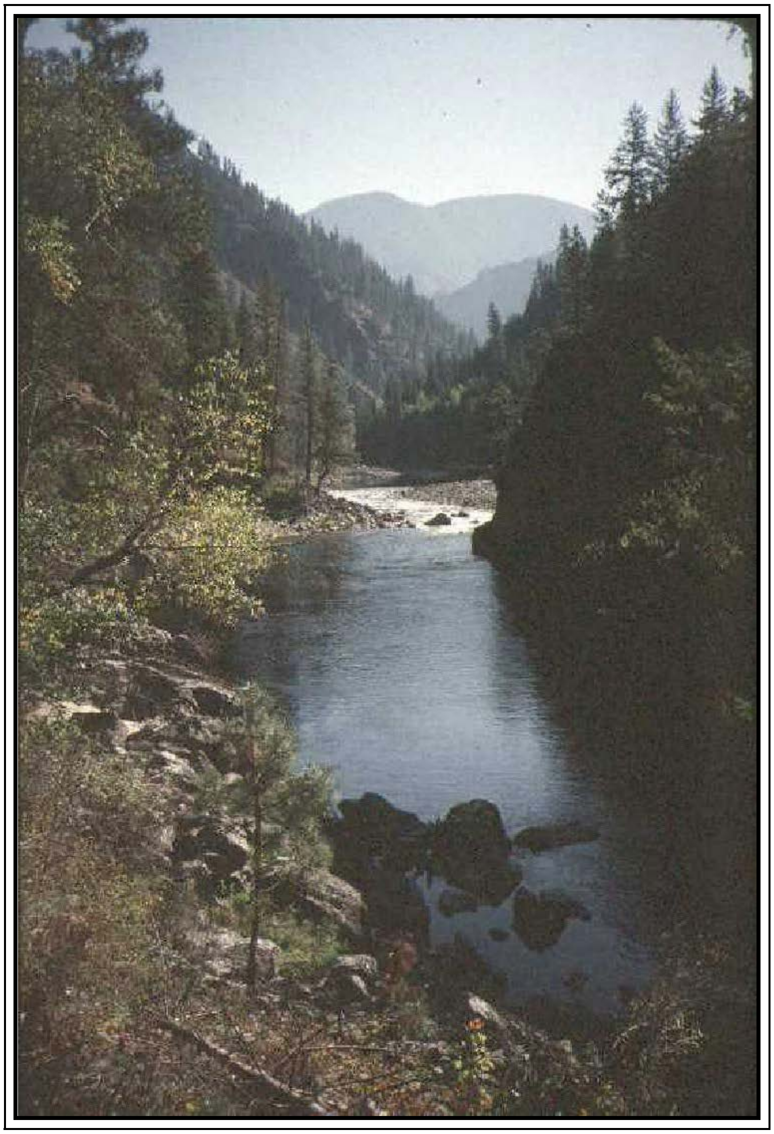
SELWAY AND MIDDLE FORK CLEARWATER RIVERS SUBBASIN ASSESSMENT

VOLUME 1: NARRATIVE



USDA FOREST SERVICE

MARCH 2001

NEZ PERCE NATIONAL FOREST

CLEARWATER NATIONAL FOREST

BITTERROOT NATIONAL FOREST

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CHAPTER 1

INTRODUCTION AND CONTEXT

This chapter contains a description of the purpose and need for the Selway River and Middle Fork Clearwater River subbasins assessment within the context of the broader-scale Interior Columbia River Basin (ICRB) assessment. It also displays a list of key questions about the environment that guide the assessment, followed by descriptions of the location and special features of the Selway and Middle Fork Clearwater subbasins, and information about policies and federal acts that guide the management of the area.

PROJECT DESCRIPTION

The purpose of this assessment is to characterize the ecological and social conditions in the Selway and Middle Fork Clearwater subbasins, and to provide a context for future management of national forest lands. The assessment focuses on the diversity, distribution, and abundance of plant and animal species and communities, landscape processes, watershed conditions and processes, transportation systems, and human uses and values.

CONTEXT

BROADER SCALE ASSESSMENTS

The Selway and Middle Fork Clearwater subbasin assessment is the second of three mid-scale planning assessments for the Nez Perce National Forest. The South Fork Clearwater River subbasin assessment has been completed, and the Salmon River subbasin assessment is scheduled for a later date. While the assessments do not result in project decisions, they do provide background information for future planning and management for the Nez Perce National Forest and parts of surrounding national forests.

An *Assessment of the Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins* was completed in 1997. The *Interior Columbia River Basin Component Report* (Quigley et al., 1997) and the *Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin* (Quigley et al., 1996) provide the broad-scale resource assessments to which this assessment tiers. This subbasin assessment considers the findings from the broader scale assessments and incorporates them where appropriate, recognizing the differences in project objectives, data resolution, spatial and temporal scales.

Mid-scale or subbasin assessment is one step in the hierarchical assessment process that applies broad-scale science findings and decisions to finer-scale areas. This assessment leads to understanding ecosystem conditions relative to historic conditions, risks to ecosystem function from natural events and management actions, and opportunities to conserve and restore a sustainable ecosystem.

The *Selway and Middle Fork Clearwater Rivers Subbasin Assessment* is not designed to address site- specific resource concerns or needs. Instead, the assessment is focused at the landscape level and provides a context for future project analyses and/or ecosystem analyses at the watershed scale (EAWS). However, because it is unlikely that many wilderness watersheds will be analyzed in more detail, we did bring more site-specificity to this assessment than appeared in the South Fork Clearwater River landscape assessment. The assessment should allow future project analyses to more effectively respond to cumulative effects issues.

FINER SCALE ASSESSMENTS AND PROJECT PLANNING

This assessment will establish the need and priorities for conducting ecosystem analysis at the watershed scale (EAWS) within the assessment area. This assessment and EAWS represent key components of the ecosystem-based planning and management process. The EAWS will step down broad-scale information and decisions to site-specific actions to ensure that broad-scale decisions are viewed within the context of local conditions, and that local decisions are made within the context of broad-scale goals and objectives. This assessment will also help establish context and purpose for fine scale project development. Where projects are relatively simple, this assessment may provide enough rationale to move directly to project development.

ASSESSMENT ASSUMPTIONS AND OBJECTIVES

ASSUMPTIONS

The basic assumption of this assessment is that scientific information about ecological and social conditions, referenced to biophysical environments and disturbance regimes, can be used to define management strategies and can be translated to forest plans and projects. The ecosystem management goals below provide more detailed interpretation of how to achieve the intent of management direction.

Ecosystem Management Goals

The overall purpose of ecosystem management is to restore and maintain ecological integrity and resiliency, and sociological integrity and resiliency (Haynes et al., 1996). Ecosystem integrity is the degree to which all components of an ecosystem are represented and functioning. Resiliency is the ability to adapt to change. Specific goals that can be used as benchmarks in assessing ecosystem conditions include:

- Maintain evolutionary and ecological processes. In order to maintain these processes, it is important to first understand the basic biophysical conditions and processes within the area, and their associated disturbance regimes.
- Manage with an understanding of multiple ecological domains and evolutionary timeframes. Consider the broad spatial and temporal context in which management actions occur.
- Maintain viable populations of native and desired non-native species. Sustaining viable populations is essential to maintaining ecosystem function.
- Encourage social and economic resiliency. Resilient communities are adaptable to change and tend to have a diverse economic base and cohesive sense of community.
- Manage for places with definable values. Understanding how different people define and relate to highly valued places can help reduce conflict.
- Manage to maintain the mix of ecosystem goods, functions, and conditions that society desires. Some goods are commodities, some goods are experiences, some functions or conditions are valued for their existence, and some functions like nutrient cycling are needed to sustain a system’s ability to produce other goods. Strategic goals for this assessment are to use scientific knowledge about ecological process and condition and human uses and values in the assessment area, to develop management recommendations that will help meet the intent of the management direction outlined in the following section. This information will be used in both revisions of forest plans and to establish the rationale for more site-specific project proposals.

OBJECTIVES

These objectives describe the structure of the assessment. The information can be used to develop recommendations that work toward meeting the goals of ecosystem management:

- Characterize historic and existing conditions in the Selway and Middle Fork Clearwater subbasins in terms of landscape elements, functions, and processes.
- Assess significant changes to landscape elements, functions and processes from presettlement conditions.
- Recommend strategies that lead to sustainable ecosystems.
- Identify actions for national forest lands that produce desired and feasible change.
- Identify issues to be addressed during revision of forest plans.
- Assess resource status and condition, as well as risks and opportunities to reduce potential unwanted effects from management actions and land uses and to better balance short- and long-term, and mid- and fine-scale risks.
- Provide an understanding of how the assessment area fits into the broad-scale ecosystem, gain an understanding of the ecosystem that is apparent only at the mid-scale, and provide context and priority for finer scale analyses.
- Provide support for further analyses such as EAWS, roads analysis, water quality restoration plans, and other mid-scale assessment needs.
- Identify risks and opportunities to meet broad-scale and mid-scale objectives through subsequent site-specific management actions.
- Identify opportunities for pooling interagency and intergovernmental resources.
- Provide information and recommendations to support land use planning, consultation, and legal requirements, such as those found in the Forest Land Planning Management Act, the National Forest Management Act, the Endangered Species Act, the Clean Water Act, and treaty and trust responsibilities with the Nez Perce Tribe.
- Verify or supplement conclusions from the *Interior Columbia River Science Assessment* (Quigley et al., 1997) and identify data gaps at the mid-scale.
- Prioritize opportunities for ecosystem restoration, filling social and economic needs, further analysis, monitoring and data collection, and other subsequent site-specific management actions.

KEY QUESTIONS

The purpose of this section is to specify the questions used to identify elements of the ecosystem most relevant to management questions, human values, and resource conditions within the subbasins. Known indicators most likely to reveal current conditions of the core assessment topics are also identified. During future monitoring, these indicators will be used as measures of departure from historic or reference conditions. Readers are encouraged to reference the table of contents to find the location of additional information on these subjects in this document.

LANDSCAPE DYNAMICS

What is the Physical Setting?

- What are the local climatic conditions?
- What is the topography including elevation, aspect, slope, landforms and valley bottoms?
- What are the important watershed and aquatic features?
- What is the geology and geomorphology?

What are the Frequency, Intensity and Pattern of Major Disturbances?

- What are the historic and current intensity, severity, frequency and distribution of fire?
- What other disturbances play an important role?
- What are the intensity, severity, frequency and distribution of human alterations?
- What are the intensity, severity, frequency and distribution of erosion processes?

Indicators or Measurement Criteria: Indicators or measurement criteria include areas in each fire regime, areas of high departure from fire regimes, areas of potentially changed fuel conditions, and areas proposed for changes in fire use or management.

What are the Distribution, Condition and Trend of Terrestrial Vegetation?

- What are the historic and current composition, density and structure of forest and rangeland vegetation?
- What are the relationships between upland and riparian vegetation?
- What are the rare or unique vegetation elements?
- For the questions above: what trends are apparent from comparing historic to current?

Indicators or Measurement Criteria: Indicators or measurement criteria include historic and existing forest composition: cover type, size class, canopy cover, canopy layers, snags, old forest, and departures from fire regimes.

Indicators or measurement criteria for rare and unique vegetation elements include areas of suitable habitat, status and threats to known populations, and habitats recommended for protection, restoration, or creation.

What are the Distribution, Condition and Trend of Exotic and Non-native Species?

- What are historic and current distributions of exotic plants and animals?
- What influence are these species having on ecosystem function?

Indicators or Measurement Criteria: Indicators or measurement criteria include acres of susceptible habitat, acres of occupied habitat, acres of high risk of spread, and acres of high risk of spread associated with high priority for vegetation management and restoration.

AQUATIC, RIPARIAN AND WATER

What are the Distribution and Population Conditions?

- What are the estimated distribution, population condition and trend of aquatic habitats and species populations?
- What are the historic and current distribution and population status for important aquatic species?
- What are the historic and current distribution, condition and connectivity of aquatic habitats?
- What species are threatened, endangered, sensitive, culturally important or socially valuable?
- For the questions above: what trends are apparent from comparing historic to current?
- What areas are defined as critical habitat or recovery areas?
- What human alterations are or may be affecting these species or habitats?

Indicators or Measurement Criteria: Indicators or measurement criteria include distribution and population status of species, stratification of habitat potential and processes, and departures from processes and functions.

What are the Distribution, Condition and Trend of Riparian Systems and Overall Watersheds?

- What are the historic and current distribution, condition and connectivity of riparian systems?
- What are the hydrologic regimes, surface flow patterns, erosion and sedimentation processes?
- What are the riparian and floodplain processes?
- For the questions above: what trends are apparent from comparing historic to current?
- What are the Clean Water Act beneficial uses?
- What streams are listed as Water Quality Limited Stream Segments (Clean Water Act 303(d))?

Indicators or Measurement Criteria: Indicators or measurement criteria include changes in watershed condition, water yield regimes, sediment regimes, water temperature regimes, riparian conditions, channel morphology, and pattern of disturbance states across subwatersheds.

Areas of high risk affected by management related disturbances include: miles of road on high surface and substratum sediment hazard lands; miles of road on landslide prone terrain; acres of harvest on landslide-prone terrain; acres of road-caused loss of productivity; and, acres of tractor logging and/or dozer piling on areas with high compaction hazard.

