA) of 1934 and we have a government to government relationship with all federal agencies of the United States of America. As a federally recognized tribal government it is very important that we relay to you our concerns about the 7 Alternatives and their impacts to our people and their Traditional lands.

It is very important to understand that we are always strongly advocating for the protection of the fisheries and game and the land for both commercial and subsistence use and that we request that our comments be seriously considered when it comes to any impacts that will occur to these resources as your organization continues to manage land usage within the Tongass National Forest. We have concerns for impacts to fish habitat, wildlife habitat, subsistence, timber harvests near fish and wildlife habitat and the need to be able to sustain jobs while not harming the environment which we depend on daily to sustain ourselves and our way of life.

We recognize that when addressing impacts to the Tongass National Forest we are also addressing the Economic well-being of our Southeast Alaskan communities, us included and we do so responsibly and respectfully.

The TLUMP Amendment overview that was provided showed, when speaking of the Traditional lands of the Douglas Indian Association members, that the impacts that were going to occur under;

Alternatives 1 thru 3: Represent basically a status quo usage of the land and waters around Juneau, from the northern shores of Berners Bay south to Snettisham and the Admiralty Island National Monument lands eastern shores from Young Bay to Point Gardner.

2

Alternative 4: We have a concern that there is a more “moderate” to “intense” approach to timber harvesting in the area north and south of the Taku River an along the southeastern shores of Stephens Passage toward Snettisham plus th southwestern shores of Douglas Island. We request as this process evolves th our government to government consultations occur and that we be kept inform as your organization develops these programs.

Alternative 5: The plan is that this is a No-Action alternative, representing a continuation of the current forest plan and would result in a mix of national fore uses and activities.

Alternative 6: Indications are that timber harvest is no longer shown on the southwestern shores of Douglas Island and that more “moderate” to “intense” timber harvest are to occur from The Taku River to Snettisham we request that our government to government consultation to occur and that we be kept informed as your organization develops these programs.

Alternative 7: Indications are that a “moderate” approach to timber harvest is to occur on the Southwestern shore of Douglas Island and that a “moderate” to “intense” approach to timber harvest will occur from the Take River to Snettish and we request as this process evolves that our government to government consultation to occur and that we be kept informed as your organization develo these programs.

We also note that there are no telecommunication systems site plans listed for the Tongass National Forest, are there any proposed?

On behalf of Douglas Indian Association thank you for considering our comme on the TLUMP Amendment and we do look forward to your response.

Respectfully,

Floyd M. Kookesh
Floyd M. Kookesh
Tribal Administrator
Douglas Indian Association

1107

1109

Hydaburg Cooperative Association
P.O. Box 349
Hydaburg AK, 99922
PH#907-285-3666
FX#907-285-3541

4/25/07

Tongass National Forest
Attn: Forest Plan Adjustment
648 Mission Street
Ketchikan, AK 99901

RE: Comments on the Tongass Land and Resource Management Plan Amendment Draft EIS

To Whom It May Concern:

The Hydaburg Cooperative Association (IRA) is a federally recognized tribe organized pursuant to the authority of Section 16 of the Act of Congress June 18, 1934 (48 Statute 984) as amended by act of Congress, May 1, 1936. Hydaburg Cooperative Association Tribal Council is the governing body of the Hydaburg Tribe in accordance with its Constitution, and by-laws, including “the protection of the Haida Nation membership.

The Hydaburg Cooperative Association has the authority to consult on behalf of its membership with the Federal Government for the well being of the tribe.

The commonality of the customary and traditional use of land, sea, and natural resources is what binds the Haida Nation together. The customary and traditional use of each Village is inseparable from the language, tradition, and ceremonies of the Haida People. This dependency on the surrounding resources is what drives our tribe to protect the resources that surround us.

The Hydaburg Cooperative Association Tribal Council passed Resolution 2007-20 that speaks to the areas of importance and their cultural significance to the Haida people.

The HCA is very concerned about certain alternatives within the TLMP Draft revision document. Specifically, Alternative 4, 5, 6, and 7 propose large scale logging activities within a 15 mile radius of the community of Hydaburg. Key subsistence watersheds will be drastically impacted. Couple these alternatives with the current private timber harvest activities in the same area, we will be faced with a decimated landscape as well as lasting impacts to our most crucial subsistence resources (the natural inhabitants of healthy watersheds and their estuaries).

Most of the areas(Sukkwaan Island, Keete Inlet , Kassa Inlet, and Mable Bay) proposed in Alt. 4 thru 7 are currently road-less. We would like them to maintain the protections from road building and large scale timber harvest. The areas are adjacent to a current LUD II and a Wilderness area. Keeping this area in tact would serve to protect the biodiversity of Cordova Bay for future generations to enjoy. The area is also one of the last untouched surfaces in our traditional territories that we can access for subsistence uses.

Lastly, the cultural significance of the timber itself (namely western red cedar) is of high concern to the Haida People. The Haida people have always had a direct reliance on red cedar to maintain its cultural identity. The current timber market is focused on this specific resource, of which is only available in high quantities in our traditional areas. We are concerned that this critical resource will be targeted and depleted under Alternates 4 thru 7. We see no protections that certify future generations will be afforded the inherent rights to utilize old growth western red cedar to perpetuate our culture into the future.

Thank you for your consideration of our comments and Resolution 2007-20

Respectfully;

Anthony Christianson
Environmental Planner

Attachment:
Resolution 2007-20 Resolution to Protect Important Areas According to the Customary and Traditional Uses of the Haida People

HYDABURG COOPERATIVE ASSOCIATION

Resolution No. 2007- 20

A RESOLUTION TO PROTECT IMPORTANT AREAS ACCORDING TO THE TRADITIONAL AND CUSTOMARY USES OF THE HAIDA PEOPLE

WHEREAS, the Hydaburg Cooperative Association (IRA) is a federally recognized tribe organized pursuant to the authority of Section 16 of the Act of Congress June 18, 1934 (48 Statute 984) as amended by act of Congress, May 1, 1936; and,

WHEREAS the Hydaburg Cooperative Association Tribal Council is the governing body of the Hydaburg Tribe in accordance with its Constitution, and by-laws, including "the protection of the Haida Nation membership; and,

WHEREAS, The Hydaburg Cooperative Association has the authority to establish and enter into contract for the well being of the tribe; and,

WHEREAS, the commonality of the customary and traditional use of land, sea, and natural resources is what binds the Haida Nation together, and the customary and traditional use of each Village is inseparable from the language, tradition, ceremony of the Haida People; and,

WHEREAS, we hold these truths to be self-evident since time immemorial; and,

WHEREAS, the Forest Service is legally obligated to meaningfully consult and collaborate with tribal governments in the development of Federal policies that have tribal implications, as directed by Executive Order 13175; and,

WHEREAS, the Proposed Action of the 1997 Tongass Land Management Plan will have far reaching and profound impacts on tribal communities throughout Southeast Alaska; and,

WHEREAS, the Proposed Action chosen by the Forest fails to adequately protect or respect the customary and traditional uses of Haida traditional use areas. The Proposed Alternatives plan intensive logging activities in some of the last remaining customary and traditional use areas such as Kassa, Keete, Moira, and Mabel Bay, and the 90 documented Haida traditional use sites (and there are more); and,

Hydaburg Cooperative Association
Resolution No. 2007 - 20

WHEREAS, the Forest Service's Proposed Action fails to adequately recognize the value of providing lasting protection to important customary and traditional use areas of the Tongass, the history of previous protections, including the 1999 Tongass Land Management Plan Record of Decision, and the 1989 House passed version of the Tongass Timber Reform Act, and community concerns; and,

WHEREAS, the Proposed Action fails to restore important salmon and deer habitat in traditional and community use areas of the people of Hydaburg; and,

WHEREAS, the Forest Service states that "roads pose the greatest threat to fish resources," and that the Haida people have depended on salmon since time immemorial, the Proposed Action almost doubles the number of roads within the Tongass; and,

WHEREAS, areas including Hydaburg, Long Island, Northwest Dall Island, Sukkwaan, Keete, Kassa, Mable Bay, Moira Sound, and other areas that are traditional use areas of the Haida People of Southeast Alaska contain highly valuable watersheds important for subsistence, tourism, fish and wildlife habitat;

NOW, THEREFORE, BE IT RESOLVED, that the Hydaburg Cooperative Association request that the customary and traditional areas Sukkwaan, Dall Island, Keete, Kassa, Mabel Bay, Moira Sound, and other areas within Haida country be removed from the timber base in order to best protect the customary and traditional activities of the Haida People; and,

BE IT FURTHER RESOLVED, that the Hydaburg Cooperative Association urges the Forest Service to heed the request of communities, tribes, and individuals to protect important traditional and customary areas for the good of future generations.

This resolution was duly adopted at the Tribal Council of the Hydaburg Cooperative Association at their regular or special meeting held on this 24th day of April 2007 by a quorum of 5 Yes and 0 No and 0 Abstentions.

President

ATTEST: Viola Burgess
Tribal Secretary

04/30/2007 MON 14:37 FAX 002/003

1374

Organized Village of Kake
P.O. Box 316
Kake, Alaska 99830-0316
Telephone 907-785-6471
Fax 907-785-4902 / email KeexKwaan@ KakeFirstNation.org
(Federally Recognized Tribal Government serving the Kake, Alaska area)

April 30, 2007

Forrest Cole, Forest Supervisor
2007 Tongass Forest Plan
Tongass National Forest
Federal Building
648 Mission Street
Ketchikan, AK 99901

Fax: 907-228-6215

Dear Mr. Cole:

The Organized Village of Kake (OVK) is a duly constituted Indian Tribe organized pursuant to the authority of the Federal Indian Reorganization Acts of 1934 & 1936 with the IRA Council as the duly elected governing body formed under its Constitution & By-Laws. OVK functions as a Federally recognized tribal government to provide services to its membership and, by its Constitution, which includes…"the protection of the tribal membership." The OVK membership has in the ancient past, present and future, used Kuiu Island, Kupreanof Island, parts of Admiralty and Baranof Islands for the customary and traditional use of the plants, animal, fish, land, water and air. The customary and traditional uses of these areas are inseparable from the language, tradition and ceremonies of the OVK Tribe. Kake is located on Kupreanof Island in the Tongass National Forest is home to an annual population of 600 people, with OVK's tribal enrollment comprising approximately 65% of the community.

This letter serves as our Tribe's comment on the updated Tongass Forest Plan. The seven alternatives presented in the Draft Environmental Impact Statement (DEIS) call for annual logging amounts ranging from current levels of approximately 52 million board feet in Alternative 1 to a five-fold increase in Alternative 6, the Proposed Action, to even more in Alternative 7. This Tongass Forest Plan amendment gives the Forest Service the opportunity to respond to changing demands for forest resources. Your decision will impact commercial fisheries from Metlakatla to Yakutat.

The Organized Village of Kake would like to select Alternative One as our preferred Alternative. OVK would suggest the US Forest Service take it's planned dollars that will be used to subsidize road building and logging and redirect it to rural villages that have been affected by the two large 50-year contracts for the Sitka and Ketchikan Pulp Mills and the Ketchikan and Wrangell Saw Mills. The USFS can redirect most of its time and money to work with the Southeast Alaska Hydro-electric Intertie to provide cheaper power to rural communities.

Other issues we want to point out:

?? Customary and Traditional Gathering by OVK Tribal Membership: The salmon-producing watersheds on Kuiu, Kupreanof, Baranof and Admiralty are vital to Kake's livelihood and customary and traditional gathering (aka, subsistence use). We support long-term funding for salmon habitat restoration and enhancement projects.

?? We support the development of a forest-wide restoration strategy for degraded watersheds that include salmon habitat restoration and forestry enhancement projects such as tree thinning and tree planting.

Organized Village of Kake
TLMP Letter to the U.S. Forest Service
Page 2

- ?? Because of past and anticipated clearcutting and road building in the region, 75% of Southeast Alaska communities could face a significant restriction to their deer hunting. Some community use areas could lose 50% or more of critical deer winter habitat, depending on which alternative the Forest Service selects. We propose that the USFS not log the areas that provide corridors for the deer. Areas that are critically over-logged need to be restored. Thinning projects could provide valuable employment to residents in rural communities.
- ?? We support no logging roads in undeveloped salmon-producing watersheds on these areas. Roughly 72 percent of all salmon in Southeast Alaska come from unroaded watersheds. The draft Forest Plan states that roads "pose the greatest risk to fish resources." Despite the risks, all alternatives increase road miles on the Tongass between 37 to 127 percent. Instead of fixing the 1,322 culverts that block fish passage on existing roads, the Forest Service wants to spend even more tax-dollars to build more roads. The USFS needs to fix existing problems before you go on to create even more.
- ?? We request that the Forest Service evaluate human disturbances to watersheds at the *very* beginning of timber sale planning by completing a comprehensive watershed analysis.

The USFS needs to re-prioritize for the 21st century. For decades, the Forest Service spent tens of millions of our tax-dollars every year subsidizing logging and building roads on the Tongass. Industries such as recreation, tourism, commercial and sport fishing, and hunting bring in millions of dollars annually to the regional economy. These industries provide more jobs than the Tongass timber industry—without massive taxpayer subsidies. In Kake, Customary and Traditional Gathering is not just important spiritually and culturally, it is an important economic factor. We do not have the luxury of shopping at a Fred Meyer's or similar grocery stores. Our 'bread basket' includes the streams and watersheds that provide homes to the sea life and wild life that we gather.

Thank you for the opportunity to comment on the 2007 Tongass Forest Plan. Please call, write or email our OVK staff, Mike Jackson, Edna Jackson or Teresa Gaudette if you need more information.

Regards,

Lincoln A. Bean

Lincoln A. Bean
OVK Vice-President

Cc: Chris Savage, Petersburg Ranger
SEACC

Klawock Cooperative Association, Tribe

310 Bayview Blvd.
P.O. Box 430
Klawock, Alaska 99925

Phone: 907-755-2265
Fax: 907-755-8800

April 10, 2007

Tongass National Forest
Attn: Forest Plan Adjustment
Federal Building
648 Mission Street
Ketchikan, Alaska 99901

Dear Madam or Sir:

The Klawock Cooperative Association, Tribe Council has met on April 10, 2007 at their Regular Council Meeting, and passed resolution 07-32. The Council would like this to be part of the official record for the 2007 Tongass Plan Adjustment as the comments of the Klawock Cooperative Association, Tribe and look forward to working with the Forest Service as they develop a Tongass Land Management Plan for the 21st Century.

If you shall need to contact me, you can reach me at the phone number or address above. Thank you!

Sincerely,

Helen Jackson

Helen Jackson
Treasurer

Klawock Cooperative Association, Tribe
310 Bayview Blvd.
P.O. Box 430
Klawock, Alaska 99925
Phone: 907-755-
Fax: 907-755-

H-A73

RESOLUTION NO. 07-32

TITLE: A Resolution To Protect Important Areas According To The Traditional And Customary Uses Of TheKlawock People.

WHEREAS: The Klawock Cooperative Association, (hereafter "Tribe"), is a duly constituted Indian Tribe organized pursuant to the authority of Section 16 of the Act of Congress of June 18, 1934 (48 Stat. 984), amended May 1, 1936 (49 Stat. 1250), and

WHEREAS: The Klawock Cooperative Association Tribal Council is a duly elected governing body of the Tribe, authorized to act by and on behalf of its members, and

WHEREAS: The commonality of the customary and traditional use of land, sea, and natural resources is what binds the Tlingit Nation together, and the customary and traditional use of each village is inseparable from the language, tradition, ceremony of the KCA Tribal Members, and

WHEREAS: We hold these truths to be self-evident since time immemorial, and

WHEREAS: The Forest Service is legally obligated to meaningfully consult and collaborate with tribal governments in the development of Federal policies that have tribal implications, as directed by Executive Order 13175, and

WHEREAS: The Proposed Action of the 1997 Tongass Land Management Plan will have far reaching and profound impacts on tribal communities throughout Southeast Alaska, and

WHEREAS: The Proposed Action chosen by the forest fails to adequately protect or respect the customary and traditional use of Tlingit traditional use areas. The Proposed Alternative plans intensive logging activities in some of the last remaining customary and traditional use areas such as Port Estrella, Port Dolores, Port Santa Cruz - Sumez, San Juan Batista – St. Johns, Point Amargura – Fern Pt. – San Fernando Is. And Fish Egg Island, and

WHEREAS: The Forest Service's Proposed Action fails to adequately recognize the value of providing lasting protection to important customary and traditional use areas of the Tongass, the history of previous protection, including the 1999 Tongass Land Management Plan Record of Decision, and the 1989 House passed version of the Tongass Timber Reform Act, and community concerns, and

WHEREAS: The Proposed Action fails to restore important salmon and deer habitat in traditional and community use areas of the people of Klawock, and

WHEREAS: The Forest Service states that "roads pose the greatest threat to fish resources," and that the Tlingit people have depended on salmon since time immemorial, the Proposed Action almost doubles the number of roads within the Tongass, and

WHEREAS: Areas including Klawock, Port Estrella, Port Dolores, Port Santa Cruz – Sumez, San Juan Batista – St. Johns, Point Amargura – Fern Pt. – San Fernando Is., and Fish Egg Is., and other areas that are traditional use areas of the Tlingit People of Southeast Alaska contain highly valuable watersheds important for subsistence, fish and wildlife habitat, and

THEREFORE, LET IT BE RESOLVED: That Klawock Cooperative Association Tribal Council request that the customary and traditional areas Port Estrella, Port Dolores, Port Santa Cruz – Sumez, San Juan Batista – St. Johns, Point Amargura – Fern Pt. – San Fernando Is., and Fish Egg Is., and other areas within Tlingit Country be removed from the timber base in order to best protect the customary and traditional activities of the Tlingit People, and

NOW THEREFORE, BE IT RESOLVED: That the Klawock Cooperative Association Tribal Council urges the Forest Service to heed the request of communities, tribes, and individuals to protect important traditional and customary areas for the good of future generations.