TERRESTRIAL SPECIES

What are the Distribution, Condition and Trend of Terrestrial Habitats and Species Populations?

- What are the historic and current distribution and population status for important terrestrial species?
- What are the historic and current distribution, condition and connectivity of terrestrial habitats?
- What species are threatened, endangered, sensitive, culturally important or socially valuable?
- For the questions above: what trends are apparent from comparing historic to current?
- What areas are defined as critical habitat or recovery areas?
- What human alterations are or may be affecting these species or habitats?

Indicators or Measurement Criteria: Indicators or measurement criteria for wildlife habitat are historic and existing forest composition: cover type, size class, canopy cover, canopy layers, snags, and old forest.

Indicators or measurement criteria for wildlife security include existing road and trail densities, current acres providing wildlife security, and acres suited for improvement of wildlife security.

SOCIAL AND ECONOMIC

What are the Distribution, Condition and Trend of Human Uses and Values?

- What are important cultural, spiritual and religious areas?
- What are tribal treaty rights and interests?
- What are the landownership patterns?
- What are important recreation use areas?
- Where does wildland interface with rural and urban areas?
- What are the distribution, condition and trend of transportation systems (roads and trails)?

- What goods and services does the subbasin provide?
- What is the relationship of the local communities with the subbasin?
- What is the visual quality of the area?
- What are the demographics and economics for the local communities?
- For the questions above: what trends are apparent from comparing historic to current?

Indicators or Measurement Criteria: Indicators or measurement criteria include the limits of acceptable change (LAC) inventory and monitoring data and the departures from the recreation opportunity spectrum (ROS) classes characterizations.

Indicators or measurement criteria for recreation include discrepancies between current and projected use and available opportunities, facilities, and facilities conditions.

Indicators or measurement criteria for transportation and access include road densities by subwatershed, road maintenance, and road use restrictions.

DESCRIPTION OF THE ASSESSMENT AREA

LOCATION

The Selway River and Middle Fork Clearwater River are located in northern Idaho, as displayed in Map 1. The assessment area encompasses approximately 2,231 square miles (approximately 1,427,995 acres), and is wholly within Idaho County. The Selway and Middle Fork Clearwater subbasins are located in the lower portion of the Idaho panhandle, on the east side of the state at the same approximate latitude as the boundary between the states of Oregon and Washington.

The assessment area includes two separate subbasins: the Selway River subbasin and Middle Fork Clearwater River subbasin. The Selway River headwaters lie near the Idaho-Montana state line, and the river flows for approximately 102 miles from its headwaters to its mouth. The Selway River and the Lochsa River, which comes in from the north, converge near the town of Lowell, Idaho to create the Middle Fork Clearwater River. The Middle Fork Clearwater River travels 23 miles to a point where it converges with the South Fork Clearwater River near the town of Kooskia, Idaho. At this confluence the Clearwater River is created and eventually flows to the Snake River at Lewiston, Idaho.

The Selway River subbasin encompasses approximately 2,013 square miles (1,288,196 acres) and contains 21 major watersheds and numerous minor and face drainages. The Middle Fork Clearwater subbasin encompasses approximately 218 square miles (139,799 acres) and contains six major watersheds and several minor drainages.

There are two unincorporated communities within the assessment area: Syringa and Lowell. These are both small towns with approximate populations of 35 and 25 respectively. Communities adjacent to or near the assessment area include Kooskia, Grangeville, and Elk City, Idaho, and Darby and Hamilton, Montana.

LAND OWNERSHIP AND ADMINISTRATION

The assessment area is dominated by federally owned and administered lands; approximately 5 percent of the land base is held in non-federal ownership, and the majority of those non-federal lands are located within the Middle Fork Clearwater River subbasin. Within the Selway subbasin there is a single tract of state owned and administered land located in the Swiftwater Creek area. Private land accounts for approximately 1,100 acres within the Selway subbasin, occurring mostly immediately adjacent to the Selway River along its lower seven miles. Additional private lands are held within the Selway-Bitterroot Wilderness. Approximately 70,500 acres of the Middle Fork Clearwater River subbasins are not within federal ownership. The majority of the lands are held in private ownership, with approximately 18,000 acres owned and administered by the state of Idaho, and approximately 1,400 acres owned by the Nez Perce Tribe. Table 1.1 displays the ownership and administration of lands within the assessment area.

Table 1.1: Land Ownership within the Assessment Area

	Approximate Acreage	
Landowner/Administrator	**Selway River Subbasin**	**Middle Fork Clearwater River Subbasins**
Total Acreage	1,288,196	139,799
USFS - Nez Perce National Forest	873,100	54,400
USFS - Bitterroot National Forest	389,000	0
USFS - Clearwater National Forest	25,100	14,200
State of Idaho - Idaho Department of Lands	200	18,200
Nez Perce Tribe	0	1,400
Private	1,100	50,900

Special Features

Special Features Common to Both Subbasins

Nez Perce Treaty Rights on Ceded Lands

The Nez Perce people have inhabited the Clearwater region for centuries. Prior to the Treaty of 1855, they used the area for hunting, gathering food, and horse pasturing. Tribal treaty rights apply to areas beyond the current reservation boundary, including the entire assessment area. Rights retained by the Nez Perce people include fishing, hunting, gathering roots and berries, horse and cattle pasturing, and access to springs on open and unclaimed land.

Inventoried Roadless Areas

Within the Middle Fork Clearwater River subbasin there are two inventoried roadless areas. These roadless areas total approximately 21,000 acres, or 15 percent of this subbasin. The roadless areas include many of the face drainages south of the Middle Fork Clearwater River, and the headwaters of the South and Middle Forks of Clear Creek.

The Clear Creek roadless area was entered for timber harvest, which included road building, in 1989 and 1991, decreasing the land containing roadless characteristics by several hundred acres. The Middle Fork Face roadless area will be entered for timber harvest sometime before 2003. This harvest will include logging by helicopter on approximately 550 acres and no road construction within the roadless area.

Five inventoried roadless areas are partially or completely within the Selway River subbasin. These roadless areas total approximately 276,000 acres, or 19 percent of the Selway River subbasin. The roadless areas include large expanses of land within the Meadow Creek drainage, land on the north side of the lower Selway River, and land in the face drainages south of the Selway River, and in O'Hara Creek.

Table 1.2 displays roadless areas and acreages within the assessment area.

Table 1.2: Roadless Areas within the Assessment Area

Roadless Area	Approximate Acres
Middle Fork Face	10,170
Clear Creek	11,900
Rackliff-Gedney	55,450
O'Hara-Falls	25,350
Meadow Creek (East and West)	194,050

Wild and Scenic Rivers

The Middle Fork Clearwater, Lochsa, and Selway Rivers were designated as wild and scenic rivers upon the establishment of the Wild and Scenic River Act in 1968. Fifty-four miles of the Selway River between Race Creek and Paradise Guard Station are designated as wild. Thirty-one miles of the Selway River between Lowell and Race Creek and between Paradise Guard Station and Magruder Guard Station are designated as recreational. The entire 23 miles of the Middle Fork Clearwater River are designated as recreational. The wild and scenic river designation protects the free-flowing and scenic qualities of the rivers. Management within the wild and scenic river corridors emphasizes the scenic, recreational, geologic, fish and wildlife, historic, cultural, and other similar values associated with the rivers.

The area influenced by the wild and scenic river designation is the water body itself and generally one-quarter mile on either side of the river. Within the Selway River subbasin approximately 30,250 acres are designated as being within the wild and scenic river corridor. Within the Middle Fork Clearwater River subbasin approximately 7,000 acres are designated as being within the wild and scenic river corridor.

One aspect of managing the wild and scenic rivers is the acquisition of scenic easements from private landowners within the wild and scenic river corridor. Most, but not all, private lands within the corridor have scenic easements, which were purchased and are held by the Forest Service. These easements allow the Forest Service to influence the level of development and visual impact of development within the corridor. Approximately 3,650 acres of private land within the wild and scenic river corridor have scenic easements.

Several streams within the Selway River subbasin are eligible for inclusion in the wild and scenic rivers system. These streams include Gedney, Three Links, Moose (including tributaries), Bear (including tributaries), Running, and Meadow Creeks. These streams have been analyzed, and legislative environmental impact statements were submitted to congress in 1996. To date congress has not made a decision to designate these streams as part of the wild and scenic rivers system.

Coastal Disjunct Habitats

The dominant maritime climate regime in the lower Selway canyon and Middle Fork Clearwater canyon provides temperatures and moisture similar to coastal areas. Many plant species typically found within coastal habitats are also found here. This includes such species as Pacific dogwood, clustered ladyslipper, and Constance's bittercress. These warm, moist habitats are generally restricted to riparian areas below 4,000 feet in elevation in the lower portion of the subbasin. They will be referred to as coastal disjunct habitats in this assessment.

SPECIAL FEATURES OF THE SELWAY RIVER SUBBASIN

Remote and roadless forestland, pristine wilderness, and nationally recognized white water characterize the Selway River subbasin. Approximately 90 percent of the Selway subbasin, and 72 percent of the assessment area, is designated wilderness or is currently within an inventoried roadless area.

Selway-Bitterroot Wilderness

The Selway-Bitterroot Wilderness (SBW) was designated in 1964 when the Wilderness Act was passed. The SBW encompasses approximately 1,340,700 acres of national forest lands, including portions within the Nez Perce, Clearwater, Lolo, and Bitterroot National Forests. The SBW lies within the Selway, Lochsa, and Bitterroot River subbasins. Approximately 978,000 acres of the SBW are located within the Selway River subbasin. This acreage equals approximately 76 percent of the lands within the Selway River subbasin.

Frank Church-River of No Return Wilderness

The Frank Church-River of No Return Wilderness (FCRONR) encompasses approximately 2,366,700 acres of Forest Service and Bureau of Land Management (BLM) lands, including portions within the Nez Perce, Bitterroot, Salmon-Challis, and Payette National Forests and the Cottonwood BLM Resource Area. The FCRNR lies dominantly within the Salmon River subbasin, with a minor inclusion within the Selway River subbasin. Approximately 117,040 acres of the FCRONR are located within the uppermost Selway River subbasin. This acreage equals approximately 9 percent of the lands within the Selway River subbasin.

Bitterroot Grizzly Bear Recovery Area

Eighty-five percent of the Selway subbasin is within the Bitterroot Grizzly Bear Recovery Area. The recovery area is comprised of the Selway-Bitterroot and the Frank Church-River of No Return Wilderness Areas. Wilderness lands within the Selway subbasin represent 30 percent of the entire recovery area. The recovery area is the core of the Bitterroot Ecosystem (BE) reintroduction analysis area of central Idaho and western Montana.

Distribution and population levels of grizzly bears have been diminished by human-caused mortality and habitat loss. Today, only 800 to 1,000 grizzly bears remain in a few populations in the western United States. Under the Endangered Species Act (ESA), the U.S Fish and Wildlife Service (USFWS) is in the process of implementing a grizzly bear reintroduction plan to restore the species to the Bitterroot Ecosystem. The BE is one of the largest contiguous blocks of federal land remaining in the lower 48 United States. Of the entire remaining unoccupied grizzly bear habitat in the lower 48 states, this area in the Bitterroot Mountains has the best potential for grizzly bear recovery, primarily due to the large wilderness area.

Core Central Idaho Wolf Restoration Area

The core of the Central Idaho Wolf Restoration Area includes the Selway-Bitterroot, the Frank Church-River of No Return, and the Gospel Hump Wilderness Areas of central Idaho. Eighty-five percent of the Selway subbasin is within the core Central Idaho Wolf Restoration Area. The Selway-Bitterroot and Frank Church-River of No Return Wilderness lands within the Selway subbasin represent 28 percent of the entire 4 million-acre core restoration area.

Humans extirpated wolves from all of the contiguous 48 states except Minnesota by the 1930s. Under the ESA, the USFWS is implementing a wolf reintroduction plan to restore wolves to the northern Rocky Mountains, including central Idaho. The Central Idaho Wolf Restoration Area is one of 3 restoration areas in the northern Rocky Mountains that also include northwest Montana and the greater Yellowstone area. In 1995 and 1996 wolves captured in Canada were released in the restoration area. The wolves have recolonized successfully and recovery goals are nearly met. As a result, wolves again occupy the assessment area.

O'Hara Research Natural Area

Within the O'Hara-Falls inventoried roadless area is the 7,000-acre O'Hara Research Natural Area (RNA). This is the largest RNA in the national forest system and was designated for its representation of unique habitats and species present in the Selway subbasin, including coastal disjunct habitat and species.

Horse Creek Administrative Study Area

The Horse Creek Administrative Study Area is located within the Meadow Creek drainage. This study area was developed in 1965 to provide paired watersheds to study the effects of timber harvest and road construction on sediment delivery and sediment effects to streams. The findings from this study have been used to calibrate the Nez Perce National Forest's sediment model and to provide background information on the effectiveness of road construction mitigation.