CERTIFICATION

FAXED By:
Date: 4-11-07

H-A74

This resolution was duly adopted at a regularly held meeting this 10th day of April, 2007, by a quorum vote of:

5 **Yes** 0 **No**

~~**President**~~ Treasurer **Secretary**

Kuiu Thlingit Nation

The Kuye'di of Kuiu Island, Alaska
PO Box 8302
Ketchikan, Alaska 99901
email kuiunation@kpunet.net

A First Nations Traditional Government -- Indigenous Original Holders of Allodial Title

The Council of the Kuiu Kwáan are members of The first House of The Kuiu Kwáan and the Shakan Kwaan

Notice of Flawed Process of the Office of Subsistence Management
Notice of Deficiencies and Violations of Tribal Law
Notice of Violations of International Law

Re: **Rural Review Process Office of Subsistence Management**
Date: ~~**September 25, 2006**~~ march 13, 2007
Location: **Saxman Village**

Jurisdiction

The Office of Subsistence Management purports to manage access to the traditional lands, waters and resources of Alaska's First Peoples. It wrongfully assumes a management responsibility for resources integral to the continuation of the Indigenous Peoples. When the Thlingit Peoples first arrived in South East Alaska there were no people here before us. The Thlingits displaced no one! We are the First People. We enjoy our Inherent Rights and Status.

The Federal government, the state of Alaska, and the Office of Subsistence Management do not exercise jurisdiction over the Indigenous Nations and Indigenous Peoples resident in region of Alaska, and have no power to deny us our traditional lifestyle, customary use and trade and traditional way of making a living and culture and a way of life that has been labeled by the newcomers as "subsistence" – an arrogant and demeaning term.

As Sovereigns, Indigenous Peoples have equal status to other nations of the world including the United States. Tribal identity must be preserved and the continuation of the First Peoples of the Americas must be insured. The United States has ratified the Covenant on Civil and Political Rights of the United Nations.

The Kuiu Thlingit Nation (aka the Kuye'di Tribe and Kuiu Kwáan) has existed since time immemorial. Its citizens are a permanent population sharing a specific history and territory; a common ancestry and lineage, tribal and ethnic background; religious, linguistic and cultural tradition. The Kuius have never relinquished rights, lands, waters, resources or liberties of any kind to any foreign power. The governing council safeguards the International Statehood and authority of the Nation and implements tribal law as sovereign. Tribal members are entitled to all ancestral rights and titles including those existing prior to contact with any Foreign Peoples including Tsarist Russia, Spain or the United States of America.

Deficiencies of the Current and Proposed Plan

Special Measures:

The current "plan" is deficient in that it contains no Special Measures recognizing or making provision for the special rights of tribes as indigenous peoples – rights that are mandated by international law, and United Nations covenants, agreements and accords and certain laws of th United States of America.

Dr. Y.N. Kly, Director of the International Human Rights Association of American Minorities (IHRAAM) Specialist in International Human Rights Law, states, "failure to provide priority rights or what is called Special Measures in International Law to the Indian Nations, leading to their extinction would be a grave violation of International Criminal Law, particularly as it relates to the Genocide Convention, to which the US is also a party. On all occasions the majority decision called for non-discrimination to include the requirement of special measures, special rights and self-determination in situations where they were warranted." The right to remedy under law is well established.

The actions of the Office of Subsistence Management and its parent governments and agencies are in violation of the Human Rights of the Indigenous Peoples. Those actions are illegitimate and actionable especially with regard to the state-wide corruption that has resulted in the theft o enormous amounts of resources.

ANCSA is supposed to add, not take away from, what we own. ANCSA, as great as it seems, is less than a meek offer by the United States and is actually a tear drop in the ocean of our huge assets we already have. ANCSA was written without our input regarding lands, waters, and resources, which cannot be taken away unless we give our consent.

Subsistence Award to Non-Natives:

By awarding subsistence to non-natives in Alaska, the state of Alaska has attempted to lump all persons, Indigenous and non-Indigenous alike into the same category, denying Indigenous Nations and Peoples their proper sovereign political status. This action has caused devastating impact on small streams and rivers, which have sustained Indigenous villages for thousands of years. Although the criteria utilized by the Office of Subsistence Management in assigning persons subsistence may be appropriate for non-Indigenous persons, it should be brought before the proper tribal authorities for approval and disposition on a Tribe by Tribe basis. The representatives of the federal and state agencies must come to a realization that each Tribe is properly and legally represented by their respective Traditional Tribal Elders and/or Village Councils. Corporations and entities created and funded by the various federal agencies, ostensibly for Indigenous benefit, are merely extensions of the federal agencies. An award of subsistence should in no way diminish tribal sovereignty or tribal rights or be utilized as a tool t exclude a portion of Indigenous peoples from their rights and titles based upon residence or oth irrelevant criteria.

Rural/Nonrural Designations not Applicable to Indigenous Peoples:

The criteria utilized for award of "subsistence" ignores the Indigenous Nations and Peoples of Alaska and their unique political status under International Law, the Constitution of the United States of America, and even the Alaska statehood Act and the Alaska State Constitution.

It is criminal to deny any First Peoples, due to physical residence, access to the resources that insure their health, ability to practice their culture and spirituality, and that guarantee their continuation as a distinct people. As noted to the Office of Subsistence Management in previous communications, our tribal members continue to practice their culture and way of life wherever they may reside.

"Subsistence" as defined by the Plan Not Applicable to Indigenous Peoples:

We prefer to use the words "traditional lifestyle" as "subsistence" is a non-Indigenous designation that we view as demeaning and arrogant.

Far more than simply supporting life, our traditional lifestyle speaks to the very heart and soul of the Thlingit Peoples. It speaks of respect for and our deep, spiritual ties to Mother Earth and our animal brothers and sisters. It speaks of Thlingits as caretakers, curators and protectors of all the resources of our Great Land.

The Traditional Lifestyle has always been and remains directly related to the spiritual, cultural and historical aspects of the Thlingit Peoples. Traditional foods and materials provide a bond and continuity to our forefathers. We are tied, in the form of respect, to the lands, waters, animals, fishes and fowl.

An Elder once compared the relationship between the Thlingit and our world to the closely interwoven fibers of the Chilkat blankets. Together they are durable and strong. Separating one from the other means the destruction of all. Indeed, the People cannot be true Thlingit unless we adhere to and practice our Traditional Thlingit Subsistence Lifestyle. Subsistence does not mean a tiny measured taste of traditional foods or only what we can carry away in our bellies. It means much more than supplying only immediate requirements. Products from the lands, waters and skies are employed for innumerable uses, such as providing foods, medicines, materials for shelter, waterborne vessels of transportation, clothing, furniture, and ceremonial and ornamental objects of art and providing and generating revenue.

Large quantities of natural resources from our region were utilized on a sustained yield basis. They were traditionally harvested, processed and stored. Portions of the harvest were commercially bartered, traded or sold to gather and accumulate wealth for days when families, Clans or Tribes would be required to assist in times of want or tragedy. When a Clan laid up goods, those goods served as a form of insurance for retirement and old age. A large portion of the first harvest was traditionally given to the elderly or incapacitated. The People commercially sold and bartered any or all of these items to secure by trade or purchase other goods that we di not manufacture or produce by our own efforts.

Our traditional lifestyle means the right to full, unrestricted utilization of the elements of our environment within the spiritual traditions, cultural traditions and customs of the Kwáan. These resources include:

Fishing. The Kuiu Kwáan have always utilized all resources located in both the fresh water and salt water systems for home and Tribal use, for barter and trade, or selling commercially whatever we chose, and what is available.

These water resources include, but are not limited to, all species of salmon that travel or pasture in our waters, bottom fish, trout, herring roe on kelp, all shellfish and crustaceans, various land, seabed vegetation and plants, and whatever is touched by the salt and freshwater systems.

Hunting. Traditional Subsistence has also includes utilizing all land mammals such as deer, moose, mountain goat, Mountain Sheep, brown bear, black bear, wolves, all fur-bearing mammals and virtually every animal that inhabits the region of the Kuiu Kwáan. All birds are utilized for food or ornamental use.

Forest and Land Products: All species of trees and vegetation are utilized for medicines, clothin shelter and to enhance the quality of Subsistence Lifestyle.
Spirituality, Happiness and Well-being: The Thlingit People cannot be Thlingit without access the lands, waters and resources that have been available to them from Tribal Lands for thousan of years.[1]

Traditional Economic Systems:

Traditional Economic Systems refers to the organized production and distribution of goods and services of a People, which enables them to live, subsist and continue as a people off the resources available to them. These systems include all the goods and services necessary to maintain all aspects of the culture to increase the survivability potential of the human being anc his family, Clan and Kwáan.

In Southeast Alaska, Subsistence Economic Systems have their basis with the Traditional Thlingit Kwáans that hold allodial title to their bioregional, kinship related regions. They are dependent upon distribution within Tribal systems that are based upon cooperation and need (rather than competition and greed).

This requires an inventory of the resources available within the Kwáan or Village structure, prioritizing these resources by their relative importance and abundance, and designation of the surplus resources to be used in the transfer or trade to other individuals, groups or nations.

The Kwáan Council (The Government of the Kuye'di) protects the Tribal Member's human rights and economic rights to resources. All Kwáan Members have a Trust Responsibility to respect, protect and nurture the resources. To do otherwise is *Thlickaws*. *Thlickaws* is an act of disrespect and ignorance or an act that breaks the Great Treaty. The perpetrators of such acts unleash negative forces upon themselves and their People. It is the same as asking for bad luck. It can result in grave consequences such as resources no longer being available.

Finally, The Indigenous Peoples, Tribes and Nations, have first priority to utilize all the resources of their respective regions. The immigrant peoples with their various entities, corporations and structures, may then utilize, only with agreement with each Tribe, the surplus as identified by the Indigenous Leadership.

Signed:

What Shaw · George S. James Jr
Marvin Charles SR
Ben James Sr.
Melvin J. Charles

752

Resolution No. 07-11

BY THE COUNCIL ANNETTE ISLANDS RESERVE

METLAKATLA INDIAN COMMUNITY

WHEREAS, *the Metlakatla Indian Community Council is the governing body of the Metlakatla Indian Community, Annette Islands Reserve, Alaska by the authority of the Constitution and By-laws of the Metlakatla Indian Community as approved on August 23, 1944 by the Secretary of the Interior; and*

WHEREAS, *the Metlakatla Indian Community is an Indian Tribe organized under the provisions of Section 16 of the Indian Reorganization Act. 25, U.S.C. Section 476; and*

WHEREAS, *the Metlakatla Indian Community, for centuries, has utilized all the natural resources of the land and waters in its traditional homeland for cultural activities, subsistence, gathering and general wellbeing, which lands include much of what is now the Tongass National Forest that are subject to the jurisdiction of the United States Forest Service; and*

WHEREAS, *the Metlakatla Indian Community, also has enjoyed the benefits of commercial logging and the sales of lumber products for its economic wellbeing and has opposed the shutdown of the Tongass National Forest as a source of raw materials for the Community's timber related industries; and*

WHEREAS, *the Metlakatla Indian Community, as a result of its multiple uses of the lands and waters within its homeland for cultural, subsistence and economic wellbeing, recognizes the need to balance the commercial use of resources from the forests with the need to protect vital fish and wildlife habitat, subsistence hunting and gathering areas and cultural sites; and*

WHEREAS, *the Metlakatla Indian Community, has carefully considered the foregoing balance regarding the uses of Gravina Island and recognizes that the island is far more valuable as a place where traditional uses are promoted, wilderness values preserved and wildlife habitat protected rather than as a place for commercial activities.*

NOW THEREFORE BE IT RESOLVED, *the Metlakatla Indian Community Council hereby request that, in its efforts to modify the Tongass Land Management Plan to comply with law, the Forest Service designates all federal land on Gravina Island to be wilderness or wilderness monuments or such other designation that will ensure that no further development takes place on the island and that it is preserved as a place where traditional cultural and subsistence activities can be pursued for all generation to come.*

Signed and dated this 6th day of March 2007 at Metlakatla, Alaska
METLAKATLA INDIAN COMMUNITY

Victor C. Wellington, Sr., Mayor

H-A77

ATTEST:

Judith A. Eaton, Executive Secretary

CERTIFICATION

I hereby certify that the foregoing Resolution was duly approved at a meeting of the Tribal Council Executives held on March 6, 2007 at which a quorum was present by a vote of 7 FOR and -0- AGAINST.

Signed:

Judith A. Eaton, Executive Secretary

66

H-A78

ORGANIZED VILLAGE OF SAXMAN

Saxman I.R.A. Council
Phone (907) 247-2502 Fax (907) 247-2504
Route 2 Box 2 – Saxman; Ketchikan, Alaska 99901

RESOLUTION # 02-02-01

A RESOLUTION BY THE SAXMAN IRA COUNCIL, WHO IS THE TRIBAL GOVERNING BODY OF THE ORGANIZED VILLAGE OF SAXMAN OBJECTS TO ANY TIMBER CUTTING ON GRAVINA ISLAND.

WHEREAS, The Organized Village of Saxman (O.V.S.) is a duly constituted Indian Tribe, organized pursuant to the authority of Congress by the Indian Reorganization Act and such Legislation of June 18, 1934 and May 1936; and

WHEREAS, The Saxman IRA Council is authorized by the Organized Village of Saxman Constitution and By-laws approved on October 18, 1940 by the Secretary of Interior, and ratified on January 14, 1994 as the Tribe's governing body; and

WHEREAS, The Organized Village of Saxman is the Federally Recognized Tribe, governed by the Saxman IRA Council, who has the authority to represent and act in all matters that concern the health, education, and welfare of the Native people who reside in the Village of Saxman; and

WHEREAS, The United States Forest Service is proposing a timber cut on Gravina Island which has been our Tribal members food locker for hundreds of years; and

WHEREAS, Gravina Island is within the Tongass National Forest and is within the Timber Land Management Plan, and

WHEREAS, The Organized Village of Saxman has not participated in the development of the Timber Land Management Plan; and

WHEREAS, It is the opinion of the Organized Village of Saxman that TLMP is obsolete for today's plan because of many things that has happened since the plan has been approved without Tribal consent or input; and

WHEREAS, Gravina Island has been feeding our Tribal Members by way of hunting of the deer, and many different kinds of sea food, and the gathering of berries which provides for our food pantry for the Village of Saxman; and

WHEREAS, It is the Organized Village of Saxman belief that once cutting of timber on Gravina Island it will be easier to do in the future; and

WHEREAS, the cutting of timber will disrupt the food supply that has been feeding our Tribal Members for hundreds of years, and

WHEREAS, The Organized Village of Saxman has met with officials from the Forest Service on number of occasions and relayed this message, No Timber Cutting on Gravina Island, and

NOW THEREFORE BE IT RESOLVED the Organized Village of Saxman objects to any timber cutting on Gravina Island

CERTIFICATION:
Passed and Approved by a duly constituted quorum of the Saxman IRA Council.

Joe Williams 2/19/02
Joe Williams, II President Date

ATTESTED: Nora DeWitt 2/19/02
Nora DeWitt, Saxman IRA Council Secretary Date

ORGANIZED VILLAGE OF SAXMAN
Saxman I.R.A. Council
Route 2, Box 2 – Saxman; Ketchikan, Alaska 99901
Phone 907-247-2502 / Fax 907-247-2504

RESOLUTION #07-06-94

A RESOLUTION FOR THE ORGANIZED VILLAGE OF SAXMAN BY THE SAXMAN I.R.A. COUNCIL TO STRONGLY REQUEST THE U.S. FOREST SERVICE TO PROTECT AND PRESERVE ALL WATER SHEDS THAT FEED INTO BOSTWICK INLET, AND TO REASSIGN THE U.S. FOREST SERVICE LAND USE DESIGNATION VALUE COMPARISON UNIT (VCU) 7630 FROM TIMBER PRODUCTION TO SEMI-REMOTE RECREATION.

WHEREAS, The Organized Village of Saxman is a duly constituted Indian Tribe organized pursuant to the authority of the United States Congress by the Indian Reorganization Act, and such legislation of June 8, 1934; and

WHEREAS, the Saxman I.R.A. Council is authorized by the Organized Village of Saxman Constitution and Bylaws approved on October 18, 1940 by the Secretary of Interior, and ratified on January 14, 1941, as the Organized Village of Saxman governing body; and

WHEREAS, the Organized Village of Saxman is the federally recognized tribe governed by the Saxman I.R.A. Council, who has the authority to represent and act in all matters that concern the health, education, and welfare of the Native people who reside in the Village of Saxman; and

WHEREAS, the Organized Village of Saxman is a federally recognized Tribe with all powers and responsibilities inherent in a sovereign government; and

WHEREAS, since time immemorial the economy, culture, spiritual tradition, and way of life of tribal citizens has been centered around fishing, hunting, and gathering natural resources, and the lands and waters in and around Bostwick Inlet are a natural food pantry ensuring a manner to sustain ourselves, for our grandchildren, and for seven generations and beyond; and

WHEREAS, all natural resources will suffer greatly if timber production occurs during any years to any water sheds feeding into the Bostwick Inlet Bay as timber production will adversely affect fishing, gathering, and hunting causing substantial harm to tribal citizens and the surrounding tribal communities; and

WHEREAS, these detrimental changes will impact our tribal sovereignty and a heartbreaking loss to the practice of customary and traditional harvesting of food for a tribal community dependent upon Bostwick Inlet; and

WHEREAS, it is particularly significant and critical to continue to fish, hunt, harvest, and gather in an accessible customary and traditional site for the revitalization and continuity of tribal Native culture and to carry on our traditions in Bostwick Inlet; and

WHEREAS, significant harm will afflict tribal natural and cultural resources from the creation and dissemination of large volumes of timber production creating other forms of pollution across the lands and watersheds feeding into Bostwick Bay; and

WHEREAS, salmon, other fish, wildlife, plants, other natural resources and cultural resources are important parts of our culture, economy, spiritualism, and way of life, and any harm to these harms us; and

WHEREAS, timber production execution in VCU 7630 will displace tribal citizens and have a direct economic and social impact creating a loss of assets or access to assets adversely impacting the tribal citizens' means to a livelihood; and

WHEREAS, scientific findings are not conclusive to the extent or impact timber production will have on the waters and lands at the conclusion of timber harvest and seven generations henceforth; and

WHEREAS, local tribal citizens are unable to devote countless hours to learn about, discuss, and debate land management options, but are aware of the sacredness and significance of Bostwick Inlet's food pantry provisions, and

WHEREAS, the U.S. Forest Service seeks out the promotion of a "collaborative approach" between agencies, partners, tribes, and local public (including tribal citizens) as a strategy on the use of forest lands and the Saxman I.R.A. Council believes its communication by resolution is a part of this approach; and

WHEREAS, the Saxman I.R.A. Council urges the U.S. Forest Service not to marginalize the social, economic, cultural identities of the tribal citizens of the Organized Village of Saxman by further timber harvest and to take positive action to safeguard the watersheds feeding into Bostwick Inlet.

NOW THEREFORE BE IT RESOLVED, the Organized Village of Saxman, Saxman I.R.A. Council hereby requests that the U.S. Forest Service and its officers deem the highest degree of protection for the watersheds feeding into Bostwick Inlet; and

BE IT FURTHER RESOLVED, the Organized Village of Saxman, Saxman I.R.A. Council requests the U.S. Forest Service and its officers to eliminate timber harvest in VCU 7630 and minimize risks to jeopardizing a means of livelihood to tribal citizens; and

BE IT FINALLY RESOLVED, the Organized Village of Saxman, Saxman I.R.A. Council vigorously requests the U.S. Forest Service to protect and preserve all water sheds that feed into Bostwick Inlet, and to re-assign the Value Comparison Unit (VCU) 7630 from Timber Production to Semi-Remote Recreation.

CERTIFICATION:
PASSED and **APPROVED** by a duly constituted quorum of the Saxman I.R.A. Council on the 18th day of July 2006 in Saxman, Alaska by a vote of 3 For, 0 Against, 0 Abstentions and 2 Absent.

ATTESTED:

Lee Wallace 7/18/2006
Lee Wallace, Saxman I.R.A. Council President Date

Sylvia Banie 7-18-06
Sylvia Banie, Saxman I.R.A. Council Vice President Date

66

RECEIVED

APR 23 2007

Ketchikan-Misty Fiords Ranger District

FOK 4/27/07

ORGANIZED VILLAGE OF SAXMAN
Saxman I.R.A. Council
Route 2, Box 2; Ketchikan, Alaska 99901
Phone 907-247-2502 / FAX 907-247-2504

April 18, 2007

Denny Bschor
Regional Forester
Alaska Regional Office – Tongass National Forest
P.O. Box 21628
Juneau, Alaska 99802-1628

Dear Denny Bschor,

The Saxman I.R.A. Council is submitting the enclosed official resolution which was approved at the March 20, 2007 Organized Village of Saxman, Saxman I.R.A. Council Meeting. Please let our resolution serve as the official position on the *Forest Plan Adjustment.* The Saxman I.R.A. Council is pleased to sign this resolution with a strong recommendation to protect and preserve significant cultural/spiritual/life-giving/healthy ecosystems within the Tongass National Forest.

I appreciate the opportunity to provide our tribal resolution for Bostwick Inlet, Yes Bay, Cat Island, and Duke Island. Thank you for defending critical areas of the *Tongass* – and for your commitment and hard work.

Sincerely,

Lee Wallace
Lee Wallace
President

copy: Saxman I.R.A. Council
Lynn Kolund, District Ranger
Forrest Cole, Forest Supervisor
Lee Kramer, Project Team Leader

ORGANIZED VILLAGE OF SAXMAN
Saxman I.R.A. Council
Rt. 2, Box 2 (Saxman); Ketchikan, Alaska 99901
Phone 907-247-2502 / Fax 907-247-2504

RESOLUTION #03-07-104

A RESOLUTION FOR THE ORGANIZED VILLAGE OF SAXMAN, SAXMAN I.R.A. COUNCIL URGING THE U.S. FOREST SERVICE ALASKA REGION TO PROTECT HIGH VALUE AREAS OF BOSTWICK INLET, YES BAY, CAT ISLAND, AND DUKE ISLAND AS IT IMPROVES THE REVISION OF LAND AND RESOURCE MANAGEMENT PLANS (FOREST PLANS) FOR EACH OF THE NATIONAL FORESTS IN THE NATIONAL FOREST SYSTEM.

WHEREAS, the Organized Village of Saxman is a duly constituted Indian Tribe organized pursuant to the authority of the United States Congress by the Indian Reorganization Act, and such legislation of June 8, 1934; and

WHEREAS, the Saxman I.R.A. Council is authorized by the Organized Village of Saxman Constitution and Bylaws approved on October 18, 1940 by the Secretary of Interior, and ratified on January 14, 1941, as the Organized Village of Saxman governing body; and

WHEREAS, the Organized Village of Saxman (OVS) is the federally recognized tribe governed by the Saxman I.R.A. Council, who has the authority to represent and act in all matters that concern the health, education, and welfare of the Native people who reside in the Village of Saxman; and

WHEREAS, the Organized Village of Saxman is a federally recognized Tribe with all powers and responsibilities inherent in a sovereign government; and

WHEREAS, in August 2005, the U.S. Circuit of Appeals for the Ninth Circuit issued a decision in *Natural Resources Defense Council, et al., United States Forest Service, et al., 421 F.3d797 (9th Cir. 2005)* that found deficiencies and inadequacies in the process used to develop the 1997 Forest Plan revision; and

WHEREAS, the U.S. Circuit of Appeals for the Ninth Circuit specifically found deficiencies and inadequacies related to timber demand, the range of alternatives considered relative to timber demand and potential effects on roadless areas, and cumulative effects from activities conducted on non-National Forest System lands; and

WHEREAS, the U. S. Forest Service has specified that a 5 Year Plan Review (completed in January 2005) indicates a need to amend the current Tongass National Forest Land and Resource Management Plan; and

WHEREAS, the Organized Village of Saxman, Saxman I.R.A. Council seeks to preserve and afford protection of biodiversity and healthy ecosystems, wildlife habitat, sea life and fish habitat of Bostwick Inlet, Yes Bay, Cat Island, and Duke Island ensuring seven generations forthcoming will inherit and benefit from these high value areas; and

WHEREAS, the Organized Village of Saxman, Saxman I.R.A. Council strongly supports protection of the biodiversity and healthy ecosystems, wildlife habitat, and sea life and fish habitat of the Tongass National Forest lands and waters, and discourages the present and future environmental threat by timber harvest to the areas of Bostwick Inlet, Yes Bay, and Cat Island; and

Continuation of Resolution 03-07-104, page 2:

WHEREAS, the Organized Village of Saxman, Saxman I.R.A. Council is strongly against continued mineral exploration on Duke Island and firmly maintains that Duke Island be

withdrawn from any further mining claims for the present and future protection of Duke Island because it is an ideal site for numerous migratory birds including geese, and because Duke Island is a significance high use *"crossroads"* area for the Tlingit, Haida, and Tsimshian nations for salmon and bottom fish harvesting, and it possesses a historical link and cultural connection to past ancestors, and lastly the Draft E.I.S. Tongass Land and Resource Management Plan (January 2007) on page 3-280 states: *"Alernatives 4 – 7 would have a somewhat greater, but unknown, potential to contribute to cumulative effects associated with mineral activity."*; and

WHEREAS, the Draft E.I.S. Tongass Land and Resource Management Plan (January 2007) explains that the alternatives are constructed using the LUD allocations defined in the 1997 Tongass Forest Plan as the base, and the Organized Village of Saxman objects to the manner of using the 1997 Tongass Forest Plan as a base for constructing LUD allocations knowing that in 1997 and years prior to 1997, the Forest Service did not engage or establish consultation or cooperation with tribal officials of Saxman when the undertaking and formulation and implementation of the 1997 Tongass Forest Plan was developed; and

WHEREAS, in OVS Resolution 02-02-01 and OVS Resolution 07-06-94 from the Organized Village of Saxman, these resolutions attest to tribal and community member's use and harvest of a significant food supply and life giving nutrition from lands and water of Bostwick Inlet on Gravina Island.

NOW THEREFORE BE IT RESOLVED, that the Organized Village of Saxman urges the U.S. Forest Service to lessen and prevent irreversible harm to Bostwick Inlet, Yes Bay, Cat Island, and Duke Island by eliminating timber harvest and mineral exploration, and for the U. S. Forest Service to ensure a standard and guideline limiting timber harvest and mineral exploration activities that will assure exemplary stewardship for Bostwick Inlet, Yes Bay, Cat Island, and Duke Island for seven generations beyond the present; and

THEREFORE BE IT RESOLVED, the Organized Village of Saxman vehemently requests the U.S. Forest Alaska Region to protect, safeguard, and defend high value areas of Bostwick Inlet, Yes Bay, Cat Island, and Duke Island as it improves the revision of land and resource management plans (Forest Plans) for each of the national forests in the National Forest System.

CERTIFICATION:
PASSED and **APPROVED** by a duly constituted quorum of the Saxman I.R.A. Council on the 16th day of April, 2007 in Saxman, Alaska by a vote of 5 **For**, 0 **Against**, and 0 **Abstentions**.

Lee Wallace 4/18/20
Lee Wallace, Saxman I.R.A. Council President Date

ATTESTED:
Ginger M. Fox 04/19/07
Ginger M. Fox, Saxman I.R.A. Council Secretary Date

Sitka Tribe of Alaska

Tribal Government for Sitka, Alaska

RECEIVED APR 19 2007 RA 4-19-07

April 12, 2007

Mr. Forrest Cole, Forest Supervisor
US Forest Service
Alaska Region, Tongass National Forest
648 Mission St.
Ketchikan, AK 99901

RE: Draft Environmental Impact Statement & Draft Proposed Land and Resource Management Plan

Dear Mr. Cole:

The Sitka Tribe of Alaska (STA) is a federally recognized tribal government, and represents over 4,084 tribal citizens based in Sitka. STA is responsible to protect the health, safety, welfare, and culture of our citizens. With this responsibility, Sitka Tribe is reviewing and commenting on your Tongass Land and Resource Management Plan Amendment.

Sitka Tribe of Alaska's customary and traditional territory reflects the lands and waters historically and presently of the Sheet'ka Kwaan, and as such is composed of the western side of Baranof Island, the greater reaches of Peril Strait, southwestern portions of Chichagof Island, and the myriad of islands as well as the waters between these locations.

Sitka Tribe is wary of supporting any of the proposed alternatives listed in the Environmental Impact Statement for the Tongass Land and Resource Management Plan. All of the alternatives contain a Right-of-Way for the Rodman Bay road, which Sitka Tribe strongly opposes. As one tribal member adamantly stated "I am disgusted with the road proposal." There are many in the Tribe who would prefer no option, no development because any development would affect our Customary and Traditional hunting, gathering and fishing sites.

If forced to support an alternative, after reviewing the options Sitka Tribe supports Alternative 1 with the exception of the Right-of-Way for the Rodman Bay road. This alternative would have the least impact on our Customary & Traditional resources and our cultural and sacred sites.

Sitka Tribe would like to address the following areas that are impacted by this plan. Sitka Tribe will not address each alternative and their potential impact because it is understood with each alternative, other than Alternative 1, will substantially affect subsistence, biodiversity, and environmental health. Alternatives 4 through 7 will have devastating impacts on Baranof Island and Sitka Tribe strongly opposes these alternatives.

456 Katlian Street • Sitka, Alaska 99835 • (907) 747-3207 • Fax (907) 747-4915

Land Use Development

Sitka Tribe recognizes the need for economic development, and wants to see economic development that will provide employment or contracting opportunities for our Tribal Citizens. Alternative 1 offers the least disruptive amount of timber harvesting; balancing between moderate and intensive harvesting the total harvest would be 52 million board feet, affecting 1.2 million acres. On Baranof Island deer habitat would receive significant reductions under all alternatives. deer habitat would receive substantial reductions under all alternatives, other than Alternative 1. The magnitude of effect is concentrated particularly on Baranof Island in Alternatives 4 through 7. Under all plans, the harvest on Baranof affects areas that are primary Customary and Traditional hunting and gathering sites.

The Forest Service needs to increase their efforts to manage these stands on Baranof to increase biodiversity. Currently there are four (4) areas on Baranof where the harvest of Sitka deer exceeds 10% of the estimated habitat capability. Without question, any further development will affect the habitat in a negative manner.

Sitka Tribe propose the impact be mitigated by treating the pre-commercial and young growth forest that has developed on the island through past clear cutting by thinning, chipping, and burning slag in place. Thinning is an activity that not only encourages local hire but also will increase the biodiversity of the stands- improving scenic quality, concentrating growth in the fewer larger trees, and improving wildlife habitat.

Steps must be made to remove logging slash that has scarred the habitat on Baranof for decades and rehabilitate the acreage through treatment or reseeding. Sitka Tribe of Alaska encourages the Forest Service to form partnerships with private and public organizations utilizing such organizations such as the Ketchikan Wood Technology Center and other Forest Service Science Centers to address and correct this specific issue. Grants such as Woody Biomass Grants, FS Tribal Granting programs can be utilized in solving the problem of how to utilize low valued material removed from the habitat. Sitka Tribe would commit itself in collaborating with the Forest Service in addressing the forest slash and pre-commercial and young forest growth to improving this environmental and working toward a healthy biodiversity habitat. One Tribal Member in recommending effective slash treatment stated, "In Washington and Oregon the logging companies are required to treat before they wave the logging site, and treating means they burn and spread the ashes of large stumps. The material that can be chipped is spread around once processed, so no piles of debris are left scattered everywhere. These suggestions are a better solution rather than removing the slabs."

Tribal Citizen John Nielsen stated at an STA Cultural Committee meeting, "I've been a resident of Sitka for seventy-seven years. The damage that the Forest Service has done to this country has been devastating. The harvest areas that were clear-cut thirty or forty years ago have been damaged and are subject to mudslides. All the alternatives have the proposed road, and I don't want the road put in place. If the road is put in place, there will be no regulations on vehicles and this would damage the area more. The Tribe should say 'NO' to the proposed road. The previous damage to the habitat ruined fish streams at Nakwasina, Fish Bay, Ushk Bay, Poison Cove, and Fick Cove. Now they want to farm fish and that is not the way to go since it doesn't

make good dry fish. I don't want to see no more clear cutting and no more new roads being built. There should be a way to figure out how to put fish back in the streams."

Trails and Road Development

Sitka Tribe of Alaska was very concerned when the Sitka Access issue came up a few years ago, and Sitka Tribe held a Tribal Citizens' meeting with members of our cultural committee, Customary and Traditional Committee, Herring Committee, and Native Allotment owners, among others. After gathering input from this meeting, Sitka Tribe **opposed** the Rodman Bay alternative. Sitka Tribe supported the Warm Springs route is the least invasive of the roads proposed for "improving" ferry service.

Sitka Tribe is very concerned that *all of the alternatives* contain a Right of Way for the Rodman Bay road. Sitka Tribe is *strongly opposed* to a Right of Way for the Rodman Bay road. Sitka Tribe of Alaska stands opposed to any further road development Again the Tribe reiterates that Sitka Tribe are mandated to protect the hunting, gathering and fishing habitat of our tribal members.

Sitka Tribe is wary of new trails, and would like to be informed of all proposed trails. All trails and roads will impact traditional hunting, gathering and fishing sites, historical and sacred sites to varying degrees. Any trail and road development will increase access to these sites. Increase in access will amplify the impact on the biodiversity of the areas cited for development. A large percentage of the trails and roads proposed will utilize old logging trails that initiated environmental damage to the habitat in the 50s and 60s. Should any development occur, Sitka Tribe propose that in addition to upgrading the trails and roads, funds be utilized for habitat restoration. Examples of habitat restoration Sitka Tribe would like to see include clearing the slags, stumps, rehabilitating the habitat through thinning and other means. Sitka Tribe encourage the Forest Service to develop whatever means possible to restore the clear-cut areas to enhance the biodiversity of the habitat.

Native Allotments:

The land use development plan as well as the trails and roads affect our current and pending allotments. Since time immemorial, Tlingits have utilized this country for settlements, for both summer and winter harvesting campsites. It was not until the middle of the 20th century that an Alaska Native was even allowed to own property. From the beginning of our relationship with the federal government, aboriginal title has been largely ignored until the discovery of oil on the North Slope brought about an immediate need for settlement of aboriginal title. The Allotment Act was instituted but never implemented until "Pence vs. Kleppe" forced BLM to reopen allotment applications that were closed without due process. Due process difficulties have exponentially been made more complicated by time, loss of witnesses, Forest Service removing substandard cabins, etc. Only a fraction of camps will be returned to their rightful owners in the Sheet'ka Kwaan territory.

Many of the allotments awarded have been damaged by clear-cutting and other means. By its definition, allotment land is federal property and as such is the responsibility of the United States Government to protect. The Forest Service by definition is a part of the United States Government. Allotments have been damaged in part due to the misfeasance of the Forest Service. The Forest Service, not unlike the Sitka Tribe of Alaska, the Bureau of Indian Affairs, Park Service and the

Bureau of Land Management, has a responsibility to ensure the protection of the rights of the allottees to enjoy their allotments and realize the full benefits intended in the title.

Native allotments are situated in prime subsistence habitats. All trails, roads, land use development plans will impact some if not all of the allotments (with the possible exception of the Warm Springs road plan). **The Forest Service needs to take affirmative action not only to correct past wrongs but also to prevent future damage to allotments.** Sitka Tribe of Alaska encourages the Forest Service to enjoin a partnership with us to ensure the protection of the allotments and develop sound management to ensure future use to the maximum extent possible.

Sacred Sites:

Sitka Tribe greatly appreciates the efforts of the Forest Service, and specifically John Autrey, to work with the Tribe on drawing up a sacred sites policy. Sitka Tribe is very pleased to see this as part of the Forest Plan. The Forest Service needs to continue acting with continued due diligence in regard to acknowledging and recording sacred sites. The Forest Service will actively ensure that all Forest Service Officers and Line Officers require all employees: 1) Protect tribal cultural and historical information, 2) Consult with Tribes on matters that may affect tribal rights and interests, 3) Work with the Tribes in providing research, transfer of technology, and technical assistance where needed or agreed to concerning cultural and historical information, 4) Ensure that repatriation of Native American human remains and associated funerary objects is done in accordance with the requirements of the Native American Graves Protection and Repatriation Act.