Historic Structures

Several Forest Service buildings are listed, or are eligible to be listed, on the National Register of Historic Places. The Fenn Ranger Station, Selway Falls Guard Station, Meadow Creek Guard Station, Moose Creek Ranger Station, Paradise Guard Station, and Magruder Guard Station are examples of these historically important buildings within the Selway River subbasin. Other historic structures within the subbasin include Coolwater Lookout, Indian Hill Lookout, Shissler Lookout, Gardiner Lookout, and Shearer Guard Station. These facilities are examples of construction and craftsmanship in the early days of Forest Service administration and provide insight to the Forest Service presence within this region.

Magruder Corridor

Between the Selway-Bitterroot Wilderness and the Frank Church-River of No Return Wilderness exists the 101-mile Magruder Road (also known as the South Nez Perce Trail Road) This road, initially developed by the Civilian Conservation Corps in the 1930s, travels between Red River, Idaho and Darby, Montana. The Magruder Corridor, a narrow strip of land surrounding the road, was excluded from wilderness designation when the Frank Church-River of No Return Wilderness was designated in 1980. Excluding the road from wilderness designation allows continued use of the road by motorized vehicles and the unique opportunity to drive through the largest contiguous block of wilderness in the lower 48 states (the SBW and FCRNR combined equal 3.5 million acres of wilderness).

Stronghold Populations of At Risk Salmonids

The Selway subbasin is considered a stronghold subbasin for at risk salmonids, which include spring chinook salmon, steelhead trout, bull trout, and westslope cutthroat trout. Within the context of the upper Columbia River basin, the Selway is considered a category 1 watershed (Quigley et al., 1997). This designation specifies this watershed as one of several which closely resemble natural, fully functional aquatic ecosystems. Watersheds classified as category 1 provide the best opportunity for long-term persistence of native aquatic assemblages. As such, the Selway subbasin is considered a core area for recovery of at risk salmonids in the upper Columbia River basin.

SPECIAL FEATURES OF THE MIDDLE FORK CLEARWATER RIVER SUBBASIN

The Middle Fork Clearwater River corridor from Kooskia to Lowell is a heavily traveled vacation route for travelers from Idaho to Montana and for recreationists traveling to river sites or wilderness portals.

Nez Perce Reservation

Approximately 11,000 acres of the Middle Fork Clearwater River subbasin are within the 760,000-acre Nez Perce Reservation. Within this portion of the reservation the Nez Perce Tribe owns approximately 1,400 acres (about 1 percent of the subbasin).

Non-Federal Lands

Approximately 61 percent of the Middle Fork Clearwater subbasin is held in non-federal ownership. Approximately 13 percent (18,400 acres) of the subbasin is owned and administered by the Idaho State Department of Lands. The majority of these state owned lands are located north of the river within the Maggie, Suttler and Swan Creek drainages. The remaining lands within the subbasin are held in private ownership. These private lands are used mainly for timber production, ranching, agricultural crop growing, and residential purposes.

Kooskia National Fish Hatchery

The U. S. Fish and Wildlife Service operates a fish hatchery at the mouth of Clear Creek. This hatchery has been in operation since 1969 and produces approximately 53,000 to 1.5 million spring chinook salmon smolts annually that are placed in the Clearwater River system to mitigate losses of anadromous fish from construction of Dwarshak Dam. The hatchery also propagates rainbow trout.

MANAGEMENT DIRECTION

AQUATIC AND TERRESTRIAL MANAGEMENT DIRECTION

This assessment provides information about natural potential, landscape dynamics, and current conditions that allow Forest Service staff to propose strategies that comply with existing management direction and acknowledge variation in natural potential and disturbance dynamics in aquatic and terrestrial ecosystems.

Legal direction and agency policy for aquatic and terrestrial resource management are derived primarily from three national laws. These are the Clean Water Act (CWA) as amended in 1972, the Endangered Species Act (ESA) of 1973, and the National Forest Management Act (NFMA) of 1976. This section introduces that direction to provide the regulatory framework for evaluating historic and current conditions.

CLEAN WATER ACT (1972) AND STATE WATER QUALITY STANDARDS

The Clean Water Act (CWA) stipulates that states are to adopt water quality standards. Included in these standards are provisions for identifying beneficial uses, establishing the status of beneficial uses, setting water quality criteria, and establishing best management practices (BMPs) to control non-point sources of pollution. There are currently designated beneficial uses for the Selway River and the Middle Fork Clearwater River. These include domestic water supply, agricultural water supply, cold water biota, salmonid spawning, primary and secondary recreation, and special resource water. No formally designated beneficial uses for the tributary streams of the Selway and Middle Fork Clearwater have been established. Existing values for the tributary streams include cold-water biota, salmonid spawning, and primary and secondary recreation.

Boyd Creek, Elk City Creek, Falls Creek, Glover Creek, Goddard Creek, Hamby Fork, O'Hara Creek, Nineteen Mile Creek, Island Creek, Rackliff Creek, Twentythree Mile Creek, and Wart Creek are listed as water quality limited streams (WQLS) on the 1994, 1996, and 1998 303(d) lists of *Water Quality Limited Stream Segments* published by the Idaho Division of Environmental

Quality (DEQ). See Map 9. Clear Creek, Brown's Spring Creek, Little Tinker Creek, Pine Knob Creek and Maggie Creek are the water quality limited stream segments tributary to the Middle Fork Clearwater River. Data available to the Environmental Protection Agency (EPA) at the time of initial listing suggested that the beneficial uses were not fully supported in these streams in both subbasins. Sediment was the listed pollutant of concern. The Idaho Division of Environmental Quality (DEQ), under the beneficial use reconnaissance program (BURP), has conducted subsequent surveillance on most of these stream segments. The *Lower Selway River Subbasin Assessment,* by the DEQ, is now in the final draft review. This draft document contains a recommendation to delist all WQLSS in the Selway subbasin. The Middle Fork Clearwater WQLSS have yet to be analyzed by the DEQ, in a similar process, although some of them have been surveyed by the DEQ using BURP methodology.

ENDANGERED SPECIES ACT (1973)

The Endangered Species Act of 1973 recognizes extinctions and depletions of various populations of native fish, wildlife, and plants in the United States. The act provides a means to conserve endangered species and threatened species and the ecosystems they are dependent upon. All federal departments and agencies are responsible for conservation of endangered and threatened species under the Act. The Act further stipulates that federal agencies shall cooperate with state and local agencies to resolve water resource issues in concert with conservation of endangered species.

NATIONAL FOREST MANAGEMENT ACT (1976)

The National Forest Management Act amends the Forest and Rangeland Resources Planning Act of 1974 to mandate that national forests provide for diversity of plant and animal communities, preserve indigenous tree species, protect soil, slope and other watershed conditions, and protect water bodies and riparian areas from detrimental changes. Federal regulations that implement this law require national forests to provide habitat in order "to maintain viable populations of existing native and desired non-native vertebrate species" (36 CFR, 219.9). This requirement is used as the basis for the objectives and ecosystem management goals and assumptions described below, which in turn frame the key questions.

OTHER IMPORTANT MANAGEMENT DIRECTION

Other important laws and directions influencing management of the subbasins include National Forest Management Planning Regulations, the Wilderness Act of 1964, and the Wild and Scenic Rivers Act of 1968.

NATIONAL FOREST MANAGEMENT PLANNING REGULATIONS

These regulations, published in the Federal Register at the time of this assessment, provide guidance for revising forest plans and guide the selection and implementation of site-specific actions. They establish the first priority of management as the maintenance or restoration of ecological sustainability to provide for a wide variety of uses, values, products, and services. Sustainability is based on maintaining the diversity of plant and animal communities and productive capacity of ecological systems. Sustainability also includes maintaining or restoring watershed functions, including stream flows and groundwater recharge, and ecological conditions needed for ecosystem and species diversity.

WILDERNESS ACT (1964)

The Wilderness Act established the National Wilderness Preservation System composed of areas designated as wilderness on federal lands, including national forests and national parks, to be managed so as to " . . . leave them unimpaired for future use and enjoyment". The act defined wilderness as an area that appears to be affected primarily by the forces of nature, with the imprint of man substantially unnoticeable; that provides outstanding opportunities for solitude or a primitive and unconfined type of recreation; that has at least 5,000 acres of land or be of sufficient size to be preserved in unimpaired condition; and if possible, contains ecological, geological, or other features of scientific, educational, scenic, or historical value.

The Selway subbasin portion of the analysis area includes most of the Selway-Bitterroot Wilderness Area, designated as wilderness in 1964, and a portion of the Frank Church-River of No Return Wilderness Area, designated in 1980.

WILD AND SCENIC RIVERS ACT (1968)

The Wild and Scenic Rivers Act was passed by Congress to protect free-flowing rivers possessing "outstandingly remarkable" scenic, recreation, geologic, fish and wildlife, historic, cultural, or other similar values associated with the rivers. The act established three possible designations for rivers: wild, scenic, or recreational. Wild rivers are essentially undeveloped and inaccessible by road. Scenic rivers can be reached or even crossed by vehicles and can have limited development on the shoreline. Recreational rivers may have parallel roads and shoreline development, but still are free flowing, thus allowing nonpristine rivers to be eligible for protection.

The Selway and the Middle Fork Clearwater Rivers within the subbasin are both protected under the act and were designated in 1968. The Selway River, from Paradise to Selway Falls, is managed under the wild designation and from Magruder to Paradise and from Selway Falls to Lowell, it is managed under the scenic and recreational designation. The Middle Fork Clearwater River is managed under the recreational designation.

CHAPTER 3
SUMMARY SUBBASIN FINDINGS AND RECOMMENDATIONS

This chapter summarizes findings and general recommendations for the entire assessment area according to each resource category. The resource categories are: social and economic, hydrology and watersheds, aquatic habitat and species, landscape ecology, fire, wildlife, roads, recreation, wilderness and trails, and cultural and heritage resources. Following these findings and recommendations is a comparison of Interior Columbia River Basin broad scale findings to the Selway and Middle Fork Clearwater subbasins findings. This chapter concludes with information regarding data gaps, additional analysis needs and priorities, and partnership opportunities within the assessment area.

SUBBASIN FINDINGS AND RECOMMENDATIONS

SOCIAL AND ECONOMIC

SUBBASIN SOCIAL AND ECONOMIC FINDINGS

The Selway and Middle Fork Clearwater subbasins lie within Idaho County, the largest and nineteenth most populous of 44 counties in the state. Since the late 1800s, natural resources have driven the economy and shaped the character of the incorporated communities of Kooskia, Elk City, Grangeville, and other small towns located just outside the southern and western boundaries of the assessment area. To the east, in Ravalli County, Montana, the towns of Hamilton and Darby, as well as other small communities, are gateways to the subbasin. The unincorporated communities of Lowell and Syringa, Idaho, lie directly within the assessment area. Dynamic market forces that influenced boom and bust cycles among periods of apparent stability have perpetuated fluctuations in the socioeconomic status of these communities.

The present circumstances may be a transition to a changed, more stable economic state. The indicators are: trends in demographic composition, workforce status, alteration in the forestry sectors of the economy, economic diversification, and land use. While manufacturing related to timber is still important, the economic base of the communities is gradually changing from agriculture and timber based industries to services and retail sales often associated with recreation and tourism. Federal and state government operations and employment remain important factors in the area's economy, although commodity production on federal lands has diminished. Based on those factors, Idaho County has a moderate economic resiliency but low socioeconomic rating (Quigley et al, 1996). These ratings were established by considering geographic isolation, specialization in industry groups, and associations with the Forest Service or Bureau of Land Management. This analysis does not account for recreation or other economic activity due to lack of sources of employment data. In examining community-level changes in resiliency, " . . . those communities that have been confronted with and survived challenges --- such as sawmill closures --- are among the most resilient because they have successfully learned how to deal with change . . . Adversity . . . often provides incentive for social interaction and cooperation, catalyzing organization and forward-directed actions" (Quigley et al., 1996).

The demographics of communities change as people move into the area from out-of-state. The population growth in Idaho County was 9.2 percent from 1990 to 1999 (U. S. Census Bureau, 1997). The aesthetics, the lure of the natural state of relatively untouched wildlands, outdoor recreation, low crime rates, pace of life, and sparse populations, not economics, attract newcomers. The traditional associations among the long-time residents involved with logging, ranching and farming are diminishing. Many immigrants are retirees and individuals who seek summer homes, especially along the wild and scenic river corridors. Few invest in community or social capital. Most live in their homes a few months out of the year.

An ethnographic study of the assessment area summarizes 60 community opinion leaders' concerns about the present and future and their perceptions of agency management and resource issues. Concerns about wilderness issues were most frequently mentioned. Access and the spread of noxious weeds were primary interests.

Management issues of concern included: effects of rotation of Forest Service personnel, community involvement, mistrust, outside influences to management that "tied the hands of managers," and effective planning and use of financial resources.

SUBBASIN SOCIAL AND ECONOMIC RECOMMENDATIONS

The socio-economic component of the ecosystem management strategy is designed to support the economic and social needs of people, cultures, and communities of the assessment area. The social and economic needs of people and communities in the Selway and Middle Fork Clearwater subbasins can, to some extent, be supported or influenced by agency management. Other influences such as market factors, natural events, and changes in legislative policy direction are outside agency control. Also, communities within the assessment area are unique; each has its own identity. The ability of each community to be resilient or adapt to change, will come from the community itself and the external assistance its citizens want or need.

While agency management makes a conscious effort to accomplish the following, public response to management issues indicates that efforts could be more effective. The following recommendations respond to citizens' economic needs, and to perceptions or concerns about management and resource issues.