Scientific evidence now embraces the fact that Tlingit have inhabited the Tongass for at least 10,000 years. Baranof Island has been the home to Tlingit since time immemorial. In recent history, Katlian's battle of 1804 has been marked in history as the last armed battle of aboriginal natives of North America against Europeans. It also marked the end of the expansion of the Russians in North America. Ad infinitum, this battle marks the determination and will of all Tlingit to protect their home and its infinite blessings the Tongass gives to its people. Land use development, trails, and roads will not only affect the biodiversity of the habitat but also will directly traverse Native allotments, historical and sacred sites including Katlian's retreat. Any development will require the due diligence and care by the Forest Service in working with the Sitka tribe in identifying and protecting these, sites, camps, villages and trails.

Tribal citizen Duck Didrickson stated at an STA Cultural committee meeting, "This is sacred land. There are many sacred places and the proposed road needs to be opposed now. The previous clear cuts have scarred the land, and people were told that in fifty years the land would be back to normal, which hasn't happened… There should be a plan established for the timber harvest and it should be presented to the Tribe how it's going to be done. There are many sacred places on the proposed road that should be protected. They should use helicopters rather than build a road on the land that the Tlingits have used for thousands of years. If there is timber cut in the proposed areas, the sacred lands will be gone."

In conclusion, Sitka Tribe can support only Alternative 1 *without the Rodman Bay road Right-of-Way*. Sitka Tribe also encourages the Forest Service to emphasize the rehabilitation of areas clear-cut in the Sitka area. Restorative measures need to be emphasized. Sitka Tribe of Alaska needs to be a party in any plan the Forest Service adopts. Sitka Tribe encourage the Forest

Service to adopt local hire and utilize Native hire in its practices that has been exercised in Angoon and Hoonah for maintenance and rehabilitation in the development of trails and roads, cabins and other recreational sites the Forest Service develops. The labor force for the logging and wood products sector in southeast Alaska is comprised of 35% nonresidents. One Tribal member stated "In previous instances, they have hired from down south and met the knowledge of local culture requirement by accepting the statement that they can learn the Native culture. The local and Native hiring policy should be more concrete than a puff of smoke." Sitka Tribe asks that the Forest Service to work cooperatively with the Sitka Tribe and the city of Sitka in reducing the nonresident work force in the logging and wood products industry on Baranof Island to the single digits.

The Tongass Land and Resource Management Plan Amendment while comprehensive is not conducive to thorough review of the developments and or plans that may impact Tribal Customary and Traditional Country. For example in Land Use Designations for timber harvests for each alternative the presentation is on a forest wide harvest. Sitka Tribe would like to see the alternative plans be identified into more specific areas such as Baranof Island where Tribal citizens can have easy access to and discern where the timber production would be, the allowable sale quantity and quality, and the impact designation for Baranof Island through each alternative plan.

In closing, thank you for this opportunity to comment. Sitka Tribe wishes to emphasize the importance of our Customary & Traditional [subsistence] resources and the importance in our cultural sites in *any* alternative considered. If you have any questions, please do not hesitate to contact Helen Dangel Lorrigan, Resource Protection Director for Sitka Tribe at (907) 747-3207.

Sincerely,

Lawrence Widmark

Lawrence Widmark
Tribal Council Chairman

CC: Sitka District Ranger Carol Goularte

99c

YAKUTAT TLINGIT TRIBE

P.O. BOX 418

YAKUTAT, ALASKA 99689

PHONE (907) 784-3238 FAX (907) 784-3595

May 7, 2007

Tongass National Forest
Attention: Forest Plan Adjustment
648 Mission Street
Ketchikan, AK 99901

This letter serves as the Yakutat Tlingit Tribe's official public comment regarding the draft Tongass Land Management Plan (TLMP). The Yakutat Tlingit Tribe has thoroughly evaluated all the Alternatives as well as the Standards and Guidelines, but limited our comments as they apply to the Yakutat Ranger District. We respect other Tribe's and communities opinions with respect to their preferred Alternatives and draft EIS as a whole.

The Yakutat Tlingit Tribe has chosen to modify Alternative 2, in particular the LUD boundaries and designations, to fit with our tribal members' and communities desire for only small timber sales in the Yakutat District. "Just under two-third of residents (61%) also support or strongly support small timber sales" according to the Yakutat Community Opinion Survey: An Analysis of Planning and Development Issues in Yakutat (October 2005, prepared by Sheinberg and Associates for the City and Borough of Yakutat).

You will find an attached map representing the Tribe's wishes to eliminate industrial logging within the Yakutat Ranger District but fulfill small local sawmill and personal use needs by changing the LUD along FS 10 from Timber Production to Modified Landscape designation. All other land outside of this designation have been converted to Semi-Remote LUD.

The boundaries of this LUD were moved outside of the Greater Situk Watershed as significant timber harvest and salvage sales have occurred in this very important area. The Yakutat Tlingit Tribe wishes to protect the Greater Situk Watershed from further timber harvest and salvage in order to sustain a critically important commercial salmon fishery and a world-class sport fishery until it the watershed has been restored. The eastern boundary was lengthened along FS 10 to offer more acres of small timber sales in roaded areas easily accessed by local small sawmill owners. This boundary and LUD change will allow provide approximately 8,984 acres of National Forest for sustainable harvest

Within the Scenic Viewshed and Modified Landscape LUDS we recommend the following changes to TLMP for the Yakutat Ranger District:

1.) Support 200-year rotation with pre-commercial and commercial thinning at logical intervals when needed.
Conversations with local sawmill owners and USFS studies indicate that 200 years is a minimum time span for harvested units to begin producing saw log quality trees and protecting many species (Hanley et al. 2005).

2.) Support selected harvest and small 1-2 acre "patch cuts"
This style of harvest is possible in Yakutat due to the flat topography. Small patch cuts do not open the forest canopy as readily to the wind as does large clear cutting methods. Selected harvest, when done correctly, provides for continuing forest function and remains useful for wildlife, watershed health and the public

3.) Support small sales to meet community needs and create small timber base for value-added wood industry (wood toys, instrument wood, molding, beams, etc.)
The Yakutat Community Opinion Survey conducted in 2005 indicated that 61% of the community is in favor of a small sales program. Only 17% of the community was opposed to this level of logging.

4.) Require research into windthrow patterns for use in harvest planning
On page 3-33 of the West Forelands Landscape Assessment (YRD 2005) the Forest Service, in regard to blowdown damage, states: ***"Almost half the stands adjacent to previous harvest openings had more then 50 percent canopy damage. Over 90 percent of the most severe damage occurred in stands adjacent to harvest openings and about 87 percent of the least damaged stands were in isolated patches".*** Since past management of the USFS has already opened up the Yakutat Foreland Forests to increased blow down intensity, the FS should be responsible for stabilizing the existing unites through research and action.

5.) Require above grade/overlay on all constructed logging roads. Establish a BMP for temporary road construction that prohibits altering the natural seasonal flow of surface or groundwater.
Often logging roads are cut below grade resulting in diverted surface and groundwater. Many streams intersect these below grade roads leading to fry dying when the below grade road surface water dries. To avoid this, roads must be planned with annual flooding in mind.

6.) Require funds generated from sale of timber be set aside for post harvest thinning treatments, silvicultural research, and restoration work.
When problems arise due to management actions by the Forest Service it should be incumbent that money is set aside for mitigation in a timely manner.

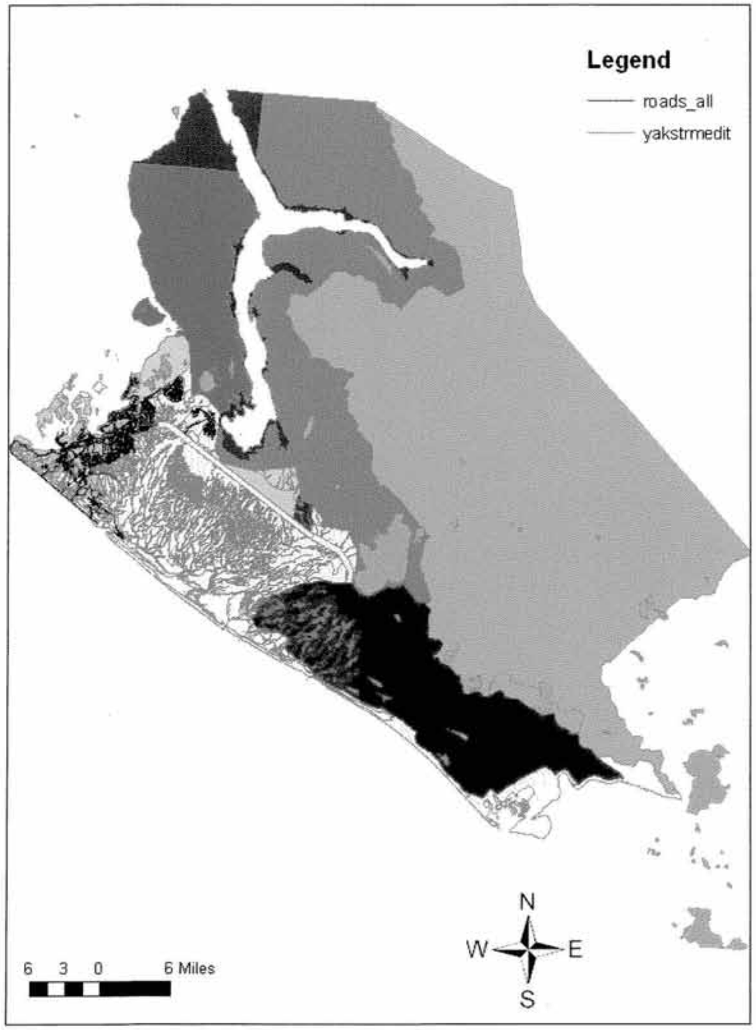
7.) Increase stream buffers from 200 to 500 feet depending on channel type and width. The 500 foot buffer was suggested in the USFS report entitled <u>Scientific Information and the Tongass Land Management Plan: Key Findings from the scientific literature, species assessment, resource analysis, workshop, and workshop risk assessment panels. (1996)</u>

The Yakutat Tlingit Tribe would like the lands surrounding Yakutat to be managed to provide fish and wildlife habitat to support our subsistence foods, tourism, and commercial fishing, sustainably harvest and locally-used lumber and firewood without risking significant damage to our forest and habitat, and a healthy forests for future generations.

Sincerely,

Victoria L. Demmert
President

Alternative 2 Modification



City of Coffman Cove
Resolution 07-14

A RESOLUTION IN SUPPORT OF ALTERNATIVE 7 OF THE DRAFT LAND RESOURCE MANAGEMENT PLAN FOR THE TONGASS NATIONAL FOREST

WHEREAS, Coffman Cove is located in the Tongass National Forest, and

WHEREAS, the residents of Coffman Cove have an abiding respect for the forest, lakes, rivers and wildlife, and

WHEREAS, the need to have a diversified economy with year round jobs with benefits is essential, and

WHEREAS, the Tongass National Forest can support resource development and recreation while maintaining the integrity of the forest for wildlife and fish habitat, and

WHEREAS, the timber industry should be maintained at a level to provide quality jobs and encouraging development of new markets and industry, and

WHEREAS, a stable timber is essential to maintain a timber industry, and

WHEREAS, at the current level of 300 million board feet the Forest Service is only able to supply less than 60 million board feet of timber per yard due to lawsuits and injunctions, and

WHEREAS, 60 million board feet is not adequate to encourage development or maintain a good job market.

NOW THEREFORE IT BE RESOLVED the City of Coffman Cove supports alternative 7 for the revised Tongass Land Management Plan.

ATTEST:

Sara Y. Yockey
Sara Yockey, City Clerk

Mikael Ashe, Mayor

Absent
Russ Holbrook, Seat A

Willy Johnson
Willy Johnson, Seat B

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4-2-07

Elaine Price, Seat C

Randy Wright, Seat D

Carolyn Duncan, Seat F

Kevin Moore, Seat G

787

CITY OF CRAIG ALASKA

April 6, 2007

RECEIVED APR 18 2007 4-18-07

Mr. Forest Cole
Forest Supervisor
Tongass National Forest
648 Mission Street
Ketchikan, AK 99901

Dear Mr. Cole:

The City of Craig supports Alternative 7 of the proposed draft Land and Resource Management Plan for the Tongass National Forest. This alternative alone provides a balance of recreational, industrial, environmental, and cultural uses of the forest. Alternative 7 meets this balance by providing 5.9 million acres of wilderness areas, 5.8 million acres of natural setting, 1.7 million acres of moderate development, and 3.4 million acres designated as intensive development.

Prince of Wales Island is an excellent example of how the forest can be managed to accommodate all users. The island supports: the timber, sport fishing, trapping, and tourism industries; recreational users of the forest; a strong commercial fishing industry; facilities that provide clean and renewable hydroelectricity; an extensive public road system; a healthy and flourishing population of terrestrial fauna; municipal watersheds; and other resources. The island also contains approximately 147,000 acres of wilderness, 169,000 acres of LUD II set-aside areas, miles of river corridor reserves, and twelve distinct communities. These wide ranging activities demonstrate the compatibility of many uses within the forest.

The City of Craig believes that one goal of the new TLMP should be to seek a more diverse economy in Southeast through the restoration of a healthy timber industry. In order to accomplish that goal, it is imperative that an adequate, reliable supply of economic saw log-quality timber be provided from the Tongass Forest. Only Alternative #7 approaches the needed annual timber supply needed for the industry.

The Tongass Forest has a biological potential of providing an annual timber harvest of 1.3 billion board feet. Only about 1.5 million acres from the 5.7 million acres of commercial timberland on the Tongass must be managed for multiple-use in order to sustain a 360 million board foot timber supply. Since the 1.5 million multiple-use acres can include most of the existing 2nd-growth acreage, about 75% of the Tongass old-growth will be untouched in perpetuity. This modest harvest from the National Forest needs to be clearly pointed out in the FEIS and reflected in the final amended plan.

In addition, based on updated science and a decade of field implementation experience with the 1997 TLMP, the current conservation measures that should be excluded from the final amended plan are:

(907) 826-3275 • Fax (907) 826-3278 P.O. Box 725, Craig, Alaska 99921

1. The marten and goshawk standards.
2. The 100-foot buffers on each side of all Class III, non-fish streams.
3. The large, medium, and small Habitat Conservation Areas (HCA) and the old-growth reserve strategy.
4. The 1000-foot beach and estuary buffers (reduce to 500-feet, except in 2[nd] growth areas where the buffer would be 100-feet).

In addition to the above four problematic conservation measures contained in the 1997 plan, the proposed addition of a Legacy Forest Structure guideline in the amendment calling for the retention of old growth timber stand characteristics within all harvest units should be excluded. This requirement would further hamper the economics of timber sales, would create safety hazards during harvest, would leave large trees subject to future wind damage and would increase the costs of sale planning and layout.

Once the planning is completed and these changes are in place, I would ask the US Forest Service to immediately begin preparing sufficient timber sales to allow for the investment necessary to sustain a fully integrated manufacturing industry.

As you are aware the US Forest Service has worked recently with the Nature Conservancy on what are commonly called restoration projects on Prince of Wales Island. The City of Craig supports these efforts and asks the US Forest Service to continue a program of restoration work here, and if possible continue its cooperative relationship with the Nature Conservancy on these projects.

The forest offers many resources to the public. As it decides which forest plan alternative to adopt, the Forest Service should attempt above all else to provide access to all the various resources in the forest. While this approach will likely mean that no one user group gets a development plan that suits its needs only, such a result is not a reasonable expectation for any one group to hold. In the final analysis the Forest Service should adopt the alternative that provides meaningful access to all user groups within the 17 million acre Tongass National Forest, and Alternative 7 meets that test.

Sincerely,

Mayor Dennis Watson

Michael Douville
Craig City Council

Greg Head
Craig City Council

Don Pierce
Craig City Council

Wanda Rice
Craig City Council

Jim See
Craig City Council

A. Millie Stevens
Craig City Council

1113

OFFICE OF THE MUNICIPAL CLERK/ ELECTION OFFICIAL
155 S. Seward St., Room 202
Phone: (907)586-5278 Fax: (907)586-4552
eMail: Laurie_Sica@ci.juneau.ak.us
www.junueau.org

April 26, 2007

Tongass National Forest
Attn: Forest Plan Adjustment
648 Mission Street
Ketchikan, AK 99901

Subject: Draft EIS for the Tongass Forest Plan amendment

Greetings!

The Assembly of the City and Borough of Juneau adopted attached Resolution 2408(b), A Resolution Expressing Assembly Support of the Tongass Futures Roundtable, at its meeting of Wednesday, April 25, 2007.

The resolution expresses the CBJ Assembly's strong support for the forest industry as an important component of the Southeast Alaska Economy. The Assembly commends to the Forest Service the principles adopted by the Tongass Futures Roundtable, and supports the efforts of the Tongass Futures Roundtable to achieve through consensus a "long-term balance of healthy and diverse communities, vibrant economies, responsible use of resources – including timber, while maintaining the natural values and ecological integrity of the forest."

This comment and the attached resolution were e-mailed to: r10_tongass_juneau_rd_plan_adjustment@fs.fed.us on Thursday, April 26, 2007.

Thank you for the opportunity to comment.

Sincerely,

Laurie Sica, CMC
Municipal Clerk
City and Borough of Juneau, Alaska

Presented by: Mayor Botelho
Introduced: 04/25/2007
Drafted by: J.W. Hartle

RESOLUTION OF THE CITY AND BOROUGH OF JUNEAU, ALASKA

Serial No. 2408(b)

A Resolution Expressing Assembly Support of the Tongass Futures Roundtable.

WHEREAS, Southeastern Alaska provides the setting for the Tongass National Forest, the nation's largest national forest at nearly 17 million acres. A 500 mile long archipelago of fjords, glaciers, ridges, jagged peaks, forests, and wetlands, the Tongass forest comprises much of the largest temperate rainforest remaining on Earth; and

WHEREAS, the Forest Service is an agency of the U.S. Department of Agriculture and manages public lands in national forests and grasslands through management plans; and

WHEREAS, the Forest Service originally adopted the current Tongass Forest Plan in 1997 and it has been amended many times since then; and

WHEREAS, additional adjustments and updates of the Forest Plan (officially called a Forest Plan Amendment) are intended to comply with an August 2005 Ninth Circuit Court of Appeals decision and to respond to the findings of the recently completed Tongass Forest Plan 5 Year Review; and

WHEREAS, the Assembly believes that a diverse economy in Southeast Alaska includes a healthy timber industry; and

WHEREAS, the Assembly has supported efforts of the Tongass Futures Roundtable a diverse group of stakeholders, including members of the forest industry, long involved in the Tongass to discuss how to incorporate Southeast Alaska's economic, cultural and ecological values in public policy issues throughout the region; and

WHEREAS, the Tongass Futures Roundtable has identified the following five principles as areas of significant common interest regarding the Tongass Land Management Plan amendments:

1. Protect intact watersheds with important values;
2. Manage timber lands to provide a steady, reliable, and predictable supply of timber to the industry;
3. Transition from old growth to second growth;
4. Promote, support and fund a forest and riparian restoration program; and
5. Provide sufficient, economic timber to support an integrated manufacturing industry.

NOW, THEREFORE, BE IT RESOLVED BY THE ASSEMBLY OF THE CITY AND BOROUGH OF JUNEAU, ALASKA:

Section 1. The Assembly of the City and Borough of Juneau expresses its strong support for the forest industry as an important component of the Southeast Alaska economy.

Section 2. That the Assembly commends to the Forest Service the principles adopted by the Tongass Futures Roundtable.

Section 3. That the Assembly supports the efforts of the Tongass Futures Roundtable to achieve through consensus a "long-term balance of healthy and diverse communities, vibrant economies, responsible use of resources - including timber, while maintaining the natural values and ecological integrity of the forest."

Section 4. Effective Date. This resolution shall be effective immediately upon adoption.

Adopted this 25th day of April, 2007.

Merrill R. Sanford for
Bruce Botelho, Mayor

Attest:

Laurie J. Sica
Laurie J. Sica, Clerk

042

KETCHIKAN GATEWAY BOROUGH

344 FRONT STREET • KETCHIKAN, ALASKA 99901

Office of the Borough Manager, Manager Roy Eckert • roy.eckert@borough.ketchikan.ak.us
907/228-6625 • Fax 907/247-6625

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RECEIVED

April 3, 2007

Mr. Forrest Cole, Forest Supervisor
USDA Forest Service
Tongass National Forest
Federal Building
Ketchikan, AK 99901

Dear Mr. Cole,

Reference is made to the Tongass Land and Resource Management Plan Amendment DEIS January 2007.

The following are the Ketchikan Gateway Borough's concerns relating to this plan amendment:

As you are aware the Ketchikan Borough experienced a serious loss of yearlong family wage jobs with the closure of the pulp mill and then the veneer plant in Ward Cove. One of the key reasons for these closures was lack of an available timber supply along with market conditions and related business decisions. We have pursued an operator for several years for the veneer plant and we believe the new owners will reopen the veneer plant. They have completed a test run of the veneer plant with positive results. Full production of the mill will require a wood supply from the Tongass National Forest. Absence of an adequate timber supply for the veneer plant and other mills in SE Alaska will be devastating to our already fragile economy, and will result in hundreds of jobs leaving the community.

The Forest Service controls 92.9 % of the land within Tongass National Forest; with only 1% being private lands - with the balance of land being owned by the state, local governments, or native corporations. Clearly only a balanced multiple use management plan for the Tongass National Forest lands will provide for the economic health and well being of SE Alaska communities.

A 2000 report by the McDowell Group stated "*Since 1990, volume of timber harvested from the Tongass National Forest has dropped from 470 million board feet to 120 million board feet annually, a 75 percent decline. Timber industry employment is at its lowest point in over 30 years, now directly accounting for only about 670 jobs. At its peak, in the 1970s, the Tongass generated 4,000 timber industry jobs in Southeast Alaska.*" Further on the report states "*Total employment and payroll in Ketchikan are down by 12 percent since 1995. The community has suffered a net decline of 950 jobs and $30 million in annual payroll. Real payroll (adjusted for inflation) has dropped 16% since 1995.*"

Since the 2000 report, the timber harvested on the Tongass has declined another 60%. The few remaining sawmills are struggling to secure enough timber to maintain at least a single-shift operation so they can stay in business and maintain some key employees until an adequate timber supply is restored.

In 2000, Congress passed the Secure Rural Schools Act. This Act provided a safety-net of payments in lieu of the boroughs and unorganized areas of Southeast Alaska's share of timber receipts from the

Tongass. That legislation expired in 2006 and, unless the Act is reauthorized, the boroughs and local governments in Southeast Alaska will again be reliant on the stumpage receipts. At current harvest levels, the loss to Southeast Alaska communities will be about $9 million per year. This amounts to approximately $400,000 that the Ketchikan Gateway Borough relies upon to help fund our borough school system. This is in addition to the lost jobs and lost economic activity from the timber sale program. This loss of funding will mean the local governments will need to raise local taxes to provide funding for schools and roads at current service levels.

The Ketchikan Gateway Borough supports the restoration of the timber industry in Southeast Alaska. The industry, the Southeast Conference, the State of Alaska, the Alaska Congressional Delegation and many others envision a fully integrated timber manufacturing industry in Southeast Alaska. The experts agree that about 360 million board feet of economically harvestable timber is the minimum volume that is needed to enable that vision to become a reality. Since alternative #7 in the Draft Environmental Impact Statement for the Tongass Plan Amendment is the only alternative that seems to satisfy that minimum requirement, we recommend that alternative #7, or one that provides a similar timber supply, be adopted in the final forest plan.

We are also concerned about the issue of timber sale economics on the Tongass. Our understanding is that several of the management prescriptions that were developed for the 1997 land management plan are the primary reason that over half of the timber sales prepared in recent years have been uneconomic, in other words, the cost of accessing, harvesting and processing the timber exceeds the value of the products produced. This situation is even more troubling when one recognizes that wood product prices have been at very high levels in recent years.

<u>Access and Harvest Costs</u>
Both the timber industry and Forest Service District timber sale planners blame most of the high construction and logging costs on four of the 1997 management prescriptions:

1. Mandatory buffer strips on non-fish streams. The Alaska Forest Practices Act requires 100-foot buffers on each side of all anadromous fish streams and high-value resident fish streams whereas the 1997 land management plan requires the 100-foot buffers on all anadromous and resident fish streams and all Class-3 non-fish streams. The requirement to maintain these 200-foot wide strips on the abundant non-fish streams is terribly costly and of questionable value. We agree with the industry that these non-fish stream buffers should be required on a case by case basis and only when absolutely necessary.

2. 1,000-foot no-cut buffers on all beach fringes. The State Forest Practices Act does not require these buffers and prior to the 1997 plan, only 500-foot buffers were required. Consequently, we support much smaller beach fringe buffers such as called for in alternative #7. Also, since the beach fringe buffers were added for old-growth habitat, we support using a much smaller buffer in existing 2nd-growth areas. Managing as much of the existing 2nd-growth as possible for timber production will lessen the need to harvest old-growth timber in other areas.

3. The old-growth reserve strategy sets aside about a million acres of large, medium and small tracts of the highest volume, lowest harvest cost timber stands. Too often the remaining timber stands in each area have such low volumes and high harvest cost that they are not operable once the old-growth parcels are removed. The old-growth reserve strategy is unnecessary because only 1.5 million acres of commercial timberland are needed to sustain the 360 million board foot harvest level. That leaves about 4.2 million acres of old-growth timber on commercial

4. timberland well distributed across the Tongass. Surely leaving ¾ of the old-growth timber untouched in perpetuity is adequate without the imposition of the old-growth reserve strategy.

5. Marten and Goshawk partial cuts. Requiring partial cutting on cable harvesting units is both dangerous and extremely costly. It is also unnecessary for a region that has more than ¾ of its commercial timberland preserved in an old-growth timber status. Furthermore, the guidelines fc protection of these wildlife species are not well founded in science.

The high operating costs associated with the four above guidelines would be further exacerbated if the Legacy Forest Structure guideline as proposed in alternatives #1-6 were adopted. It calls for maintenance of old growth forest structure in all harvest units. Such practices would increase sale design, layout and harvest costs, while creating additional safety hazards. We oppose the inclusion of the above mentioned standards in any of the alternatives.

Manufacturing costs

The cost of manufacturing forest products is higher than necessary because the timber supply has been so severely constrained for so long. The few remaining mills cannot make the necessary investments to remain optimally competitive when they are struggling to maintain a single-shift operation. Further, the sawmill operators are compelled to saw many logs that would more appropriately go to a veneer plant, a fiberboard plant or some other type of processing facility. Sawing these unsuitable logs lowers both the productivity in the mills and the value of the lumber that the mills produce. As a consequence the manufacturing cost is higher than necessary.

Many of the Borough's citizens depend upon subsistence of fish and wildlife resources for their families The Borough does not believe the harvesting and growing of timber under Alternative #7 will be detrimental to the fish and wildlife resources. In fact, we believe species such as deer can and will be more plentiful if Alternative 7 is selected and indeed implemented.

This DEIS is in response to a Ninth Circuit court ruling. Three key issues have been identified: 1) protecting high-value roadless areas, 2) providing a sufficient timber supply to meet market demand and maintain a vibrant economy, 3) protecting wildlife habitat and biodiversity. The Ketchikan Gateway Borough fully believes that Alternative 7 with suggested changes will completely meet and fulfill these key issues.

Summary

The Ketchikan Gateway Borough urges you to adopt an alternative like #7 with whatever changes are needed to insure a suitable land base of 1.5 million acres that provides at least 360 million board feet of economic timber sales offered for sale every year. The industry needs a reliable supply of timber and the 360 million board foot operating level can be provided from a small portion of the Tongass.

These comments were approved by vote of the Ketchikan Gateway Borough Assembly on April 2, 2007

Sincerely,

Joe Williams
Mayor

Copy:

Mark Rey
Department of Agriculture
Undersecretary for Natural Resources
1400 Independence Ave. SW
Stop Code 0108, Wash. DC 20250

Governor Sarah Palin
PO Box 110001
Juneau, AK 99811

Senator Ted Stevens
522 Hart Building
Washington D.C. 20510

Senator Lisa Murkowski
709 Hart Building
Washington D.C. 20510

Congressman Don Young
2111 Rayburn Building
Washington D.C. 20515

Dennis Bschor, Regional Forester
Alaska Region
PO Box 21628
Juneau, Alaska 99802-1628

http://www.borough.ketchikan.ak.us

City of Ketchikan

RECEIVED
APR 13 2007
RCP 4-13-07

April 10, 2007

Tongass National Forest
ATTN: Forest Plan Adjustment
648 Mission Street
Ketchikan, AK 99901

To Whom It May Concern:

At its regular meeting of April 5, 2007, the Ketchikan City Council unanimously approved Resolution No. 07-2190 supporting a sustainable annual economical timber harvest in Southeast Alaska. This resolution reaffirms the position the City Council has strongly supported for several years: the timber industry is essential to the economic health of Southeast Alaska, and a key component of a healthy and diversified economy in Ketchikan.

The Ketchikan City Council continues to believe that the Tongass National Forest should be managed through the Tongass Land Management Plan and local forest planning efforts. Please consider this resolution as part of the comment record regarding this issue.

Sincerely,

Bob Weinstein

Bob Weinstein
Mayor

CC: Congressional Delegation
Governor Sarah Palin
Senator Bert Stedman
Representative Kyle Johansen

Weinstein/Forest Service – timber harvest

334 Front Street / Ketchikan, AK 99901 / PH: 907-225-3111 / FX: 907-225-5075

CITY OF KETCHIKAN, ALASKA

RESOLUTION NO. 07-2190

A RESOLUTION OF THE CITY OF KETCHIKAN, ALASKA SUPPORTING A SUSTAINABLE ANNUAL ECONOMICAL TIMBER HARVEST; RECOGNIZING THE IMPORTANCE OF THE TIMBER INDUSTRY TO SOUTHEAST ALASKA; AND ESTABLISHING AN EFFECTIVE DATE

WHEREAS, the USDA Forest Service is requesting public comment on the Draft Environmental Impact Statement (DEIS) and the proposed Tongass Land Management Plan (TLMP) Amendment; and

WHEREAS, 5.7 million acres of the ten million acre Tongass National Forest are classified as "productive timberland;" and

WHEREAS, approximately 1.5 million acres, inclusive of those areas previously logged, are necessary to sustain a viable economical timber supply in Southeast Alaska; and

WHEREAS, the timber industry in Southeast Alaska has long been a cornerstone of many local economies throughout the region; and

WHEREAS, sustainable timber harvest is consistent and compatible with Ketchikan's interests and goals related to a healthy and diversified economy.

NOW, THEREFORE, BE IT RESOLVED by the Council of the City of Ketchikan, Alaska as follows:

Section 1: The Council of the City of Ketchikan, Alaska expresses support for the public comment process relative to the Draft Environmental Impact Statement (DEIS) and the proposed Tongass Land Management Plan (TLMP) Amendment.

Section 2: The Council of the City of Ketchikan affirms that there are approximately 10 million forested acres in the Tongass National Forest and of that, only 5.7 million acres are currently classified as "productive timberland."

Section 3: Of the 5.7 million acres that are currently classified as "commercial timberland," the Council of the City of Ketchikan urges the USDA Forest Service approve a Tongass Land Use Management Plan (TLMP) Amendment that makes available 1.5 million productive forested acres, inclusive of those acres previously logged, to sustain a viable economical timber supply in Southeast Alaska.

Section 4: The Council of the City of Ketchikan affirms its support of a sustainable economical timber harvest as a component of healthy local and regional economies within Southeast Alaska.

Section 5: This resolution shall become effective immediately upon adoption.

1132

CITY OF KUPREANOF
P.O. BOX 50
PETERSBURG, ALASKA 99833

April 23, 2007

To: Chris Savage, Acting Petersburg District Manager

Subject: Forest Plan Revision, Tongass National Forest

Dear Mr. Savage,

Please enter into public comments Resolution #05-1 from the City of Kupreanof regarding Land Use Designations for the acquired land parcel known as the Petersburg Creek Land Acquisition. This property adjoins the City of Kupreanof and the Petersburg Creek Duncan Salt Chuck Wilderness. A copy of this Resolution is attached.

When the Forest Service makes a decision regarding the Forest Plan Revision and the Petersburg Creek Land Use Designation the City of Kupreanof wishes to restate its strong community desire that the "Tongass National Forest use WILDERNESS designation on all lands within the Petersburg Creek water shed and the remaining lands within the Petersburg Land Acquisition be designated as REMOTE RECREATION".

Thank you for your consideration,

Robert Dolan

Mayor, Robert Dolan

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APR 30 2007
FOREST SERVICE

RESOLUTION #05-1

A RESOLUTION OF THE CITY OF KUPREANOF, ALASKA REQUESTING THAT THE PETERSBURG RANGER DISTRICT, TONGASS NATIONAL FOREST USE A COMBINATION OF WILDERNESS AND REMOTE RECREATION AS THE LAND USE DESIGNATION FOR THE ACQUIRED LAND PARCEL KNOWN AS THE PETERSBURG CREEK LAND ACQUISITION.

WHEREAS, this acquired property is either adjacent to or contained within the City boundaries of the City of Kupreanof and/or borders the Petersburg Creek/Duncan Salt Chuck Wilderness; and

WHEREAS, the entire Petersburg Creek drainage, except these lands, is already designated wilderness; and

WHEREAS, the Kupreanof Policy Plan has a stated goal to "Preserve a roadless community"; and

WHEREAS, the Kupreanof Policy Plan has a policy that states "The City of Kupreanof shall oppose all road construction within its boundaries"; and

WHEREAS, Remote Recreation and Wilderness designations would best protect the purity of potable water sources for Kupreanof residents; and

WHEREAS, it is contained in the City of Kupreanof City Code of Ordinances, Ordinance 76-2 Section 1, "All motorized land vehicles will be prohibited within city limits except on private property". Remote Recreation designation would best support the City of Kupreanof's use policies and the character of the surrounding lands.

THEREFORE, BE IT RESOLVED THAT THE City of Kupreanof strongly requests that the Petersburg Ranger District, Tongass National Forest use WILDERNESS designation on all lands within the Petersburg Creek water shed and the remaining lands within the Petersburg Creek Land Acquisition be designated as REMOTE RECREATION.

Passed and approved by the duly constituted quorum of the City Council of the City of Kupreanof, Alaska on this 10th day of April, 2005.

SIGNED
Richard E. Sprague, Mayor

Attest Judy R. Reinarts
Judy R. Reinarts, City Clerk

1380

City of Pelican

BOX 737 · PELICAN, ALASKA 99832 · PHONE: 735-2202/2203 · FAX: 735-2258 · E-MAIL: cityhall@pelicancity.net · WEBSITE: www.pelicancity

CITY OF PELICAN
RESOLUTION 2007-7

A RESOLUTION FOR THE CITY OF PELICAN, ALASKA URGING THE UNITED STATES FOREST SERVICE TO MANAGE TONGASS FOREST RESOURCES IN A SUSTAINABLE AND BALANCED MANNER.

WHEREAS, the residents of the community of Pelican, Alaska are heavily dependent on the resources of the Tongass National Forest for our food, health, livelihoods, and lifestyles; and

WHEREAS, Pelican's economy is inextricably linked to the health of the fisheries resource; and

WHEREAS, Pelican residents rely heavily on subsistence foods; and

WHEREAS, road building, according to the Draft Environmental Impact Statement, poses the "greatest risk to fish resources; and

WHEREAS, the projected market demand in all the proposed alternatives greatly exceeds current market demand; and

WHEREAS, the City of Pelican supports small mills and their sustainable and value-added operations in the Tongass; and

WHEREAS, none of the alternatives provided adequately address climate change and global warming issues nor provide for adequate game corridors; and

WHEREAS, it is in Pelican's best interest that old growth watersheds remain intact to provide habitat, subsistence, fishing, hunting, recreation, and tourism opportunities.