Support local economic activity in providing goods and services; help communities move toward economic diversification.

The Forest Service should encourage local work force participation on forestlands that support traditional occupations, cultures, and a sense of involvement. Stewardship contracting is a high priority, especially in less economically diverse areas. To help sustain communities during transitions from economically specialized to more diversified economies, offer contracts for sales and services to local firms and individuals. Promote and support economic diversification. Become informed of the goals and visions of local community development planners and participants and be prepared to coordinate and cooperate on their terms.

Determine and utilize more effective methods for public involvement.

Some individuals are disgruntled with past and current public involvement processes. To improve public involvement, fair and cordial treatment is important. Knowledge of methods of effectively facilitating public meetings is necessary. Use a fresh approach to community involvement. Instead of large meetings including polarized interest groups, involve key individuals and target small groups with common interests. Combine the knowledge of agency personnel with the knowledge of public opinion leaders.

More effectively communicate the activities and purpose of Forest Service management strategies.

More use of local media, newspapers, radio, and newsletters to communicate Forest Service efforts and operations would contribute to understanding.

Inclusion of community resources in planning and implementation of agency policy would facilitate understanding and cooperation.

More one-on-one, personal level communication among agency employees and local citizens would promote trust. Facilitate Forest Service employee inclusion in community activities.

Integrate the needs of local communities more thoroughly into agency decision-making and management activities.

Create working advisory committees in the spirit of stewardship projects and wilderness planning groups (LAC task group). Minimize the time and cost of planning, be efficient and effective. Create a more predicable operating environment.

To establish trust and to encourage Forest Service involvement in community activities, minimize costs of planning and be more predictable. Facilitate FS employee involvement in community activities.

Coordination with state, county, and tribal governments is important to avoid duplication of research, planning and implementation. Share information.

Understand tribal issues (Appendix N) in the context of economic and cultural effects. Cooperate with and collaborate with the Nez Perce Tribal Government on social and ecosystem management issues.

Demonstrate that concerns and information offered by opinion leaders are given due consideration.

Using the information presented above and in Appendix N (discussions with opinion leaders who represent interest groups) be aware of how social factors affect responses to management issues.

Identify possible changes to land and resources management plans to incorporate concerns of stakeholders.

AIR QUALITY

SUBBASIN AIR QUALITY FINDINGS

Air quality in the assessment area is good. The Selway-Bitterroot Wilderness in the Selway sub-basin is a class I airshed and receives the highest level of air quality protection. The downwind areas of impact experience infrequent effects from wildland fires and planned prescribed fires. Working to improve ecosystem function by increasing the use of fire processes is likely to increase conflicts with protecting air quality. The challenge will be to maximize the benefits of fire use while still protecting air quality. The following are air quality findings:

- Wildland fires are considered natural events and are covered under EPA's Natural Events Policy, exempting smoke from wildland fires from meeting national ambient air quality standards (NAAQS).
- Prescribed fire smoke from planned events is subject to the rules of the Clean Air Act and NAAQS.
- There are no non-attainment areas within 10 miles of the subbasins; but the Missoula non-attainment area in Montana is downwind from the subbasins and it has been affected by wildfire and prescribed fire smoke in the past.
- The Montana/North Idaho Airshed Group has the authority and resources to monitor and manage for the protection of the air resources.

SUBBASIN AIR QUALITY RECOMMENDATIONS

The Forest Service, specifically the national forests of northern Idaho, should continue to participate in the Montana/North Idaho Airshed Group.

- The Nez Perce National Forest should continue to apply the mitigation and control measures specified by the Montana/North Idaho Airshed Group.

- Continue implementing the Air Resource Monitoring Plan established for the Selway-Bitterroot Wilderness, including doing phase III lake sampling and using automatic camera system data collected from Sula Peak.

HYDROLOGY AND WATERSHED

SUBBASIN HYDROLOGY AND WATERSHED FINDINGS

Hydrologic Regimes

Hydrologic runoff regimes in the Selway and Middle Fork Clearwater subbasins show three distinct patterns when recorded on hydrographs. Streams affected by winter rainstorms or rain-on-snow events show winter flood peaks as well as snow runoff peaks within the same water year. Streams dominated by high elevation snowmelt runoff in spring show only one peak between April and June. Low to mid elevation watersheds that flow into the lower Middle Fork Clearwater River have a mixed streamflow regime and can show peaks from winter storms, spring and summer rains, and spring snowmelt occurring from December to July.

The Effect on Water Yield from Disturbance Processes

Water yield patterns in the higher elevation watersheds in the headwaters of the Selway subbasin are strongly dominated by spring snowmelt runoff regimes. The disturbance process that historically affected water yield was wildfire. Water yield increased after wildfire and was an important process in channel formation and woody debris recruitment. Fire suppression has decreased the effect of fire as stands continue to recover. Increases in water yield due to fire are absent in some watersheds.

Watersheds in the middle and lower Selway subbasin are strongly dominated by spring snowmelt runoff regimes. The disturbance process that historically has had the most effect on water yield is wildfire, in combination with winter storm or rain-on-snow floods. Debris torrents after large fires provided debris and large wood to channels. Fire suppression has caused a departure from large fires, which removed vegetation in large areas of watersheds. Due to this, there has been a departure from the historical processes that affect channel formation and also provide debris and wood to channels that provide diversity for fish habitat.

Within the Middle Fork Clearwater River, O'Hara and Goddard Creeks, and Clear Creek ERUs, and some watersheds in the North Selway Face ERU, fire suppression and human management activities have resulted in a departure from natural water yield processes. These watersheds have lost the influence on water yield and streamflow regimes related to large-scale fire disturbance. Natural disturbances such as wildfire are pulse disturbances. Timber harvest, road construction, subdivisions, and recreational developments introduced press disturbances. Frequent entries for timber harvest have caused frequent, small increases in water yield creating a chronic disturbance, which is a departure from historical processes. Historically the disturbance was rapid with recovery following.

The Effect on Sediment From Disturbance Processes

Historical sediment patterns in watersheds were highly dependent on natural fire regimes. The frequency of the sediment peak and pattern of the peaks varies within watersheds in the subbasin. Watersheds with a large proportion of their area at high elevation have sediment peaks that are smaller than watersheds in the middle and lower Selway subbasin. The sediment peaks were often two or three times as high as in the lower Selway and Middle Fork Subbasin. This is probably due to a longer fire season, lower elevation area in the watershed, and longer snow-free season.

Historically sediment patterns were dependant on pulse disturbances such as wildfire and floods, or wildfires followed by floods. This is considered a pulse disturbance and is part of the natural sediment regimes. Fire suppression changed the pattern of sediment peaks within the past 60 years, decreasing sediment peaks within watersheds that are near natural conditions as in designated wilderness, Meadow Creek ERU, and most of the North Selway Face ERU.

Historical sediment patterns within the O'Hara and Goddard Creeks, Clear Creek, and Middle Fork Clearwater River ERUs were similar to the unmanaged watersheds until around 1935 when fire suppression began. Another departure from historical patterns in these ERUs is the change from fire and floods as pulse disturbances to wide-scale press disturbances associated with road construction, timber harvest, recreational developments, and human settlement.

Stream channels evolved with sediment regimes that are a result of the large pulse disturbances. Decrease in the pulse events slows down recruitment, storage and movement of sediment and wood through the river system.

Watershed, Streamside, and Riparian Conditions

Within the wilderness, roadless and unmanaged watersheds in the Selway subbasin, watershed conditions, water quality, and streamside riparian conditions are considered to be near natural. Fire suppression has affected some of the natural channel forming processes, but how much it has affected these processes is unknown.

High road densities, multiple stream crossings, recreational and residential development, and timber harvest have had a moderate to high effect on watershed conditions in the O'Hara and Goddard Creeks, Middle Fork Clearwater River, Clear Creek, and North Selway Face ERUs.

Encroachment of human activities on riparian areas in the Selway and Middle Fork Clearwater subbasins has moderately affected several watersheds. These include lower Clear Creek, Leitch Creek, lower O'Hara Creek, Deep Creek, portions of the upper Selway River, Swiftwater Creek, Maggie Creek, Smith Creek, Suttler Creek, and other small watersheds in the Selway and Middle Fork Clearwater subbasins.

Water temperatures have increased above historical conditions due to a decrease in riparian vegetation along streams and road encroachment. Stream temperature data on Clear Creek and lower O'Hara Creek show increases in stream temperature over time.

Soil Productivity and Soil Erosion

Soil productivity has decreased below historical levels due to surface soil disturbance, soil surface heating, soil surface erosion, and soil compaction related to press disturbances such as timber harvest, skid trails, landing construction, dozer piling of slash, high severity prescribed fire, and road building. This has occurred mostly in the Middle Fork Clearwater, O'Hara and Goddard Creeks, and Clear Creek ERUs. Widespread OHV use has also resulted in soil compaction, multiple trail formation, and soil disturbance in the lower Selway and Middle Fork Clearwater watersheds. Soil compaction and loss of vegetation is occurring around high lakes and in meadows due to heavy use in the wilderness and in the Meadow Creek area.

Large wood has decreased from historical levels in timber harvest units where large wood was piled and burned after timber harvest, or prescribed burns where high severity fire burned large wood. This has decreased woody debris available for soil nutrients, and removed soil duff and humus, which store the plants' available nitrogen source.

SUBBASIN HYDROLOGY AND WATERSHED RECOMMENDATIONS

Recommendations for the subbasins are the following:

- Restore natural sediment and water yield regimes at the subbasin and fifth code HUC (hydrologic unit code) level.
- Restore and conserve stream zone and riparian areas.
- Restore long-term soil productivity and reduce accelerated erosion related human activities.

Restore Natural Sediment and Water Yield Regimes

Restoration actions aimed to restore natural sediment and water yield regimes at the subbasin level include restoration of large natural disturbances such as fire. Increasing the use of wildland fire for resource benefit in wilderness and roadless areas is a very high priority. Another very high priority is to increase the use of natural and prescribed fire in the developed areas of the subbasins where possible. Restoration actions that are a very high priority on a fifth code HUC scale are: reduction of frequent entries into watersheds for timber harvest and road building, in order to reduce chronic sediment levels and frequent water yield increases; planning harvest and road activities to reduce the chronic sediment deposition in streams; and timing harvest entries to conserve and restore natural streamflow regimes.

Restore and Conserve Stream Zone and Riparian Areas

Very high priority actions associated with restoring and conserving stream zone and riparian areas at the subbasin level include restoration of natural fire regimes and natural erosion processes such as debris torrents that provide woody debris to stream systems and are a large component of stream channel formation. Road encroachment has impaired riparian function at the fifth code HUC level. A high priority in watersheds where roads encroach on stream zones is to investigate relocating roads out of stream zones, decommissioning roads in riparian zones, and developing sediment reduction and revegetation plans where roads remain in stream zones. A high priority in the Middle Fork Clearwater River, Clear Creek, and the O'Hara and Goddard Creeks ERUs is to use the ecosystem analysis at the watershed scale (EAWS) process to prioritize road-decommissioning opportunities when roads are no longer needed for the transportation system. This process should be done in partnership with the Clearwater National Forest in the Middle Fork Clearwater ERU. Continuing the Horse Creek paired watershed study and road obliteration study is a high priority.

Restore Long-Term Soil Productivity and Reduce Accelerated Erosion Related to Human Activities

High priority actions to restore long-term soil productivity and reduce accelerated erosion related to human activities would include restoration of soil productivity where timber harvest with ground-based equipment has increased soil compaction and disturbance. Another high priority for soil restoration is to obliterate and restore abandoned trails, illegal salt licks, dispersed and unauthorized OHV trails, and abandoned outfitter camps. A moderate priority for soil restoration is to increase the amount of large woody debris that is left on harvest units and prescribed burns. Where landslide risk occurs, map and delineate high-risk areas during project planning (this is a high priority).

AQUATIC HABITAT

SUBBASIN AQUATIC HABITAT FINDINGS

STREAMS

The Selway and Middle Fork Clearwater subbasins provide a significant amount of habitat with high or very high habitat potential to support aquatic species. The largely wilderness and roadless character of the Selway subbasin results in a diversity of high-quality, well-connected habitat. The Selway subbasin in particular is considered a stronghold watershed in the context of the upper Columbia River basin.

The greatest changes in habitat condition have occurred in tributaries to the lower reaches of the Selway River and throughout the Middle Fork Clearwater subbasin, including its largest watershed, Clear Creek. Habitat changes are generally the result of human-caused press disturbances on the landscape, and include increased sediment deposition, higher stream temperatures, lack of large woody debris recruitment, loss of pools, and overall simplification of habitat. In addition, fire suppression has undoubtedly resulted in a reduction in fire frequency, thus changing the historic sediment, large wood, water flow, and temperature regimes in both roaded and roadless watersheds. Changes in these regimes may have resulted in changes to pool-forming processes and stream productivity, even in areas where obvious changes in landscape condition are not evident.

Local changes in stream habitat and riparian condition are present throughout both subbasins. Domestic livestock, pack stock grazing, and high concentrations of wild ungulates have resulted in wider channels and bank instability in some reaches, but these changes have not occurred at a landscape level.