NOW, THEREFORE BE IT RESOLVED that the City Council of Pelican, Alaska urges the Forest Service to provide funding for restoration of damaged culverts that block fish passage on existing roads; and

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BE IT FURTHER RESOLVED that the Forest Service manage, rehabilitate and offer sales in second-growth forests to meet the needs of small mill operators and set harvest levels consistent with recent market demands; and

BE IT FURTHER RESOLVED that the City Council of Pelican, Alaska urges the Forest Service to manage the forest in a sustainable manner that will provide for varied and healthy ecosystems and an economy that allows sustainable use of subsistence, fisheries, timber, and tourism resources.

PASSED, APPROVED AND ADOPTED THIS 30th DAY OF APRIL, 2007.

Signed: Patricia Phillips
Patricia Phillips, Mayor

Attest: Carol Seymour
Carol Seymour, Assistant Clerk

H-A93

767

CITY OF PORT ALEXANDER

P.O. Box 8068 Port Alexander, AK 99836-8068 907/568-2211 Fax 907/568-2211

RECEIVED
APR 25 2007
Ra
4-26-07

RESOLUTION 07-02

WHERE AS the residents of Port Alexander are heavily dependent upon the Tongass Forest for our water, health, livelihoods and lifestyles, and

WHERE AS the days of slash clearcutting have gone the way to be replaced to a large degree by a value added forest products mentality, and

WHERE AS most of these products have evolved into a potential second growth sourced manufacturing process, and

WHERE AS so many of the other industries of the Tongass base, such as fisheries, tourism, fishing and hunting charter operations, personal recreation and scenic majesty have also evolved into a multifaceted shared resource. Therefore,

BE IT RESOLVED the City of Port Alexander would recommend that the Forest Service take steps to finally eliminate the utilization of the old growth forests for the timber industry; that the Forest Service take steps to assist the current level of forest product manufacturers in transitioning from the old growth to the second growth primary resources.

ADOPTED this 16th day of April, 2007 at a Port Alexander City council meeting

Ptarmica McConnell

Ptarmica McConnell, mayor pro-tem

ATTEST:

Linda Lawson

Linda Lawson, city clerk

1877

RECEIVED
APR 23 2007
Regional Forester's Office

RESOLUTION 07-04-17-03
CITY OF THORNE BAY

A RESOLUTION OF THE CITY COUNCIL FOR THE CITY OF THORNE BAY, ALASKA; SUPPORTING ALTERNATIVE 7 OF THE TONGASS NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLAN

WHEREAS, the City Council is the governing body for the City of Thorne Bay, Alaska; and

WHEREAS, Alternative 7 of the Tongass National Forest Land and Resource Management Plan provides a balance of recreational, industrial, environmental, and cultural uses of the forest; and

WHEREAS, Alternative 7 meets this balance providing 5.9 million acres of wilderness areas, 5.8 million acres of natural setting, 1.7 million acres of moderate development, and 3.4 million acres designated as intensive development; and

WHEREAS, the Prince of Wales Island supports the timber, sport fishing, trapping, and tourism industries; recreational users of the forest; a strong commercial fishing industry; facilities that provide clean and renewable hydroelectricity; and extensive public road system; a healthy and flourishing population of terrestrial fauna; municipal watersheds; and other resources; and

WHEREAS, Alternative 7 approaches the needed annual timber supply needed for the industry.

NOW, THEREFORE, BE IT RESOLVED the Thorne Bay City Council supports Alternative #7 of the Tongass National Forest Land and Resource Management Plan.

PASSED AND APPROVED April 17, 2007

James H. Gould

Jim Gould, Mayor

ATTEST:

Teri Gould

Teri Gould, City Clerk/Treasurer

RECEIVED
APR 30 2007
4-30-07

795

CITY OF WRANGELL
INCORPORATED JUNE 15, 1903

P.O. BOX 531 (907)-874-2381
Wrangell, AK 99929 FAX (907)-874-3952

RECEIVED
APR 16 2007
Eao
4-16-07

April 11, 2007

Forrest Cole
Forest Supervisor
Tongass National Forest
648 Mission Street
Ketchikan, AK 99901

RE: City of Wrangell comments on TLMP/DEIS

Dear Supervisor Cole:

The City of Wrangell would like to offer the following comments on the Tongass Land Management Plan Amendment and Draft Environmental Impact Statement.

Wrangell fully supports the restoration of a healthy timber industry to improve the economy of Southeast Alaska and our own community. In order to accomplish this, it is imperative that an adequate, reliable supply of economic timber be provided from the Tongass National Forest.

As you are aware, the City of Wrangell experienced a serious loss of direct yearlong family wage jobs when the mill closed and the subsequent loss of population. Over ten years later, Wrangell is still feeling the decline in the economy due to continued loss of population and the economic staying power to help build businesses and encourage support and service industries. Full production of the Wrangell sawmill will require an economically viable wood supply from the Tongass National Forest. The absence of an adequate timber supply will devastate the large and small mills in SE Alaska and further impact our already fragile economy, resulting in hundreds of additional jobs leaving the region and the less than 75 direct jobs Wrangell has now employed in the timber industry, not to mention other businesses and jobs relying on the employees of the industry for their direct and indirect income.

The US Forest Service controls 92.9% of the land within the Tongass National Forest with only 1% being private lands and the balance of land being owned by state, local governments or native corporations. A balanced *multiple use* management plan for the Tongass National Forest, that includes timber harvesting, can provide economic health and well being for Southeast Communities. It appears that optimistic or unrealistic assumptions were used previously when defining the ability of the state and private lands to annually supply timber. The vast majority of commercial timberland in southeast Alaska is within the National Forest. Much of the non-federal timberland is now in 2nd-growth timber that will not be mature and again commercially harvestable for about another 30-40 years. Thus, the timber supply must come from the Tongass National Forest.

To assure that the Tongass Land Management Plan provides sustained employment for the region, Wrangell offers the following comments:

- The management of the Tongass National Forest must be based on a balanced multiple use plan that provides the employment, goods and services needed by SE Alaska communities both in the short and long term. Economies of SE Alaska must be weighed heavily during consideration.

- When calculating and analyzing economic impacts, examine the impacts on a community-by-community basis and do not claim that the benefits from a growing community that does not depend on the timber industry somehow offset the negative impacts on communities that do depend on the timber industry.

- The areas scheduled for harvest should be concentrated in intensive management blocks so that fewer roadless and high value areas will be impacted.

- Four of the conservation management measures that were developed for the 1997 TLMP are the primary reason that over half of the timber sales prepared in recent years have been uneconomically viable, in other words, the cost of accessing, harvesting and processing the timber exceeds the value of the products produced. This situation is even more troubling when one recognizes that wood product prices have been at very high levels in recent years. Harvests should be designed and managed so that all of the usable wood is taken and used in some form of value-added manner.

1. Mandatory buffer strips on non-fish streams. The Alaska Forest Practices Act requires 100-foot buffers on each side of all anadromous fish streams and high-value resident fish streams whereas the 1997 land management plan requires the 100-foot buffers on all anadromous and resident fish streams ***and*** all Class-3 non-fish streams. The requirement to maintain these 200-foot wide strips on the abundant non-fish streams is terribly costly and of questionable value. We agree with the industry that these non-fish stream buffers should be required on a case by case basis and only when absolutely necessary.
2. 1,000-foot no-cut buffers on all beach fringes. The State Forest Practices Act does not require these buffers and prior to the 1997 plan, the buffers were not required. Smaller beach fringe buffers could be possible on a case by case basis. The all encompassing beach fringe buffers were added for old-growth habitat, but smaller buffers in existing 2nd-growth areas could be permitted for future sustainable harvest areas. Managing as much of the existing 2nd-growth as possible for timber production will lessen the need to harvest old-growth timber in other areas.

3. The old-growth reserve strategy sets aside about a million acres of large, medium and small tracts of the highest volume, lowest harvest cost timber stands. Often the remaining timber stands in each area have such low volumes and high harvest cost that they are not operable once the old-growth parcels are removed. In stead of the old-growth reserve strategy, if the USFS could identify 1.5 million acres of commercial timberland needed to sustain a healthy industry managed for second growth harvesting, that leaves about 4.2 million acres of old-growth timber on commercial timberland that would not be harvested well distributed across the Tongass. Surely leaving ¾ of the old-growth timber untouched in perpetuity is adequate without the imposition of the old-growth reserve strategy.
4. Marten and goshawk partial cuts. Requiring partial cutting on cable harvesting units is both dangerous and extremely costly and would be unnecessary for a region that has more than ¾ of its commercial timberland preserved in an old-growth timber status.

- Establish sale design on the basis of the resources needing protection and otherwise try to maximize production.

- Provide sufficient, economic timber to support an integrated manufacturing industry and do so at an economy of scale that allows the Southeast Alaska timber industry to harvest and process timber competitively with other regions in the world.

- Manage the forest for multiple uses, one of them being timber harvest. Expanding already developed areas, extending existing roads, and staying out of other higher value areas can concentrate harvest to select areas. But some of the standards and guides would need to be relaxed to allow more harvesting in these already developed areas and road extensions. Enough land for a long term sustainable 2nd growth forest could be developed.

In summary, the City of Wrangell urges the Forest Service to fairly evaluate all portions of the alternatives and select a preferred alternative that allows an annual harvest level to maintain full employment and use of the existing mills as well as permit job growth and manufacturing growth opportunity in the wood manufacturing component. The City also urges the Forest Service to provide flexibility with the conservation management measures in order to more intensely manage harvest areas for timber harvesting.

Once the planning is completed and these changes are in place, we would like the U.S. Forest Service of the Tongass National Forest to immediately begin preparing sufficient timber sales to allow for the investment necessary to restore a fully integrated timber manufacturing industry and healthy economies.

Sincerely,

Valery McCandless, serving as Mayor
Valery McCandless, serving as Mayor

Councilmember Ronald Rice

Councilmember Paul Southland

Wilma Stokes
Councilmember Wilma Stokes

Ernest Christian
Councilmember Ernest Christian

Tom
Councilmember Tom Sims

Councilmember James Stough

City Manager Robert Prunella

1379

CITY OF WRANGELL, ALASKA

RESOLUTION NO. 04-07-1081

A RESOLUTION OF THE COUNCIL OF THE CITY OF WRANGELL, ALASKA, COMMENTING ON THE TONGASS LAND MANAGEMENT PLAN AMENDMENT AND DRAFT ENVIRONMENTAL IMPACT STATEMENT AND SUPPORTING A SUSTAINABLE TIMBER HARVEST

WHEREAS, the City of Wrangell fully supports the restoration of a healthy timber industry to improve the economy of Southeast Alaska and our own community; and

WHEREAS, the City of Wrangell has continued to see a decline in the local economy due to the loss of jobs directly related to the timber industry and indirectly from the continued loss of support and service industry jobs to the community from the declining population; and

WHEREAS, the Southeast Conference has been analyzing the Draft Environmental Impact Statement (DEIS) and proposed Tongass Land Management Plan (TLMP) Amendment and made initial comments to the US Forest Service; and

WHEREAS, unless the problematic conservation measures are adequately addressed and sufficient acres are dedicated to intensive timber management as SEC recommends, there will not be an adequate, reliable supply of economically harvestable timber available to restore an integrated industry and support the many timber dependent communities in Southeast.

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF WRANGELL, ALASKA, is on record supporting the Southeast Conference's comments on the 2007 Tongass Land Management Plan Amendment and Draft Environmental Impact Statement and encourages the U.S. Forest Service to work with communities and Southeast Conference to seek solutions in achieving economic diversification and social well-being of Southeast Alaska by developing a sustainable timber harvest within the Tongass National Forest.

ADOPTED April 10, 2007

Valery McCandless, serving as Mayor
Valery McCandless, Mayor

ATTEST: Christie L Jamieson
Christie L. Jamieson, City Clerk

CITY & BOROUGH of YAKUTAT
P.O. Box 160
Yakutat, Alaska 99689
Phone (907) 784-3323
Fax (907) 784-3281

RECEIVED
APR 30 2007
4-3-0-07

April 25, 2007

To: Tongass National Forest
Attention: Forest Plan Adjustment
648 Mission Street
Ketchikan, AK 99901

The following letter is submitted by the City and Borough of Yakutat Assembly as official public comment regarding the upcoming adjustments to the Tongass Land Management Plan (TLMP). The attached map illustrates the desires of the community of Yakutat regarding land use designations on National Forest within our borough boundaries. This map has been endorsed by the Yakutat Tlingit Tribe, the Yakutat Salmon Board and The Yakutat Planning and Zoning Commission.

We have modified Alternative 2 in regards to Intensive Development, Modified Landscape, Scenic Viewshed and Semi-Remote Recreation Land Use Designations (LUDS).

We have eliminated all intensive development LUD acreage and converted 4,798 acres to modified landscape to allow small timber sales and free-use while encouraging select harvest and small one to two acre "patch cuts". We have reduced the Scenic Viewshed LUD along forest highway 10 to 4,197 acres. The reduction of the Scenic Viewshed LUD is based on its proximity to the Situk River on the Western end of FH10 and the low grade cottonwood/spruce forest on the Eastern end. This alteration will allow for sustainable harvest on 8, 984 acres of National Forest Land.

All remaining lands outside of these designations have been converted to Semi-Remote Recreation LUD. The one exception, which appears to be a FS clerical oversight, is the redesignation of the LUD surrounding Tanis Lake in the Brabazons. This should be redesignated as remote recreation in place of semi remote recreation to match the surrounding LUD. The former timber harvest LUDS redesignated for semi-remote recreation includes the clearcuts along Tawah Creek and the Lost River and the entirety of the federally owned portions of the West Fork Situk, Upper Situk and Old Situk HUC3 Watersheds. Harvest in these watersheds has exceeded sustainable levels. Furthermore, the two major growth industries in Yakutat remain commercial fishing and tourism. We feel that by increasing acreage managed for recreation and subsistence, the USFS will restructure the focus of their budgets by funding tourism infrastructure and planning, and research of fisheries and wildlife resources that community depends on.

Below are specific recommendations for alterations to the TLMP. These comments are made for the geographical area of Yakutat only. However, some of these recommendations may be applicable to the Tongass National Forest as a whole.

Within the Scenic Viewshed and Modified Landscape LUDS we recommend the following changes to TLMP for the Yakutat Ranger District:

1.) Support 200 year rotation with precommercial and commercial thinning at logical intervals when needed.

Conversations with local sawmill owners indicate that 200 years is a minimum time span for harvested units to begin producing saw log quality trees.

2.) Support selected harvest and small 1-2 acre "patch cuts"

This style of harvest is possible in Yakutat due to the flat topography. Small patch cuts do not open the forest canopy as readily to the wind as does large clear cutting methods. Selected harvest, when done correctly, provides for continuing forest function and remains useful for wildlife, watershed health and the public

3.) Support annual small sale program to meet community needs and create small timber base for value added wood industry (wood toys, instrument wood, molding, beams, etc.)

A community survey conducted in 2005 indicated that 61% of the community is in favor of a small sales program. Only 17% of the community was opposed to this level of logging.

4.) Require research into windthrow patterns for use in harvest planning

On page 3-33 of the West Forelands Landscape Assessment (YRD 2005) the Forest Service, in regard to blowdown damage, states*:" **Almost half the stands adjacent to previous harvest openings had more then 50 percent canopy damage. Over 90 percent of the most severe damage occurred in stands adjacent to harvest openings and about 87 percent of the least damaged stands were in isolated patches"***. Since past management of the USFS has already opened up the Yakutat Foreland Forests to increased blow down intensity, the FS should be responsible for stabilizing the existing unites through research and action.

5.) Require all logging roads be constructed above grade. Establish a BMP for temporary road construction that prohibits altering the natural seasonal flow of surface or groundwater.

The attached photos illustrate how roads divert surface and groundwater. To avoid this, roads must be planned with annual flooding in mind.

6.) Require funds generated from sale of timber be set aside for post harvest thinning treatments, silvicultural research, and restoration work.

When problems arise due to management actions by the FS it should be incumbent that money is set aside for mitigation in a timely manner.

7.) Increase stream buffers from 200 to 500 feet depending on channel type and width. The 500 foot buffer was suggested in the USFS report entitled <u>Scientific Information and the Tongass Land Management Plan: Key Findings from the scientific literature, species assessment, resource analysis, workshop, and workshop risk assessment panels. (1996)</u>

The attached photo shows a riparian buffer failure off the end of a USFS 2000 acre clearcut. This buffer was 300 feet wide.

What the majority of Yakutat Residents want is to have, in essence, a community woodlot that is managed sustainably and at low intensity. We want the timber lands managed so that they can be used by all residents for lumber and firewood, provide habitat for wildlife and fish, a place to hunt and trap, and a landscape that shows visitors good stewardship practices. The rest of the non-timber National Forest land is presently providing well managed commercial fishing, guiding, and subsistence opportunities for Yakutat's citizens and the public of the United States. We commend this management and encourage the Forest Service to focus on these activities as the planning team rewrites TLMP.