MOUNTAIN LAKES

The existing physical characteristics of mountain lakes remain similar to the historic condition. Due to natural succession, there may be fewer lakes now than historically. High human use at some lakes may have resulted in local changes in soil compaction, riparian plant communities, streamside and lakeside morphology, and the appearance of naturalness. In many areas, high visitor use is correlated with the establishment of stocked, non-native fish in mountain lakes. Landscape scale changes in lake morphology, however, have probably not occurred in the past 200 years.

Of the 347 mountain lakes in the Selway subbasin, 239 (69 percent) have been surveyed. Of these 239 lakes, 136 (57 percent) have been stocked within the past 50 years. Currently, 98 (40 percent) historically fishless lakes now support fish; 142 (60 percent) remain fishless. Presumably, the existing biological characteristics of fishless lakes are similar to the historic condition.

Establishment of introduced brook trout populations in mountain lakes is correlated with reduced abundance or absence of specific aquatic organisms and a reduction in overall aquatic species diversity, when compared to lakes where introduced fish are not present. For example, long-toed salamanders rarely occur in fish-bearing lakes but occur frequently in fishless lakes, suggesting fish stocking has adversely affected habitat for this species (Bahls, 1987).

Six mountain lakes may historically have supported indigenous westslope cutthroat trout (Bahls, 1987). Of these, one is now exclusively populated with non-native brook trout, four have been stocked with non-native cutthroat trout, and one continues to support indigenous cutthroat with no stocking history.

AQUATIC SPECIES

SUBBASIN AQUATIC SPECIES FINDINGS

Westslope Cutthroat Trout

Westslope cutthroat trout remain widely distributed across both subbasins (Map 23). Current distribution is similar to historic distribution. The migratory component of this metapopulation is intact and relatively strong, although it may be functioning at risk in the Middle Fork Clearwater River due to angling pressure and harvest. Numerous subpopulations are located across the Selway subbasin. Subpopulations are generally connected to the river, but distance or natural barriers may functionally isolate some subpopulations. Existing connectivity is similar to historic connectivity.

Westslope cutthroat trout may have been extirpated in some headwater reaches through interspecific competition with non-native brook trout, which have encroached into streams from mountain lakes (USFS unpublished data, 1990-1999). Brook and cutthroat trout occur sympatrically in other reaches, often with cutthroat trout more abundant (USFS unpublished data, 1996). Habitat factors determining the success or failure of cutthroat trout have not been defined.

The genetic integrity of some westslope cutthroat trout subpopulations may be less than the historic integrity, due to possible introgression with non-native cutthroat trout. These changes have potentially occurred across the landscape at higher elevations. Similar to brook trout, non-native cutthroat have been stocked in mountain lakes and have immigrated to connected streams

(Bahls, 1987; IDFG unpublished data, 1990-1999). Stocking of non-native cutthroat was more widespread than stocking of brook trout (IDFG unpublished stocking records, n.d.).

The Selway subbasin continues to support substantial amounts of habitat with very high potential to support westslope cutthroat trout (Map 23). Habitat for westslope cutthroat trout has been changed due to human-caused press disturbances in some high or very high potential watersheds. These impacts may have resulted in reduced carrying capacity from increased deposited sediment, reduced large woody debris recruitment, loss of pools, and simplification of habitat. On a landscape level, significant areas of high and very high potential streams remain unaffected by human disturbance (Maps 23 and 27).

Harvest of fluvial and resident cutthroat trout and introduction of non-native species are the key factors responsible for current declines in westslope cutthroat trout in the assessment area. Although some subpopulations no longer exist, in general cutthroat trout in the assessment area are probably at low risk of extinction due to high connectivity, high habitat integrity, relatively high abundance, and the roadless and wilderness status of much of the Selway subbasin.

Bull Trout

Bull trout remain widely distributed throughout the Selway subbasin (Map 24), although distribution is patchy. Current distribution is similar to historic distribution. Abundance may have declined from historic levels, but the species is not at high risk of imminent extinction. Both migratory and resident forms are present in the analysis area.

The Selway subbasin supports large amounts of habitat with high to very high potential to support bull trout (Map 24), principally in high elevation aquatic landtype associations (ALTAs 1, 2, and 4). Habitat in high and very high potential areas remains in high quality condition with little change in the disturbance regime. Suppression of wildfires may have decreased the disturbance frequency in some areas.

Harvest of adult bull trout and the presence of introduced species (such as brook trout) constitute the primary threats to bull trout in the assessment area.

Steelhead/Redband Trout

Steelhead/redband trout remain widely distributed across both subbasins (Map 22). Abundance of the anadromous form varies by year and stream and is correlated with numbers of returning adults. Other factors affecting abundance include habitat quality, habitat accessibility, and mortality from harvest.

Redband trout, the resident form of this species, appear to comprise a significant portion of some steelhead/redband populations in the Selway subbasin. Resident redband trout and anadromous steelhead pre-smolts exist in sympatry in several watersheds but differ in their physical appearance (Huntington, 1996). Both physical appearance and adoption of a resident life history strategy suggest that a degree of genetic divergence may have occurred, possibly accentuated by lower numbers of returning adult steelhead trout.

The Selway subbasin supports substantial areas rated with high or very high habitat capability to support steelhead/redband spawning and rearing (Map 22). A majority of fifth code HUC watersheds are classified as stronghold watersheds, which indicates both undegraded habitat and high population strength (Map 26). The Selway subbasin is thus considered a high priority area for recovery of this species in the upper Columbia River basin. Habitat potential for steelhead/redband trout has been reduced from human-caused press disturbances in two historic stronghold watersheds.

No known hatchery supplementation of steelhead trout in the Selway subbasin has ever occurred. It is highly likely that current genetic composition of this population is similar to the historic composition. Key spawning and rearing areas for anadromous steelhead trout are highly associated with the breaklands ALTAs, suggesting inherent resistance and resilience in this species in relation to short-term environmental perturbation.

Downstream effects probably contribute most to the risk of extinction of the anadromous component of the population in the analysis area. Even given impacts to habitat and angling mortality, which cumulatively contribute to the risk of extinction, downstream effects easily carry the majority of the risk. The resident component is probably not at risk of extinction.

Spring Chinook Salmon

Spring chinook salmon are distributed in many areas of the assessment area (Map 21), but distribution is not considered widespread, and abundance is presumably much less than occurred historically. Salmon are currently found in the highest numbers in high order, low elevation tributaries flowing through the breaklands ALTAs. Abundance of spring chinook has declined over the past century through a combination of downstream effects and local habitat degradation.

The Selway subbasin supports significant amounts of habitat with moderate and high potential for this species (Map 21). Only one stronghold area has been identified, although habitat strongholds are found throughout most of the upper Selway subbasin (Map 25). This reflects both lack of population strength and quality of habitat present for this species. Existing populations are maintained tenuously with the use of hatchery supplementation, which may also put the population at risk. Supplementation of naturally produced spring chinook salmon may prevent extinction in the short-term but may have deleterious impacts on the long-term persistence of this species in the assessment area.

Spring chinook salmon in the assessment area are at high risk of extinction. Downstream effects contribute most to this risk. Habitat degradation is not a major determinant in most cases, because degraded watersheds were probably not historically as important to salmon as watersheds in roadless areas. Clear Creek is one notable exception. In addition, the illegal taking of adult salmon in August and September, even if not widespread, could jeopardize the long-term persistence of salmon in the Selway subbasin.

Other Aquatic Species

The assessment area supports an array of native aquatic organisms besides the salmonid species discussed above. Data on most of these species are lacking, however. Other native fish known to inhabit the assessment area include mountain whitefish, northern pikeminnow, longnose dace, mottled sculpin, pacific lamprey, and suckers (unknown species). Of these, mountain whitefish are probably the most abundant. Anecdotal accounts suggest the historic presence of a large, mainstem spawning, ocean-type chinook salmon in the Middle Fork Clearwater and lower Selway Rivers, generally observed in mid- or late fall. If such a fish existed, it was likely a fall or summer chinook salmon. Known non-native fish include brook trout, coho salmon, Yellowstone cutthroat trout, and smallmouth bass.

Non-fish species include a wide variety of macroinvertebrates, mussels, filamentous algae, diatoms, mosses, and various vascular aquatic plants.

SUBBASIN AQUATIC HABITAT AND SPECIES RECOMMENDATIONS

General subbasin recommendations for aquatic species and habitat fall under two broad categories. These categories include:

- Restore habitat in lower Selway River and Middle Fork Clearwater River tributaries.
- Conserve native aquatic organisms throughout both subbasins, but particularly in the wilderness and roadless portions of the Selway subbasin.

Restoration actions included under the first category are found in the hydrology and watershed section of this chapter. These actions are focused at the fifth code HUC scale and generally include recommendations for watershed restoration. Conservation actions included under the first category include restoration of fire to most watersheds and a fine-scale assessment of site-specific changes to habitat from localized impacts.

Conservation actions associated with the second category include the following actions at the subbasin scale. For salmonid fishes, the primary actions include monitoring and possible control of brook trout, the most widespread introduced non-native fish species throughout the assessment area. This action is a very high priority. Unfortunately, effective reduction or removal of brook trout from both lake and stream environments generally requires methods that are inconsistent with social values associated with designated wilderness and/or involve socially unacceptable risks to non-target species. In addition, the removal of any fish population from a mountain lake, regardless of other biological and social issues, could be viewed as socially unacceptable despite the ecological benefits. Proposals to reduce or remove brook trout from a mountain lake should thus include careful consideration of the social risks and costs involved, as well as a realistic assessment of the effort required to achieve success in relation to the probability that success can be achieved.

The only known effective method for permanent reduction or removal of undesirable fish is the use of piscicides such as rotenone and antimycin, which are also toxic to non-target species. Methods still in the experimental stage include blasting and introduction of biocontrol agents. Less risky methods include netting and electro fishing; neither of these methods has proven effective in broad scale, long-term reduction or removal of undesirable fish from lake environments. Knapp and Matthews (1998) achieved limited success in removing brook trout from one mountain lake in the Sierra Nevada after repeated gill netting over several years. Success was based a narrow range of criteria focused on lake morphometry. Small lake size, presence of barriers at the outlet stream, and lack of significant streamflow into or out of the lake appeared to be the required attributes to achieving success. The applicability of this technique to mountain lakes in the Selway subbasin is presumably dependent on target lakes meeting these criteria.

Lakes in the subbasin that are currently fishless, especially deep lakes, should remain fishless to preserve deep lake ecosystems. This recommendation is a very high priority. Stocking of any species besides westslope cutthroat trout in any lake to provide angling opportunities should not occur. Effects to the genetic integrity of indigenous westslope cutthroat trout from hatchery westslope cutthroat trout should be carefully considered. Currently, the state of Idaho stocks only a small percentage of mountain lakes in the subbasin.

Other conservation actions include acquiring data to determine the extent, if any, of introgression of westslope cutthroat trout subpopulations. This recommendation is a high priority. The methods required to achieve this information are generally non-controversial and do not include the sacrifice of individual fish. Additional conservation actions generally include monitoring and data collection to address data gaps.

LANDSCAPE ECOLOGY

SUBBASIN LANDSCAPE ECOLOGY FINDINGS

Many areas of the subbasin are relatively intact compared to other subbasins in the interior Columbia River basin. However, the effects of fire exclusion have been pervasive across the subbasin, and the effects of timber harvest have been locally important in departures from historic conditions of composition, structure, and function. The effects of introduced organisms have had highly significant impacts in a few specific situations.

Pattern of Plant Communities in the Landscape

Early Seral Communities: With fire suppression, advancing succession, and timber harvest, open early seral communities have decreased in average and maximum patch size, but only slightly in extent. Where once they occurred in all terrain settings, they are now more likely to be found only in warm canyons, high elevation ridges, or harvest units. Early seral closed forest has increased greatly in extent and maximum patch size, as old burns have reforested.

Mid-Seral Communities: Mid-seral open forest has increased, while closed canopy mid-seral forest has decreased, perhaps due to increased pathogen activity or transition to later seral stages.

Late Seral Communities: Late seral open forest has decreased greatly in extent and maximum patch size, due to fire suppression. Late seral closed canopy forest has decreased and large patches have been fragmented, probably due to harvest of old growth in the western portion of the subbasin.

Plant Community Composition

Whitebark pine has decreased dramatically due to fire suppression, blister rust and mountain pine beetle activity. Alpine larch has also decreased. Large ponderosa pines in open stands have decreased due to fire suppression and forest succession. Increases in more shade tolerant species like grand fir and western red cedar have occurred with fire suppression and forest succession. Old burns now support lodgepole pine. Shrublands have decreased with forest succession. Recent burn patches have decreased. Annual grasslands and noxious weeds have become established on open, low elevation, steep, south-facing slopes. Western white pine has decreased from its minor historic levels due to blister rust and forest succession. Montane park has increased as old burns and denuded areas have revegetated, or whitebark pine has been lost.

Plant Community Structure

Nonforest plant communities have decreased due to forest establishment on old burns. Timber harvest and recent burns have not occurred at the same rate and with the same ecological effects as presettlement fire disturbance. Seedling-sapling and pole forests have increased due to tree growth on old burns. A decrease in the large tree component may be due to extensive timber harvest in old growth.

Areas in low tree canopy cover and total forest cover have increased with the increase of young forests on old burns. The area in moderate tree canopy has decreased, probably due to transition to high canopy cover in increasingly dense stands due to fire suppression and succession.

Pathogen and Insect Activity

Susceptibility to pathogens and insects associated with late seral tree species like true fir and Douglas-fir has increased with successional shifts toward these tree species and away from more resistant species like pine and larch. The pathogens include root rots and spruce budworm. Susceptibility to insects associated with larger, aging trees like Douglas-fir and lodgepole pine has increased with succession and fire suppression. Whitebark pine has widely succumbed to blister rust and mountain pine beetle activity. Increasing stand densities mean that more stands are under competitive stress for moisture and nutrients than would have been in presettlement times. Such stress makes them more susceptible to pathogens and insects that might otherwise operate at endemic levels.

Fire Regimes

Over much of the subbasin, fire is allowed to burn much less often and over smaller areas than during presettlement times. The interval between fires has increased most markedly in the areas once dominated by very frequent and frequent fire. This departure from historic condition and the consequent increased fuel quantities and continuity indicate that future fires could have more severe watershed effects and effects on successional processes than fires during presettlement times.

Plant Communities of Concern

Whitebark pine communities have been most affected in the subbasin. A 92 percent decline in whitebark pine-dominated communities appears to have occurred. Montane park or mixed subalpine forests have replaced the pine communities. Aspen and other hardwood communities appear to have decreased as a result of fire suppression, but changes at this fine scale are poorly tracked. Mountain grassland communities have been severely impacted at low elevations along the river corridor by non-native plants. Open ponderosa pine forests have decreased with encroachment of more shade tolerant Douglas-fir and grand fir. Groves of very large old cedar have been fragmented by timber harvest. Habitat for coastal disjunct plant species has been impacted by fire exclusion, road construction, and recreational use.

Old Growth

The total area in mature forests is greater today than historically, but large blocks of mature and old growth mesic conifer forests have been highly fragmented by timber harvest in the western portion of the subbasins. In canyons and higher elevation glaciated settings, mature and old growth forests have likely increased as a result of fire exclusion. More multilayered, mixed-species old growth occurs, while open ponderosa pine old growth has decreased.

Snags

Snag production from episodic large fires or from more frequent smaller fires has declined as a result of fire exclusion. As a consequence, the large snag patches of several hundred to thousands of acres that once were generated every 15 years or so are not being generated. Fire exclusion, succession, increasing stand density, and consequent stress and pathogen activity, appear to be resulting in increased production of smaller, more uniformly distributed snags, such as those that occur in the extensive root rot patches. Snags of long-lived species like ponderosa pine or larch are expected to increase as these species die off in favor of more shade-tolerant firs, which will not produce snags of the same size or longevity over the long term. Cedar snags, however, are very long lasting, and recruitment is likely to increase in the west portion of the subbasin as succession proceeds.

SUBBASIN LANDSCAPE ECOLOGY RECOMMENDATIONS

In spite of the largely wilderness and roadless character of the subbasins, landscapes at all elevations show moderate to high departure from presettlement conditions because of effective fire exclusion since about 1935. Conservation themes are generally applicable only to a few ERUs or a few elements, where conservation means saving what remains, in terms of either condition or process. Restoration, even in wilderness areas, will be required to recover the array of communities, habitats and species that the assessment area supported before Euro-American settlement.

Two general recommendations concisely summarize the vegetation restoration themes for these subbasins:

- Restore landscape and plant community composition, structure and function through restoration of natural disturbance regimes or well-designed simulations of natural disturbance regimes.
- Restore plant community and genetic integrity through control of non-native species and revegetation with native plant species from locally adapted sources.

More specific recommendations are subsets of these general themes and reflect the highest priorities at the subbasin scale. Priorities may be different at the ERU scale.

High Elevation Forests

Vegetation response units (VRUs) 2 and 9, and portions of VRU 1, have been most markedly affected by the decline of whitebark pine and alpine larch.

- Inventory whitebark pine for condition and trend in areas where active restoration can occur. Iron Mountain and Running Creek are two examples where slashing and prescribed fire could be used and local seed sources propagated.

- In wilderness areas identify fire scenarios best adapted to maintain or regenerate whitebark pine and alpine larch based on the species conditions and threats. Use this information to develop wildland fire use prescriptions.
- Collect and store whitebark pine seed from stands that appear to have developed any rust resistance. Use this seed to provide planting stock for areas where planting is appropriate.
- Analyze past fire behavior to determine if increased use of wildland fire can be supported. Priority is very high.

Low Elevation Grasslands and Open Dry Forest

Vegetation response units (VRUs) 3 and 12 have been highly impacted by invasion of noxious weeds and non-native grasses and forbs.

- Inventory weed and non-native plant communities. Middle and Upper Selway Canyon ERUs are highest priority.
- Collect and propagate native grasses and forbs from intact communities to provide restoration materials.
- Secure areas in relatively good condition with weed treatments. In areas needing more comprehensive approaches, increase emphasis on weed treatment and active restoration using native plant materials. In areas adjacent to other land ownerships, establish and nurture partnerships to accomplish these objectives. Priority is very high.

Low Elevation Dry and Moderately Moist Forest

Vegetation response unit (VRU) 3 has been impacted by fire exclusion, with consequent increases in stand density, multi-layered stands, and increases in grand fir and Douglas-fir.

- Conduct the necessary analysis to support expanded wildland fire use in appropriate areas.
- Conduct the necessary analysis to support expanded use of management-ignited fire in appropriate non-wilderness areas.
- Include use of management-ignited fire in dry forests in conjunction with harvest activities, or in neighboring stands.
- Use harvest where appropriate to reduce dense understories of fir.
- Conserve existing large ponderosa pine and larch. In mixed conifer stands in canyons on moister aspects, conserve existing pine and larch, reduce stand densities, favor development of one and two-story stands with pine or larch overstories or legacy trees as available, and provide increased amounts of snags and early seral habitat, including hardwoods and shrubs. See recommended guidelines for snag retention in Appendix I. Priority is high.

Moist Maritime Forest

Vegetation response units (VRUs) 7, 8, 10, and 17 have been impacted by timber harvest on uplands and by harvest and fire exclusion in canyons.

- On uplands, conserve existing old growth and restore old growth through allocation of larger proportions of VRU 7, 10, and 17 to old growth in contiguous blocks.
- Conserve Pacific yew.
- In canyons (VRU 8), restore age class diversity and importance of seral species by use of fire or harvest.

- Introduce rust resistant white pine planting stock where appropriate.
- Favor deferred regeneration where there is potential for shrub and hardwood seral stages.
- Emphasize snag production in some dense patches as well as early seral habitat.
- Favor mixed severity treatments as often as stand replacing treatments.
- Conserve all groves of very large (25 inches DBH or more) cedar old growth. See recommended guidelines for old growth in Appendix H.
- Inventory treatment areas for coastal disjunct species and adapt treatments to favor their conservation as species and well distributed populations, within the range of natural disturbance dynamics.

Priority for old growth conservation is very high. Priority for snags and hardwood production is high. Priority for restoration of age class diversity and early seral habitat production is moderate.

Mid Elevation Cool Forest

Vegetation response units (VRUs) 1 and 6 where lodgepole pine was historically dominant have been impacted by fire suppression. Landscape level diversity has been reduced, particularly early seral habitat including snags, herbaceous, shrub, seedling-sapling and pole stages, and diversity of patch size.

- Conduct the analysis necessary to support expanded wildland fire use in appropriate areas.
- Conduct the analysis necessary to support expanded use of management-ignited fire in appropriate non-wilderness areas.
- Include the use of prescribed fire in VRUs 1 and 6 in conjunction with harvest activities, or in neighboring stands.
- Use harvest where appropriate to reduce true fir components. Harvest should simulate mostly stand replacement, but conserve existing larch or other legacy trees, provide for recruitment of future residual overstory trees, and provide dense patches of snags. See recommended guidelines for snag retention in Appendix I. Priority is moderate.

FIRE

SUBBASIN FIRE FINDINGS

Historic and Current Fire Regimes and Smoke Production

Fire regimes in the subbasin were historically dominated by infrequent and very infrequent mixed and lethal regimes, with more frequent, lower severity fire in canyons and on open high elevation ridges. Large fires of more than 1,000 acres occurred about every 3 years in the subbasin, from 1870 to 1934. About 22,285 acres burned annually on the national forest lands. Very large fires at 10 to 20-year intervals produced long lasting, very large smoke plumes that affected the Bitterroot Valley and blanketed downstream canyons during inversions. In about 85 percent of the years from the record of 1870 to 1934, smoke production was more limited in duration and extent, but still substantially more frequent and longer lasting than from 1935 to the present. From 1935 to 1978, when fire suppression was the policy on all lands in the subbasin, about 314 acres burned annually, a decline of more than 95 percent. Since the implementation of the fire use program in the Selway-Bitterroot Wilderness from 1979 to 1996, about 8,842 acres have burned annually. This still amounts to only about one-third of the historic rate. Concerns about smoke production, as well as other concerns, have constrained wildland fire use to levels substantially below historic fire occurrence.

Changes in Fuel Quantity and Continuity

Patterns of fuels that existed in the 1930s contrast strongly with those that occur today. Areas of grasslands, shrublands, and seedlings and saplings less susceptible to severe fire have declined, while areas of mature forest with greater fuel accumulation and connection of ground fuels to the tree crowns have increased. Areas with fuel accumulations and distributions outside the range of historic variability may pose increased risk for large fires, more severe in fire intensity and impacts to watersheds and plant communities, compared to presettlement times. Based on plant community structure, the White Cap Creek, Indian Creek, Deep Creek, lower Running Creek, and Upper Selway Canyon areas show strong evidence of unnaturally high fuel accumulations.

Areas Outside their Disturbance Interval

Over much of the subbasin, fire frequency has been much less in the past 60 years than in prior years, as far back as the 1500s. The interval between fires has increased most markedly in the very frequent and frequent fire regimes in the canyons. Based on departures in fire intervals, the Whitecap Creek, Indian Creek, Deep Creek, lower Running Creek, Little Clearwater, and upper Selway canyon areas show strong evidence of likelihood for more severe fire behavior and effects than occurred historically. It is likely that fuels in these areas have increased in quantity and ability to carry fire into the tree crowns and have the potential to burn with greater lethality and effects to plant communities and watersheds.

Increased Risk of More Severe Fires

High ignition probabilities, based on recent fire starts, and departures in fuels or fire regimes do not coincide spatially in the subbasin. High rates of ignition occur in the western portion of the subbasin and fuels concerns are highest in the eastern portion of the subbasin. This generalization may not hold well in any specific fire weather situation or lightning strike location, however. Based on the pervasive effects of fire exclusion in the subbasins, and considering harvest disturbance has occurred only in limited areas, there appears to be a substantially higher risk of large severe fires across more of the subbasins than would have been typical of presettlement times. Even at high elevations, areas of mature forest and higher fuel loads are more continuously distributed in the landscape than historically.

Increased Difficulty of Structure Protection

As continuity and quantity of fuels have increased, the risk of loss of private property and administrative structures has increased. Structure protection is a costly component of fire use and fire suppression in the assessment area. Structures are usually located at low elevations in xeric settings where departures from presettlement fire regimes are most marked, and risks of fire damage have increased the most.

SUBBASIN FIRE RECOMMENDATIONS

Recommendations for fire use and management in the Selway and Middle Fork Clearwater subbasins are shown in Map 36. This map shows three main areas of recommended fire management emphasis on national forest lands.

Areas with Fire Use Plans in Place

The wilderness areas and some adjacent unroaded areas including much of Rackliff, Gedney and East Meadow Creeks have fire use plans in place. It is evident, from the analysis presented in Chapter 4, that natural fire regimes are still highly constrained under these fire use plans and consequent departures of ecological condition and process are marked. Some of this constraint may be due to poor information on fuel complexes within the wilderness areas. More site-specific information, or improved modeled information about fuel conditions and likely fire behavior and effects is warranted in these areas. Treating fuels in adjacent non-wilderness areas with prescribed fire could reduce risks to values on adjacent lands, and increase opportunities to let fire play a more natural role within the wilderness areas. Prescribed fire may be needed in some areas with fire use plans in place, including wilderness areas, to help transition to fuel conditions where naturally ignited fires can be allowed with less risk of unnaturally high ecological or social effects.

Additional Areas Proposed for Wildland Fire Use for Resource Benefits

The west side of Meadow Creek in the unroaded area, and the O'Hara Creek Research Natural Area (RNA) are proposed for modified wildland fire use. They are unroaded, large, intact areas where timber harvest is restricted. The west side of Meadow Creek is adjacent to the large area to the east where a fire use plan is already in place. Meadow Creek itself is a relatively difficult boundary to defend from fire passage. The O'Hara Creek RNA is within a generally moist forest and alder field setting where fire typically has little opportunity for rapid spread. In either of these areas there is currently no other mechanism than prescribed fire to sustain disturbance regimes. Because both of these areas are closer to developed lands and the forest boundary, it is recommended that wildland fire use and prescribed fire use be implemented under tighter constraints than in East Meadow Creek and the wilderness areas. Additional analysis in consideration of this recommendation is necessary.