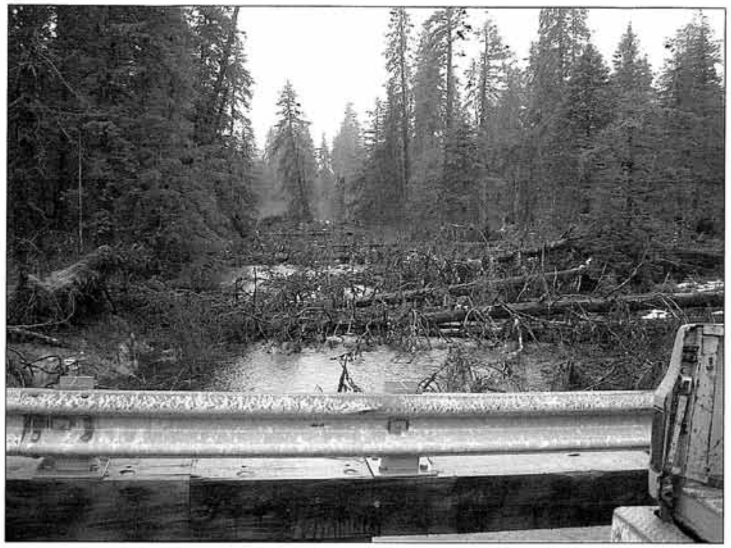
Sincerely,

Dave Stone, Mayor

February 2005 Yakutat Salvage Sale II Road

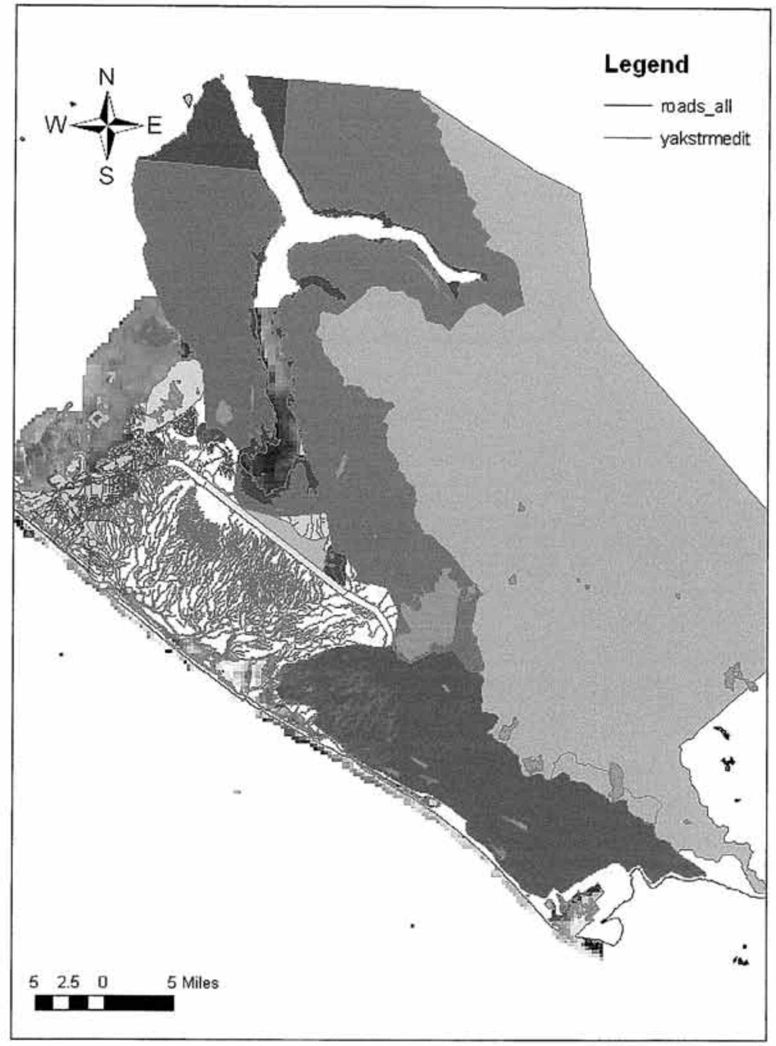
May 2004 – blowdown harvest road on private land adjacent to National Forest

First logging road constructed for Yakutat Salvage Sale 1 (2004)



Upper Riparian Buffer failure on the West Fork of the Situk River Buffer failure extends for several hundred yards downstream (2005)

Alternative 2 Modification



H-A101

Land Use Designations

WILDERNESS AND NATIONAL MONUMENT

Wilderness and Wilderness National Monument- Preserve essentially unmodified areas to provide opportunities for solitude and primitive recreation. Limit motorized access.

Non-Wilderness National Monument - Facilitate the development of mineral resources in a manner compatible with the National Monument purposes.

MOSTLY NATURAL SETTING

LUD II - Maintain the wildland characteristics of these congressionally-designated unroaded areas. Permit fish and wildlife improvements and primitive recreation facilities.

Old-Growth Habitat - Maintain old-growth forests in a natural or near-natural condition for wildlife and fish habitat.

Research Natural Area - Manage areas for research and education and/or to maintain natural diversity on National Forest System Lands.

Semi-Remote Recreation - Provide for recreation and tourism in natural-appearing settings where opportunities for solitude and self-reliance are moderate to high.

Remote Recreation - Provide for recreation in remote natural settings outside Wilderness, where opportunities for solitude and self-reliance are high.

Municipal Watershed - Manage municipal watersheds to meet State water quality standards for domestic water supply.

Special Interest Area - Preserve areas with unique archaeological, historical, scenic, geological, botanical, or zoological values.

Wild, Scenic, or Recreational River - Maintain and enhance the outstandingly remarkable values of river segments which qualify the river to be classified as a Wild, Scenic, or Recreational River.

MODERATE DEVELOPMENT

Scenic Viewshed - Maintain scenic quality in areas viewed from popular land and marine travel routes and recreation areas, while permitting timber harvest.

Modified Landscape - Provide for natural-appearing landscapes while allowing timber harvest.

Experimental Forest - Provide opportunities for forest practices research and demonstration.

INTENSIVE DEVELOPMENT

Timber Production - Manage the area for industrial wood production. Promote conditions favorable for the timber resource and for maximum long-term timber production.

Minerals - Encourage mineral exploration and development of areas with high mineral potential.

1475

CRAIG COMMUNITY ASSOCIATION

P.O. Box 828
Craig, Alaska 99921
Phone: 907-826-5125
Fax: 907-826-3997
Email: whalehouse@hotmail.com

Date: 4 April 2007
To: USFS
From: Craig Community Association
Environmental Protection Division
Re: Tongass Land Management
Plan (TLMP) Comment

Greetings U.S. Forest Service,

Thank you for your time. Craig Community Association is a federally recognized Tribe; with 672 qualified and enrolled Tribal members.

This letter is in regards to the comment that is requested for the Tongass Land Management Plan (TLMP). As a federally recognized Tribe, we support "Alternative 1".

"Alternative 1" takes a lot of economic stress that our forest might not be able to handle anymore. The 20th Century was "The easy way out". In the end, our lands are paying for our mistakes. We must protect and preserve our precious forest. Keeping our logging to a minimum is crucial to the survival of the 21st Century. Southeast Alaska is nothing without our forest.

Alternative 1 will provide a mix of National Forest uses and activities, but would give much additional emphasis to maintaining inventoried roadless areas, associated fish and wildlife values, and unroaded recreation, tourism, and subsistence opportunities, relative to the current Forest Plan. Timber would be managed primarily within the roaded land base and the vast majority of inventoried roadless areas would remain in a natural condition. A total of 1.2 million acres of the Tongass would be in Development LUDs and 15.6 million acres would be in Non-development LUDs.

The 21st Century is full of opportunity- capitalize. We need to get our 20th Century thought and applications out of the stream and start to apply 21st Century consequences with our future actions. We must not make the same mistake again.

The data presented in your EIS shows a decline in the amount of timber being harvested within the TNF; as well as an increase in recreational and subsistence activities. The data presented should be considered in making your decision. We are suggesting that recreation, subsistence and "sacred sites" be put in the front, and set timber sales to a gradual halt.

We understand that up to 450 employees in Southeast Alaska depend on the timber industry (5%). Please take into consideration how many other employees that can be implemented to a National Forest that supports recreation, tourism, and subsistence; not to mention how much wildlife will be enhanced (62% natural resource based). More employees will benefit this "New Horizon", with the interagency protection of our "Sacred Sites".

More areas of great concern are the protection of our subsistence rights, and the conservation and monitoring of our "sacred sites" that are located within the TNF. Sacred Sites are valuable to indigenous people of the TNF. These areas should be protected and monitored under Tribal/USFS interagency supervision. These sacred areas need special attention and will require sensitive monitoring from both governmental agencies. This action will provide balance- a much needed ingredient in today's economy.

Tourism has spiked since the 1990's and will continue to grow. Tourists will not travel to come and see a land that "Once thrived". Tourists are eager to see the true meaning of "The Last Frontier".

Our environment- this is the largest concern in our Draft EIS for the Tongass Land Management Plan. With the increase in the Industrial Age and in global population, a lot of weight is being put on natural resources. Once again, balance is the key ingredient missing in this recipe.

The introduction of noxious or invasive animal and plant species in our forests is drawing more concern with each new initiation. They present no natural predators to control this silent outbreak. Interagency attack is an effective "first-step" to remediation. The Forest Service and Tribes must work together.

Global climate change has scientific based proof that Alaska's overall temperature is increasing faster than any area in the world. Our trees and plants have the balancing effect to help neutralize such worldwide events from happening. We must protect our future today.

We thank you for your time and consideration.

Respectfully,

Dennis Nickerson
Environmental Coordinator
Craig Community Association

Date

784

PRINCE OF WALES COMMUNITY ADVISORY COUNCIL

Chairman: Jon Bolling, Craig
Vice Chairman: Art King, Naukati
Secretary/
Treasurer: Elaine Price, Coffman Cove

PO Box 725
Craig, AK 99921
(907) 826-3275
(907) 828-3380
FAX: (907) 826-3278

April 17, 2007

Mr. Forest Cole
Forest Supervisor
Tongass National Forest
648 Mission Street
Ketchikan, AK 99901

RECEIVED
APR 18 2007
RAS 4-18-07

Dear Mr. Cole:

The Prince of Wales Community Advisory Council supports Alternative 7 of the proposed draft Land and Resource Management Plan for the Tongass National Forest. This alternative alone provides a balance of recreational, industrial, environmental, and cultural uses of the forest. Alternative 7 meets this balance by providing 5.9 million acres of wilderness areas, 5.8 million acres of natural setting, 1.7 million acres of moderate development, and 3.4 million acres designated as intensive development.

POWCAC is an association of communities on Prince of Wales Island (POW) dedicated to improving the quality of life on Prince of Wales. POWCAC achieves this goal by acting in an advisory capacity to State and Federal agencies concerning issues that affect Prince of Wales communities.

Prince of Wales Island is an excellent example of how the forest can be managed to accommodate all users. The island supports: the timber, sport fishing, trapping, and tourism industries; recreational users of the forest; a strong commercial fishing industry; facilities that provide clean and renewable hydroelectricity; an extensive public road system; a healthy and flourishing population of terrestrial fauna; municipal watersheds; and other resources. The island also contains approximately 147,000 acres of wilderness, 169,000 acres of LUD II set-aside areas, miles of river corridor reserves, and twelve distinct communities. These wide ranging activities demonstrate the compatibility of many uses within the forest.

POWCAC believes that one goal of the new TLMP should be to seek a more diverse economy in Southeast through the restoration of a healthy timber industry. In order to accomplish that goal, it is imperative that an adequate, reliable supply of economic timber be provided from the Tongass Forest. Only Alternative #7 approaches the needed annual timber supply needed for the industry.

PARTICIPATING COMMUNITIES:
Coffman Cove, Craig, Hollis, Hydaburg, Kasaan, Klawock, Naukati, Thorne Bay, Whale Pass

The Tongass Forest has a biological potential of providing an annual timber harvest of 1.3 billion board feet. Only about 1.5 million acres from the 5.7 million acres of commercial timberland on the Tongass must be managed for multiple-use in order to sustain a 360 million board foot timber supply. Since the 1.5 million multiple-use acres can include most of the existing second growth acreage, about 75% of the Tongass old growth will be untouched in perpetuity. This modest harvest from the National Forest needs to be clearly pointed out in the FEIS and reflected in the final amended plan.

In addition, based on updated science and a decade of field implementation experience with the 1997 TLMP, the current conservation measures that should be excluded from the final amended plan are:

1. The marten and goshawk standards.
2. The 100-foot buffers on each side of all Class III, non-fish streams.
3. The large, medium, and small Habitat Conservation Areas (HCA) and the old growth reserve strategy.
4. The 1000-foot beach and estuary buffers (reduce to 500-feet, except in 2nd growth areas where the buffer would be 100-feet).

In addition to the above four problematic conservation measures contained in the 1997 plan, the proposed addition of a Legacy Forest Structure guideline in the amendment calling for the retention of old growth timber stand characteristics within all harvest units should be excluded. This requirement would further hamper the economics of timber sales, would create safety hazards during harvest, would leave large trees subject to future wind damage and would increase the costs of sale planning and layout.

Once the planning is completed and these changes are in place, the US Forest Service should begin immediately preparing sufficient timber sales to allow for the investment necessary to sustain a fully integrated manufacturing industry.

As you are aware the US Forest Service has recently worked with the Nature Conservancy on what are commonly called restoration projects on Prince of Wales Island. POWCAC supports these efforts and asks the US Forest Service to continue a program of restoration work here, and if possible continue its cooperative relationship with the Nature Conservancy on these projects.

The forest offers many resources to the public. As it decides which forest plan alternative to adopt, the Forest Service should attempt above all else to provide access to all the various resources in the forest. While this approach will likely mean that no one user group gets a development plan that suits its needs only, such a result is not a reasonable expectation for any one group to hold. In the final analysis the Forest Service should adopt the alternative that provides meaningful access to all user groups within the 17 million acre Tongass National Forest. Alternative 7 meets that test.

Thank you for considering our comments.

Sincerely,

Jon Bolling
POWCAC Chairman

PARTICIPATING COMMUNITIES:
Coffman Cove, Craig, Hollis, Hydaburg, Kasaan, Klawock, Naukati, Thorne Bay, Whale Pass

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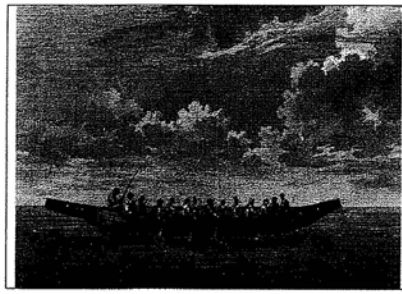


Southeast Alaska Regional Advisory Council

Bertrand Adams Sr., Chair

P. O. Box 349
Yakutat, AK 99689
907 784 3357
kadashan@ptialaska.net

April 27, 2007

RECEIVED APR 27 2007

U.S.D.A Forest Service, Region 10
P.O. Box 21628
709 W. 9th Street
Juneau, Alaska, 99802-1628

Dear sirs,

H-A104

The Southeast Regional Advisory Council (SERAC) met in Kake, Feb. 26 through Mar. 1, 2007. SERAC represents all southeast subsistence communities including Yakutat. The Council is authorized by the Alaska National Interest Lands Conservation Act (ANILCA) and chartered under the Federal Advisory Committee Act to provide recommendations to the Federal Subsistence Board concerning regulatory and land management actions that may affect subsistence uses of fish and wildlife. ANILCA and the charter also recognizes the Council's authority to "initiate, review and evaluate proposals for regulations, policies, management plans, and other matters related to subsistence uses of fish and wildlife on public lands within the region" and to "provide a forum for the expression of opinions and recommendations…..(on) any matter related to the subsistence uses of fish and wildlife on public lands within the region." Our 13 Council members come from 11 Southeast Alaska communities. They are very well informed concerning the effects of timber management in the region. The Council provided comments on the Tongass Land Management Plan Revision on Nov. 11, 1997 (appended); many of our comments at made at that time remain valid today.

At our recent meeting, Council members reviewed the Tongass Land and Resources Management Plan Amendment, Draft Environmental Impact Statement (DEIS). The Council wishes to acknowledge the attention paid to the review of this plan by Council members Bangs, Hawkins, Hernandez, and Wallace. The following are the Council review comments. Overall, the Council is concerned that the DEIS does not adequately recognize the importance of the subsistence use taking place in the Tongass National Forest, that it does not provide sufficient protections for this use, and that it does not provide enough information to evaluate the foreseeable effects of proposed timber

management, increased levels of tourism and non-subsistence consumptive use, and of global warming on subsistence uses.

1. **Purpose and need**. The Council questions the treatment of the DEIS of market demand. While the Tongass Timber Reform Act may direct Forest Service to meet market demand, Forest Service may have interpreted "market demand" incorrectly. The best indicator of market demand is current and past harvest levels actually achieved. Over the past decade, actual harvests from Federal public land have generally been under 100 mmbf per year. This recent recorded harvest provides an accurate metric for "market demand." The Council believes that the DEIS should use this figure or a slightly higher figure allowing for incremental growth of existing harvesting businesses as the basis for market demand.

   The Council strongly objects to setting market demand to meet the possible demand from industries or businesses that may one day choose to operate in Southeast Alaska. We do not believe that Forest Service needs to meet the fictional demand of businesses that exist only as ideas or proposals. Should viable industrial plans to use Tongass NF timber come close to implementation in the future, the plan may be amended to accommodate these new uses.

2. **A Revision or an Amendment**? The Council is unclear why Forest Service has chosen to undertake an amendment rather than a plan revision. We believe that the ecological situation on the Tongass NF has changed sufficiently, human uses and demands put on the forest have changed, global warming is upon us, and that new management perspectives have emerged since the plan was first approved. This argues for a full plan revision and not an amendment. The main changes we note are:

   a. Virtual collapse of the large scale industrial timber industry in the region. Presently, small producers are the main timber harvesters. Note that the Council supports these local Alaskan business endeavors.
   b. Tourism has grown exponentially since the plan was approved. The charter fishing industry is part of this growth and impacts subsistence directly.
   c. Management perspectives identifying the critical need to restore and rehabilitate clear cut areas of the Tongass NF have come to the fore.
   d. The consensus from scientific and Traditional Econological Knowledge is that the Tongass NF is being and will be profoundly affected by climate change. This effect on the forest and on subsistence uses needs to be fully evaluated in a new forest plan.

3. **Subsistence land use designation**. The Council continues to be concerned about the lack of an appropriate land designation for subsistence. In 1997 we wrote, "Although the Plan included 19 land use designations for purposes such as logging, recreation, research, and municipal watersheds, it included no

designations to protect the most important subsistence use areas of rural communities." To the extent that the DEIS considers subsistence at all, it looks at the effect of other uses on subsistence. We believe that subsistence is a prime use of Tongass NF natural resources and that it should be designated as such. The DEIS must plan **FOR** subsistence rather than merely see the effect of plan activities upon subsistence uses.

4. **Subsistence studies.** The original TLMP identified the need to conduct periodic harvest assessments and other studies of subsistence to provide the data needed by management and to assess whether ANILCA Sec. 810 protections were insuring a continuance of subsistence uses. The Council notes that this provision appears to have been dropped from the DEIS.