Areas Recommended for Continued Prescribed Fire Use

The rest of the national forest lands within the assessment area are recommended for continuation of prescribed fire use to reduce fuel loads, risk of unnaturally high fire effects, and stand density as appropriate. Areas around private and administrative structures both within wilderness and roadless areas should be evaluated for prescribed fire use, to reduce risk of loss, and costs and danger of structure protection during wildfires. Opportunities to acquire private inholdings that are difficult to protect should be pursued, recognizing that by reducing the future costs of protection the market value of such properties could be easily recouped.

WILDLIFE

SUBBASIN WILDLIFE FINDINGS

Large parts of the subbasins are designated wilderness and roadless and provide effective and secure habitat for a large diversity of species. But in some cases, departures from presettlement conditions have significantly influenced or have the potential to influence the subbasins' wildlife habitats and populations. The Wilderness Act, which governs a large portion of the Selway subbasin, applies higher standards of naturalness to wilderness conditions than to non-wilderness conditions, including wildlife populations and habitats. As a result, similar impacts occurring in both wilderness and non-wilderness are more significant within wilderness.

The most important mechanisms of departure from presettlement conditions in wildlife habitats and populations in the subbasins include:

- Fire suppression throughout the subbasins
- Weed introductions in xeric habitats throughout the subbasins
- Timber harvest and road construction in accessible habitats in the lower Selway subbasin and throughout the Middle Fork Clearwater subbasin
- Residential and agricultural development in the lower Selway subbasin and Middle Fork Clearwater River subbasin.
- Construction of Highway 12 and motorized access to winter range in the upper Selway and lower Selway and Middle Fork Clearwater subbasins
- Introduction of non-native fish and wildlife species
- Historic hunting and trapping that led to species extirpations
- Construction of the Lewiston Power Dam and subsequent loss of native salmon runs that were important to grizzly bears

The following discussions on habitats and populations focus on important departures from historic conditions and potential threats.

HABITAT INTEGRITY

Disturbance Dynamics

Landscape processes in the subbasins include chronic natural disturbances that affect wildlife habitat through vegetation succession, insect and plant pathogen influences, climatic changes, and changes in fire frequencies and intensities, and catastrophic disturbances like fire, storms, and floods.

Fire: Wildlife habitats in the upper portion of the subbasin, including Running and Goat Creeks, Upper Selway Canyon, Whitecap Creek, Indian Creek, Deep Creek, and the Little Clearwater portion of the upper Selway Headwaters ERUs have been influenced most by fire exclusion. Some of the private lands in lower Clear Creek and Middle Fork Clearwater ERUs also indicate significant increases in fuel accumulations and missed fire intervals. In the absence of fire, forage productivity, snag recruitment, and important recently burned patch habitat, which black-backed woodpeckers and other species are dependent on, has been reduced.

Prescribed fire ignitions in the Lower Selway Canyon and North Selway Face ERUS may be occurring more frequently than would naturally occur. Most spring fire ignitions have concentrated on the north side of the lower Selway River and the east side of Meadow Creek. Spring fire ignition has implications for species with increased vulnerability during spring breeding, denning, and nesting periods and for vegetation that is not physiologically adapted to accommodate fire in the growing season. Spring burning does not have the same influence on resprouting and invigorating forage that fire in the dry season does.

Insects and Plant Pathogens: Changes in species composition and canopy density due to fire exclusion and logging practices probably have increased the levels of insect populations and plant pathogens in the subbasins. The increased insect population levels benefit subbasin species that forage on insects, including woodpeckers and migratory landbirds. But long-term implications of artificially high infestations may be the reduction of forest cover with associated impacts to wildlife habitat. The combination of fire exclusion and blister rust disease has imperiled whitebark pine with negative influences on associated dependent species in alpine habitats.

Composition

The most significant changes in subbasin habitat composition include marked declines in whitebark pine due to the blister rust pathogen and fire suppression, and declines in ponderosa pine, also due to fire exclusion. These departures have significant implications for subbasin animal species that are strongly associated with whitebark pine and ponderosa pine communities. In the absence of fire, species with more shade tolerance like grand fir, western red cedar, and lodgepole pine have increased. Shrublands are also less well represented, with resulting reductions in habitat for migratory landbirds and other species.

Weed infestations have changed species composition and fire dynamics in dry, winter range grasslands where native bunchgrass forage has been diminished. These habitats are important for bighorn sheep, elk, mule deer, white-tailed deer, and their predators, including wolves, mountain lions, bobcats, wolverines, and bald eagles. The weed invasions have also diminished habitat for native mountain quail that require more open ground cover for movement through their habitat. The lower Middle Fork Clearwater area, lower Clear Creek area, and the north and east sides of the Selway canyon have been most impacted by weed infestations. The reduction in availability and quality of winter forage is detrimental to ungulates, and to the carnivores that prey on ungulates.

Structure

Canopy Density: Forest canopy density has been significantly influenced by fire exclusion in the subbasin. High canopy density has increased with related declines in moderate canopy density.

Many species of owls and hawks, including white-headed woodpeckers, flammulated owls, and northern goshawks, require more open, lower canopy density habitat for foraging. Higher canopy densities also may result in artificially high levels of insect populations and plant pathogens.

Early and Mid-Seral Forests: Ungulates and their predators, small mammals, mountain quail, and many migrant bird species are dependent on early seral habitats and shrublands. Bighorn sheep rely on open, early seral habitat, not only for forage, but for long sight distances to avoid predators. Mid-seral forest often provides foraging habitat and thermal and hiding cover for numerous species. Changes due to fire exclusion include a general decrease in unforested, early seral habitat. However, unforested openings where timber harvest has been extensive in the lower Selway and Middle Fork Clearwater areas have increased. Mid-seral habitat structure has dramatically increased as a result.

Old Forests: Many subbasin species depend on various types of old forests. White-headed woodpeckers and flammulated owls are associated with old ponderosa pine. Old ponderosa pine structure has significantly decreased because of logging in the lower subbasin and fire suppression throughout the subbasin. The most significant representation of old ponderosa pine and Douglas-fir forests in the subbasin occurs in the Selway River canyon above Moose Creek in the wilderness portion of the Selway subbasin. These communities are concentrated on the east side of the canyon with the largest patches occurring in the Whitecap Creek drainage.

Xeric ponderosa pine and Douglas-fir old growth habitats are important for white-headed woodpeckers and flammulated owls. Mesic old growth provides habitat for lynx, fishers, goshawks, great gray owls, and moose. Restoration of old whitebark pine is critical for the interdependent species assemblage that it supports, including grizzly bears.

Great gray owls, goshawks, denning lynx, moose, and some species of migratory songbirds depend on old, mesic, coniferous forest. In the wilderness portion of the subbasin, old mesic forests are concentrated in the Bear, Moose, Running, Mink and Marten Creek areas. In the lower Selway and Middle Fork Clearwater subbasins, the Meadow Creek, O'Hara Creek, Goddard Creek, upper Clear Creek, upper Middle Fork Clearwater canyon, and lower Selway canyon areas have significant old, mesic forest structures. Large patches of old western red cedar and Pacific yew communties important to moose are unique old forest elements that contribute to wildlife habitat in the subbasins. Although timber harvest has fragmented mesic, old forests in the lower subbasins, old forests are better represented across the subbasins than in presettlement times as a result of fire suppression.

The largest patches of old, whitebark pine forests in the subbasins occur in the headwaters area of Mink and Marten Creeks on the divide between the Selway River and Meadow Creek, and in the headwaters area of Pettibone Creek at Wahoo Peak. Other significant old, whitebark pine forest occurs on the main divide ridges that bound the Selway subbasin. Old, cone-bearing whitebark pine structure has dramatically decreased in the Selway subbasin as a result of fire suppression and subsequent blister rust disease. Mature whitebark pine is an important food source for an interdependent species assemblage that includes grizzly bears.

Dead and dying trees are an important and limited component of old forest habitat. Snag production and dead wood recruitment in the subbasins has declined due to fire suppression. Firewood cutting in the subbasins primarily targets standing snags, a rare habitat feature important for feeding, nesting, and perching. Although primarily restricted to roadside access in the Middle Fork, O'Hara and Goddard Creeks, and Clear Creek ERUs, these localized impacts are intense where they occur. During timber harvest and fire suppression activities, snags are often felled to ensure worker safety. Downed wood, also an important habitat component, is frequently removed following timber harvest to reduce fire risk.

Function

Genetic Interchange and Population Dispersal: Most of the areas in the subbasins provide intact habitats that should adequately provide for genetic interchange and population dispersal.

However, extensive logging and road construction from 1960 through the 1990s in the Middle Fork Clearwater, O'Hara and Goddard Creeks, and Clear Creek ERUs has contributed to fragmentation of old growth habitats in the developed portions of the subbasins. Fire exclusion has artificially increased the risk for eliminating patches of old forest habitat due to greater fuel accumulation. Conversion of private lands to agricultural and residential development in the lower subbasins has also increased habitat fragmentation. The significance of these influences on genetic interchange and population dispersal in the subbasins is unknown.

Habitat Connectivity: Although timber harvest, agricultural, and residential development has fragmented habitats in the lower subbasins, habitat connectivity probably is functional for most species in the largely undeveloped areas of the subbasins.

Large areas of the subbasins are mountainous and highly dissected. Most major corridors available to large-bodied species like ungulates and carnivores are associated with riparian zones and ridgetops. Wide ridgetop corridors are uncommon, but the major ridges that divide the Selway from the Lochsa River, Bitterroot Valley, Salmon River, and Meadow Creek are undoubtedly important travelways for ungulates and carnivores.

An important travel corridor in the Selway subbasin is East Fork Moose Creek, a wide, flat, valley bottom that connects the Bitterroot Valley with the Selway River. This corridor was historically important to wolves and probably to grizzly bears as well.

Running Creek connects the upper Selway River with Meadow Creek, and with the Salmon River through Bargamin Creek. If bighorn sheep migrate between the Selway and the Salmon Rivers, they probably use this route. Meadow Creek and O'Hara Creek connect the lower Selway River with the wide valleys and significant meadow complexes of the Red River, the American River, and Newsome Creek, tributaries within the South Fork Clearwater subbasin. These corridors are important for ungulate and carnivore migration between the summer range meadows at higher elevations and winter range in the Selway subbasin.

Clear Creek connects summer range in the Newsome Creek area with winter range in the lower Middle Fork Clearwater area, although the integrity of the corridor and winter range is compromised by agricultural, commercial, residential, and road development. Several drainages connect the Lochsa River with the Selway River and its East Fork Moose Creek tributary.

SPECIES AND POPULATION INTEGRITY

Extirpations and Reintroductions

The gray wolf, historically a primary predator in the subbasins, was largely eliminated by hunting and trapping from all of north central Idaho by the 1930s. Wolf reintroduction to north central Idaho was initiated in 1995, and wolves are successfully reproducing. At least two packs occupy the subbasins today.

Grizzly bears were common in north central Idaho and the Bitterroot Mountains until the early 1900s when hunters, trappers, and sheepherders eliminated them from the region. Construction of the Lewiston Power Dam in 1927 eliminated the native salmon runs the Bitterroot grizzly bears depended upon as a food source. Whitebark pine, an important grizzly food source, has been reduced to remnants of its historic occurrence. Grizzly bear recovery planning is ongoing. The U. S. Fish and Wildlife Service prepared the *Final Environmental Impact Statement for Grizzly Bear Recovery in the Bitterroot Ecosystem* in March 2000, and the decision to reintroduce grizzlies has been signed.

Mountain quail are indigenous to the subbasin and few, if any, exist today. Fire suppression and loss of early seral communities that provide shrub galleries (tunnels or passage ways) have undoubtedly contributed to the decline of mountain quail habitat in the subbasin. Extensive cheatgrass and other weed species invasions in xeric habitats have increased ground cover density that reduces the ability of mountain quail to travel through their habitat. Grazing has contributed to direct habitat loss or deterioration in some areas, but has improved habitat by opening dense ground cover in other areas. Mountain quail are also vulnerable to hunting in sparse habitats in xeric ranges. Little is known about the influences of introduced gallinaceous birds on mountain quail, but habitat competition from these populations may also be a factor. There is some evidence in research literature (Heekin, 2000) of disease decimating entire populations in one season, which indicates the presence of introduced organisms that mountain quail are not adapted to.

Introduced, Non-Native Species

Many of the mountain lakes within the Selway subbasin have been stocked with non-native fish. Almost all these lakes were originally fishless. The introduced fish have impacted native amphibian, reptile, and insect populations that occupy the lake habitats. Eastern brook trout are the most prolific of the introduced fish species and pose the greatest threat to native terrestrial populations. Spotted frogs and long-toed salamanders are usually common or abundant at fishless lakes and less common, rare, or absent at lakes with fish present. Low insect populations result in lower diversity of insect-feeding birds and increased presence of fish-eating birds including ospreys, great blue herons, and kingfishers. Lakes that remain in a fishless condition, particularly deep lakes, may play an important role in maintaining the genetic pool of native species in the Selway subbasin.

Several species of non-native gallinaceous birds have been introduced into the subbasins or have expanded their populations into the subbasins from adjacent lands. These include California quail, chukar partridge, ring-necked pheasant, and Merriam's wild turkey. Merriam's wild turkey is the most recently introduced species, and populations in the last few years have dramatically increased. They are common along the Middle Fork Clearwater River and the lower Selway River. Individuals have also been reported as far upstream as Moose Creek Ranger Station in the wilderness. Little is known about how these introduced species influence native gallinaceous birds. Some experts speculate that they may compete with natives for habitat, parasitize nests, and carry pathogens that are lethal to the native birds.