   The Council believes that periodic assessment of subsistence harvests and other documentation of subsistence characteristics needs to take place. Projects conducted through the Federal Subsistence Program have led to development of tribal and community capacity to successfully undertake management studies of this type.

5. **Conservation strategy**. Council members reviewed the joint statement of peer review committee members concerning the adequacy of conservation measures proposed for wildlife in the DEIS. The Council agrees with the conclusions that:

   a. The habitat reserves identified are inadequate to provide for viability of wildlife species on the Tongass NF.
   b. There is not enough connectivity between old growth reserves. Key areas for connectivity are:
      i. Cleveland Peninsula
      ii. Bay of Pillars-Port Camden-Three mile arm to Tebenkof Wilderness area on Kuiu Island
      iii. Whale Pass and Honker Divide on Prince of Wales Island
      iv. Hoonah Sound-Port Frederick-Tenakee Inlet on Chichagof Island
      v. Portage Bay-Duncan Salt Chuck on Kupreanof Island.
   c. There is too much fragmentation of wildlife habitat.
   d. In areas where there are wolves, fragmentation results in increased wolf predation and increased pressure on deer.

6. **Viability as a standard**. The DEIS emphasizes species viability and distribution as a standard that needs to be met. In the Council's view mere viability is not an appropriate standard. Subsistence users need to be able to harvest the wildlife and fish they need for subsistence within their normal community hunting and fishing areas, generally those areas where they have recognized customary and traditional use of the species in question. A better standard would be "sustainable and normally distributed" if this were taken to mean that fish and wildlife populations would be maintained in sufficient abundance and in locations where subsistence

harvests may take place.

7. **Habitat rehabilitation and restoration (R&R)**. Some restoration and rehabilitation projects aimed at recovering the original biological productivity of clear cut areas have been begun on Prince of Wales Island. The DEIS needs to greatly expand the scale and scope of R&R to address all clear cut and second growth areas on the Tongass NF. The stewardship responsibility of the Forest Service for areas that have had active timber management includes planning to restore areas to their natural condition.

8. **Impacts on fish and fisheries**. The Council believes that the DEIS inadequately reviews the impact on the region's fish populations and fisheries. Is it really plausible that there is ***no effect*** anywhere from the aggressive timber harvesting program pursued on public lands over that past 30 years? The Council would like more thorough discussion of effects on stream flow, stream temperature, transport of nutrients and feed from headwaters to fish rearing habitat, and the influence of large wood and beaver dams on fish productivity.

   The Council is concerned that known problems with culverts obstructing fish passage, with siltation from forest roads, and with detritus at log transfer facilities are not competently addressed. We need to know when and how these problems will be remedied.

   Steelhead should be listed as a species of concern .

9. **Competition for resources**. The DEIS needs to address the effects of competiton on subsistence uses. Increased road building for timber production would lead to more competition for fish and wildlife resources. Trout and steelhead are particularly vulnerable to over exploitation when there is road access to streams. Subsistence use areas on Gravina Island, Prince of Wales island, Kupreanof island, Wrangell island, Mitkof island, Baranof island, and Chichagof island all have ferry access, making them prone to competition from non subsistence hunters and fishers.

   An increase in timber production would require more logging camps in remote areas. This would greatly increase competition in some presently used subsistence areas.

10. **Climate change**. The DEIS needs a much fuller discussion of climate change and how the DEIS will respond to our best prediction of what lies ahead. Climate change and it's effects on the health of the forest ecosystem essential to wildlife and fish habitat is of great concern to the Council. The Council believes that maintaining diversity of forest flora is very important in a changing climate. Large scale changes to the landscape as a result of intensive logging minimizes diversity. Climate change as stated in the draft report will result in more severe weather which will cause more blowdowns, landslides, and siltation, impacting

streams. Summers could also be hotter and drier. Resulting insect infestation leading to loss of forest could effect stream temperatures. Cedar decline as a result of climate change is also resulting in loss of tree cover for winter range and stream shading.

11. **Maintenance of cultural practices**. In addition to cultural values mentioned in the draft report, the Council also believes that maintaining remote areas where subsistence activities take place is important. A certain amount of solitude is a valuable aspect of the subsistence way of life.

12. **Community assessments**. The council disagrees with the draft plan's blanket conclusion that their will be no impacts to subsistence fisheries for any communities in the Tongass forest. The Council notes that the community assessments do list many impacts to subsistence deer hunting. Given the importance to the rural economy of subsistence hunting, we think impacts on subsistence should be heavily weighted when deciding on an alternative.

13. **ANILCA Sec**. 810. Most or all of the alternatives proposed "may significantly restrict subsistence uses." The DEIS needs to show the relative level of impact from the different alternatives proposed. The alternatives directing large timber harvests have decidedly greater restrictions on subsistence uses than alternatives that direct less calamitously large harvests. Timber harvests in areas documented to be particularly important to subsistence users will have more effect than timber harvests that are less productive for subsistence harvesters.

The Council understands that, "No withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such Federal agency--:

1) Gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to section 805;
2) Gives notice of, and holds, a hearing in the vicinity of the area involved; and
3) Determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands; (B) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition, and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.

The Council is primarily concerned with 3) above. We do not believe that the DEIS has demonstrated that the restrictions on subsistence uses that would occur from timber harvest levels above those of the past 10 years is "necessary" as intended in Sec. 810. Such excessive harvest would not be consistent with sound management of the Tongass NF. Further, the Council is not convinced that the

DEIS has demonstrated that the proposed actions would involve the minimum amount of land necessary. The DEIS also has not demonstrated specifically how adverse impacts to subsistence uses and resources would be minimized.

Please address any questions with this letter either directly to me or through Dr. Robert Schroeder, Subsistence Management Coordinator, U. S. Forest Service, Alaska Region, Box 21628, Juneau, AK 99802-1628, 1 800 586 7895, fax 907 586 7860, rschroeder@fs.fed.us.

Sincerely,

/S/

Bertrand Adams Sr.
SERAC Chair

cc. Council Members:
Michael Bangs, Petersburg   Nick Davis, Kake   Mike Douville, Craig
Merle Hawkins, Ketchikan   Donald Hernandez, Pt. Baker/Petersburg
Joe Hotch, Klukwan   Floyd Kookesh, Angoon   Harvey Kitka, Sitka   Patricia Phillips, Pelican   Dick Stokes, Wrangell   Lee Wallace, Saxman
Frank Wright Jr., Hoonah

Denny Bschor, Regional Forester, USDA Forest Service
Steve Kessler, USDA Forest Service
Dr. Winifred Kessler, WFEW, USDA Forest Service
Pete Probasco, Office of Subsistence Management
Don Rivard, OSM, Division Chief, FWS

SOUTHEAST ALASKA FEDERAL SUBSISTENCE REGIONAL ADVISORY COUNCIL

c/o Subsistence Program
Box 21628
Juneau, Alaska 99802-1628

Voice: 1-800-586-7895, or 907-586-8890
FAX: 907-586-7860

Dr. Michael P. Dombeck, Chief of the Forest Service
USDA Forest Service
PO Box 96090
Washington, DC 20090-6090

11/17/97

Dear Chief Dombeck;

The Southeast Alaska Federal Subsistence Regional Advisory Council (the Council) is a FACA chartered committee that has responsibility under Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA) to make recommendations concerning issues and actions that may impact subsistence uses of wild renewable resources in the Region. The Council is comprised of citizens from across the Region, both Native and non-Native people selected for their extensive experience and knowledge concerning subsistence and non-subsistence resources and their uses. The members are appointed jointly by the Secretaries of the Interior and Agriculture.

At their recent public meeting in Yakutat (September 30 - October 2, 1997), the Council considered many issues, including the potential impacts of the Tongass Land Management Plan (TLMP). The Council is concerned about the reduction of subsistence opportunities that will occur as a result of the TLMP and unanimously passed a motion to write this letter in support of the Appeal to TLMP submitted to you by five Federally recognized Tribes in Southeast Alaska.

Five major Tlingit Indian Tribes of Southeast Alaska appealed the Revision of the TLMP, arguing that the Plan fails to protect customary and traditional uses of wild fish and game resources for subsistence purposes, as required by section 810 of ANILCA. The appellants are the federally recognized Indian Tribes from the four largest primarily Tlingit villages in the region: Hoonah, Angoon, Kake, and Klawock. The fifth appellant is the Tribal government for Sitka, the largest community in Southeast Alaska defined as "rural" under Title VIII of ANILCA. The Tribes make the following points in their appeal:

- Customary and Traditional uses of fish and game retain vital importance to these villages. Economically, they provide a substantial portion of the villages' food supply. Even more importantly, however, traditional harvest of wild fish and game is the foundation of Native culture.
- Clearcut logging of Tongass old growth harms subsistence uses primarily by destroying essential winter deer habitat. The Forest Service admits that implementation of the Plan will significantly restrict subsistence uses of deer. The agency projects that the areas of the Forest most heavily used for subsistence by rural communities will lose up to half of their deer habitat capability.
- This restriction to subsistence uses is not "necessary," as required by ANILCA section 810. There are no legal or contractual requirements that compel the Forest Service to take actions that restrict subsistence uses.
- The Forest Service illegally concluded that clearcut logging approved as part of a general "multiple use" balancing process justified any restrictions to subsistence uses. Congress enacted ANILCA section 810 specifically because the agencies were not adequately protecting subsistence uses under existing authorities such as "multiple use." Congress intended heightened protection for subsistence uses, not reduced opportunity.
- Although the Plan included 19 land use designations for purposes such as logging, recreation, research, and municipal watersheds, it included no designations to protect the most important subsistence use areas of rural communities.
- None of the standards and guidelines in the Plan provide meaningful protection for subsistence uses, but rather place a priority on timber production. The agency dropped the only standard that could have protected deer habitat in the most heavily use subsistence areas, falsely claiming that it would be "difficult to administer."

The Southeast Alaska Federal Subsistence Regional Advisory Council agrees with the Tribes' points outlined above and offers this letter in support of their appeal.

Sincerely,

Mim McConnell for William C. Thomas

Chairman **William C. Thomas**, Ketchikan

and *the other Council members*:

John Vale, *Yakutat*	**Mary Rudolph, *Hoonah***	**Marilyn Wilson, *Haines***
Gabriel George, *Angoon*	**Patricia Phillips, *Pelican***	**Jeff Nickerson, *Klawock***
Herman Kitka, *Sitka*	**Mim McConnell, *Auke Bay***	**Vicki LeCornu, *Hydaburg***
John Feller, *Wrangell*	**Lonnie Anderson, *Kake***	**Dolly Garza, *Sitka***

cc Tom Waldo, Earthjustice Legal Defense Fund
Michael Jude Pate, Sitka Tribe of Alaska

1003

Yakutat Salmon Board
City & Borough of Yakutat
P.O. Box 160
Yakutat, Alaska 99689
Phone 907-784-3329
Fax 907-784-3281

30 April, 2007

To: Tongass National Forest

Re: TLMP Adjustments

This letter is submitted on behalf of the Yakutat Salmon Board. The Yakutat Salmon Board is an advisory committee to the City and Borough of Yakutat. These comments are only reflective of Yakutat Salmon Board staff and should not be construed as City & Borough of Yakutat comments except when referenced.

We have a lot of experience with the timber aspect of TLMP in Yakutat. Over 1 billion board feet have been exported from East Yakutat. In addition, all economical timber in West Yakutat has been harvested and the timber operations are leaving this year. Given that Sitka Spruce Forests grow slowly in the North Tongass it is likely that we won't see 1
large scale timber production in our borough for at least another 100 years. In 1903 large tracts of land were harvested for railroad, fish plant and housing construction. The regrowth of this 104 year old forest averages around 10-12 inch dbh which is unsuitable for saw log production. Our community is in favor of small sales. The proposed map includes all small sale units proposed by the Yakutat District.

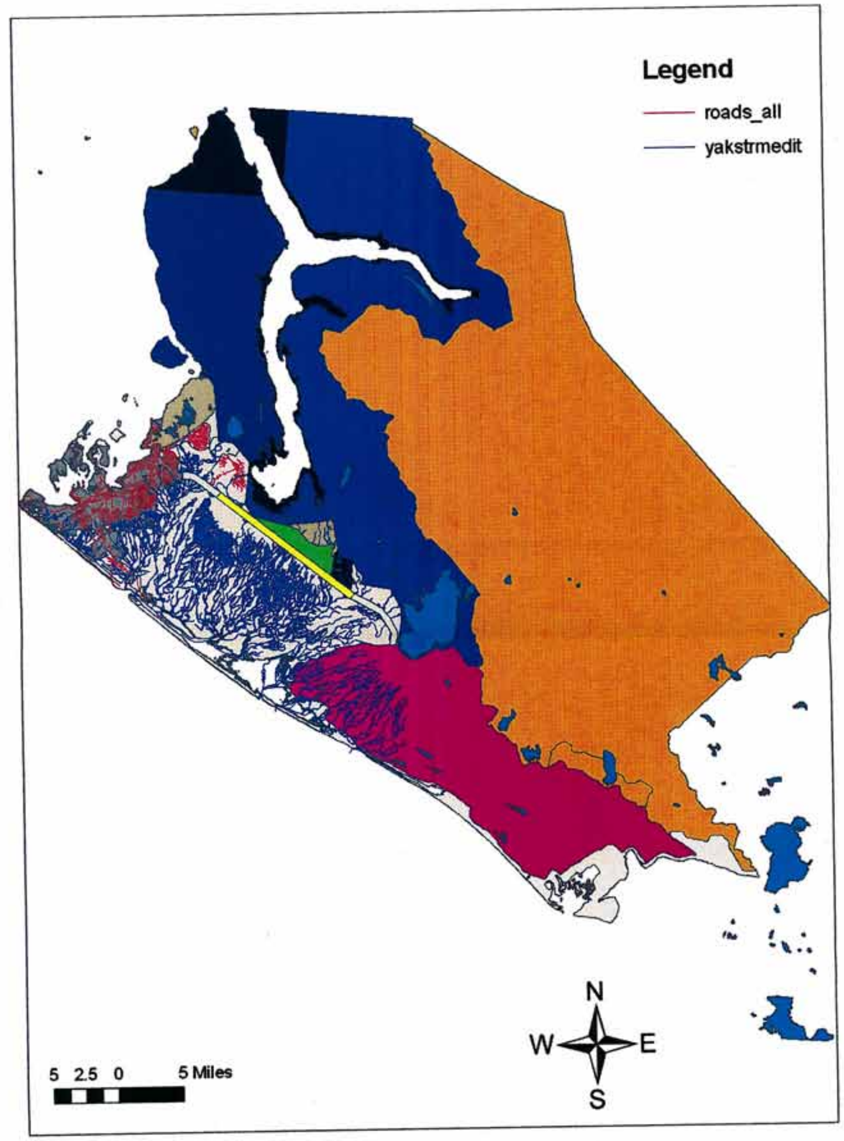
Our community relies on recreation and commercial fishing for the bulk of its economy. I feel the proposed land use changes illustrated by the enclosed map reflect the economic reality of our town. I also believe that non-local U.S. citizens using the Tongass in 2
Yakutat would agree that fishing, hunting and wildlife viewing is the best use of this public land. If there is a demonstrated need to prove this we can apply for survey money to statistically back this claim.

I strongly encourage the USFS to accept our proposed modifications to alternative 2, which were passed unanimously by the Yakutat Tlingit Tribal Council, The Yakutat Salmon Board, The Yakutat Planning and Zoning Commission and the City and Borough of Yakutat Assembly. I would like to see an increase in spending for Fisheries, Wildlife and Recreation projects on the district.

Sincerely,

Bill Lucey
Director, Yakutat Salmon Board

Alternative 2 Modification



H-A109

Yakutat
Community Opinion Survey

An Analysis of Planning and Development Issues in Yakutat

prepared for the

City and Borough of Yakutat
P.O. Box 160
Yakutat, Alaska 99869

prepared by
Sheinberg Associates
204 N. Franklin St, Ste 1
Juneau, Alaska 99801
bsheinberg@gci.net

October 2005

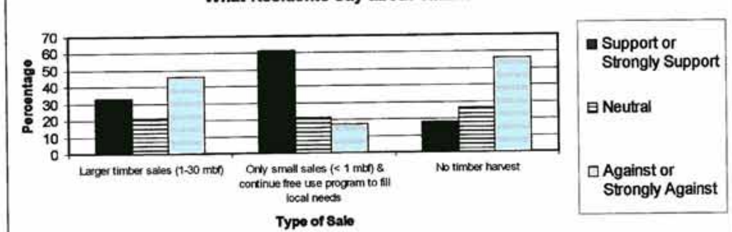
9.0 Timber

Residents were asked how much they supported future timber harvest activities in Yakutat, which could occur on Forest Service, State, or Borough lands or a combination.

This question generated some controversy because the question told residents to assume that all timber harvest could stimulate local value added production and local jobs, that timber harvest would meet State and Federal environmental regulations, and that it could be designed to attempt to stabilize stands from future wind throw. Some suggested this wording was misleading because in their judgment it is the inability of timber sales to achieve these matters that has led to recent controversy and legal action. Residents answered the question as it was written and results indicate:

- Just under two-third (61%) of residents support or strongly support small timber sales.
- 18% support no timber harvesting while over half (56%) do not agree with this option.
- Just under half (46%) are against large timber sales, while one-third (33%) support them.
- 21-26% are neutral on all timber harvest options.

What Residents Say about Timber Harvest



	Net support	Strongly support	Support	Neutral	Against	Strongly against	Net against
Larger timber sales (1- 30 million board feet).	33%	15%	18%	21%	18%	28%	46%
Only small sales (less than 1 million board feet) and continuation of the free use program to fill local needs.	61%	23%	38%	21%	5%	12%	17%
No timber harvest at all.	18%	11%	7%	26%	26%	30%	56%

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Photograph taken looking northeast with Lindenberg Peninsula on Kupreanof Island and the mouth of Petersburg Creek (front cover) in the foreground, Petersburg Mountain (front cover) in the middleground, and Frederick Sound and the mainland in the background.