Security

Access by Motorized Vehicles: Highway 12, adjacent to the Middle Fork Clearwater River, is an important linear barrier to many species. Although impacts to large-bodied ungulates are common, they are probably not as significant as the impacts to smaller-bodied species including amphibians, small mammals, and carnivores attempting to cross between the forested uplands and the riparian habitat along the river. Fishers are sometimes seen attempting to cross the highway between the uplands that provide cover and the river environment they are strongly associated with.

Forest roads that may present barriers to movement to and from riparian habitat are located in the Deep Creek, Upper Selway Canyon, and Clear Creek ERUs. Some forest roads and trails probably are not important barriers to movement, but do have implications for species vulnerabilty relative to security. Impacts to species from motorized traffic are greatest in denning, calving, and nesting areas during breeding and natal periods, and on winter range in wintering periods. Motor vehicle access increases vulnerability of hunted species during hunting seasons. Open road density is highest in Clear Creek and Middle Fork Clearwater River ERUs, with three to five mi/mi^2 in some areas.

Winter snowmobile users in the subbasins access winter range and high elevation habitats in Clear Creek, Meadow Creek, Lower Selway Canyon, North Selway Face, O'Hara and Goddard Creeks, Middle Fork Clearwater River, Gedney and Three Links Creeks, Deep Creek, Selway Headwaters, and Upper Selway Canyon ERUs. Species potentially influenced by winter snowmobile use in the subbasins include ungulates and carnivores on winter range, especially bighorn sheep, mountain goats, wolverines, and lynx. Wintering bighorn sheep, mountain goats, and mule deer are concentrated in the upper Selway canyon where Magruder and Paradise Roads are open to snowmobile traffic in winter. Mountain goat and bighorn sheep populations are declining in the Selway subbasin.

Motorized vehicle use on roads and trails that access alpine environments and high elevation denning and calving habitat can potentially impact vulnerable species. In Meadow Creek, North Selway Face, Gedney and Three Links Creeks, Running and Goat Creeks, Moose Creek, Deep Creek, and Selway Headwaters ERUs, roads and trails used by motorized vehicles access alpine environments and disturbance-sensitive species like mountain goats and wolverines. High elevation habitats and species vulnerable in calving and denning periods like lynx, wolves, and elk are accessible to motorized traffic in Meadow Creek, Running and Goat Creeks, North Selway Face, and Gedney and Three Links Creeks ERUs.

All non-wilderness areas in the subbasin are open to motorized vehicle access unless designated closed. With the continued increase in motorized recreational pursuits and associated technological advances in motorized equipment, pro-active access planning to address present and future motorized vehicle use is essential.

Non-Motorized Activities: River recreation may impact harlequin ducks in breeding territories, otters, nesting ospreys, wintering bald eagles and other river-dependent species on the Selway River. Companion dogs not under control can stress or threaten wildlife, with the levels of sensitivity dependent on species and life stage. Humans visiting alpine communities can influence the security of disturbance-sensitive species, including wolverines, grizzly bears, and mountain goats.

Blasting associated with trail maintenance and construction is common in the subbasins and can impact species most during breeding, denning, and nesting periods. Sudden, loud noises have been found to cause bighorn sheep and mountain goats to withdraw to cliffs and marginal habitat.

Residential and Administrative Developments: Private inholdings and other residential and administrative developments in the subbasins influence wildlife and habitats. Human habitation preferences often coincide with important wildlife habitats like winter range, meadows, and riparian areas. Consequences of the human-wildlife interface may include reduced wildlife habitat and security, displacement, harassment or mortality from domestic pets, and direct mortality by humans to prevent depredation and threats to human safety.

Airfields are associated with most private inholdings and administrative sites in the wilderness portion of the Selway subbasin. Most airstrips are accessible all year. Wildlife is most vulnerable to air traffic in winter when additional stress further taps limited energy reserves.

The potential for increased development of private holdings in the subbasins is significant. Additional dwellings, residents, and air traffic would increase impacts to wildlife security in the subbasins.

Hunting and Trapping: Hunting and trapping activities were historically significant in the subbasins and resulted in grizzly bear and wolf extirpation in the late 1800s and early 1900s, and near elimination of mountain lions by 1935. The state paid bounties on wolves, coyotes, bobcats, lynx, and mountain lions as early as 1907.

Take and hunting seasons are regulated today, although because of the remote character of the subbasins and lack of funding, there is little field presence to enforce regulations. Risks associated with hunting and poaching include shooting protected species. Lynx, a listed “threatened” species, can easily be mistaken for bobcat, a species legal to shoot. Wolves, listed “endangered-experimental” are often mistaken for coyotes. Between 1985 and 2000, at least 15 protected grizzly bears were mistakenly shot by hunters during spring black bear season in Montana.

Trapping is now primarily confined to roaded areas and those areas accessible by snowmobiles in winter. When fur prices rise, the risks of trapping lynx in bobcat traps increase, and security of lynx habitat declines with increased access.

Salt Attractants: Unauthorized salt distribution to attract wildlife commonly occurs in the subbasins. The salt can change the distribution pattern of ungulates and make them more vulnerable to hunting mortality. Salt also attracts other species and increases their potential for being shot or preyed upon at artificial salt lick sites. The unauthorized activity has been associated with both commercial and private hunting operations. The Moose Creek ERU is an example of an area with probable significant influence on elk distribution and vulnerability as a result of salt distribution. The gentle terrain in the East Fork Moose Creek area is easily accessible by pack stock for salt distribution. An artificial lick site in the Whitecap Creek area is located between two mountain goat ranges and is less than a mile from winter and spring range. Goats are easily habituated to salt licks where their vulnerability is increased. Numerous unauthorized salt licks also occur in the Little Clearwater River area within the upper Selway subbasin.

SUBBASIN WILDLIFE RECOMMENDATIONS

The following recommendations generally address subbasin wildlife habitats and focal species. More specific habitat restoration recommendations are discussed in the Landscape Ecology section of this chapter. Recommendations specific to the focal wildlife species in the assessment can be found in Appendix Q.

Restore and Conserve Habitat Integrity

Disturbance Dynamics: Restore more natural disturbance dynamics in the subbasins to provide the habitat diversity, both spatially and temporally, that native species evolved with. In wilderness, restoration of more natural fire regimes is appropriate. Outside wilderness, a combination of carefully planned prescribed fire use and mechanical vegetation removal is recommended to achieve objectives. Implementation of these methods should adequately consider wildlife habitat and population needs. Disturbances should approximate natural distribution, frequency, intensity, and season of occurrence. Spring burning should be avoided when possible to reduce impacts to nesting and breeding wildlife and to gain the forage production benefits of drier season burning. Restoration of disturbance dynamics is necessary to restore and maintain forage in winter range habitats, provide early seral structure including shrublands, conserve old growth habitats by reducing fuels and risks for stand replacing fire, and facilitate seed germination for some species. Fire is important in providing critical dead and dying wood habitat that includes snags and downed wood.

Habitat Connectivity and Fragmentation: Provide for range-wide habitat connectivity and migration routes for carnivores and ungulates. Design timber harvest and other landscape alterations to reflect natural disturbance dynamics in space and time that influence forest structure and patch size, shape, and distribution. Restore fragmented grand fir-Pacific yew habitats in Clear Creek and O'Hara and Goddard Creeks ERUs that are critical moose winter range. Conserve large patches of contiguous western red cedar old forest that provide important habitat for numerous species including cavity nesters and brown creepers. Avoid new road construction in ponderosa pine patches greater than 250 acres to minimize fragmentation in white-headed woodpecker and flammulated owl habitat. Consider formation of a local habitat conservation district on non-federal lands in the Middle Fork Clearwater River subbasin to identify actions that would improve or restore important fragmented habitats, including winter range and the shrub galleries that mountain quail depend on.

Dead and Dying Wood Retention: Implement recommended snag and live tree retention guidelines (Appendix I) to ensure maintenance of habitat integrity for dependent species when planning timber harvests, salvage operations, firewood gathering, and other activities with potential for snag removal. Retain large patches of dead, dying, deformed, leaning, and diseased trees that are important to white-headed woodpekers, flammulated owls, goshawks, great gray owls, and black-backed woodpeckers. Retain large diameter ponderosa pine by limiting snag harvest to less than 15 inches diameter at breast height, where possible.

Weed Management: Reduce weed populations, conserve existing weed-free areas, and prevent new infestations. Xeric winter range foraging areas are the highest priority and have been impacted the most. These habitats are important for mountain quail, bald eagles, small mammals, ungulates, and their predators. Bighorn sheep winter range restoration in the upper Selway is a very high priority. Weed management is discussed in more detail in the noxious weeds section of Chapter 4.

Aquatic and Riparian Habitats: Aquatic and riparian habitats in the subbasin are important for numerous terrestrial species, including amphibians, harlequin ducks, bald eagles, ospreys, fishers, and moose. Buffer streams and waterfalls during timber harvest, road and trail construction and maintenance, fire suppression, prescribed fire, and other activities that could result in impacts. Minimize frequency of trail and road stream crossings and, where necessary, bridge streams instead of constructing fords or installing culverts. Prevent contamination of water sources resulting from herbicide and dust abatement applications, fire retardant, fuel spills, and other potential toxicants. Avoid prescribed and slash burns in proximity to riparian habitats. Work with federal Wild and Scenic River Act administrators to address conservation of important wildlife habitat attributes on easement properties, such as bald eagle winter perching and roosting habitat. Recommendations in the Aquatics section of this chapter include additional measures that also benefit terrestrial species in aquatic and riparian habitats.

Restore and Conserve Security

Evaluate impacts of motorized vehicle access and other activities on wintering animals. Significant winter range for bighorn sheep, elk, and mule deer associated with winter snow machine use occurs in the upper Selway area. Address effects on wildlife of Deep Creek Road 468 and Paradise Road 6223. Important elk and mule deer winter range occurs in the lower Selway, Middle Fork Clearwater, and upper Clear Creek and is also associated with winter motorized vehicle use. Address the impacts of Roads 286, 470, Selway Road 223 above O'Hara Creek, Fog Mountain Road 319, Indian Hill Road 9720, Falls Point Road 443, and Swiftwater Road 470. Identify snow machine routes that may increase the vulnerability of lynx, moose, and fishers. Evaluate the impacts of snow machine access to lynx habitats and critical grand fir-Pacific yew moose winter habitats in O'Hara Creek.

Evaluate impacts of motorized vehicle access and other activities in elk calving areas during calving season. Specifically, address upper Meadow Creek, Glover Ridge, Gedney Creek, and Moose Creek Ranches. Implement area closures to confine motorized traffic to designated routes where appropriate.

Review existing motorized vehicle trail and road systems associated with species populations vulnerable to disturbance in alpine elevations. These include mountain goats, which appear to be declining, and wolverines, whose population status is unknown. Priority areas for alpine security evaluation include Meadow Creek, Running Creek, Fog Mountain, and Coolwater Ridge.

Integrate the need to reduce open road and motorized vehicle trail density for wildlife security with watershed restoration efforts and the need to provide an appropriate level of motorized vehicle access. Evaluate high road density areas in Clear Creek, Middle Fork Clearwater River, Meadow Creek, and O'Hara and Goddard Creeks ERUs. Inventory seasonal and year-round motorized vehicle access closures, evaluate effectiveness, and determine existing and potential breaches. Resolve problems with ineffective barriers and develop partnership strategies for effective compliance monitoring and enforcement.

The potential for increased development of private inholdings in the wilderness is significant. An increased in human use with additional residents and air traffic would decrease wilderness wildlife security. Continue pursuing federal acquisition of the properties. Additional dwellings, residents, and traffic will also increase impacts to wildlife security in the lower Selway area outside wilderness. Many authorized homesites remain undeveloped. Consider federal acquisition of these vacant properties as they become available to conserve critical wildlife habitat and security and wild and scenic river integrity.

Avoid permitting motorized boating activity, including jet skis, on occupied bald eagle and harlequin duck streams. This applies to the lower Selway River and possibly Meadow Creek. Evaluate the security of breeding harlequin ducks in association with river recreation activities in the Selway River.

Implement an effective camp and administrative facility sanitation program to prevent habituation of bears and other vulnerable species. Evaluate camp locations and practices, including artificial salt licks, for potential impacts to wildlife. Restore artificial lick sites. The highest priorities are the Whitecap Creek mountain goat winter-spring range and the East Moose Creek elk calving and foraging area.

Develop an information-education strategy for hunters, outfitters and guides, and their clientele that includes identification, status, and ecology of wolves, lynx, and grizzly bears to reduce the potential for misidentification and take of non-target species.

Restore and Conserve Species and Population Integrity

Encourage and support the Idaho Department of Fish and Game objectives to manage the harvest of wilderness species to approximate expected natural age and sex structure and minimize the influence on behavior, in the spirit of wilderness wildlife management objectives.

Support the U. S. Fish and Wildlife Service efforts to reintroduce grizzly bears to the subbasin by assisting with information and education efforts for the public and for agency personnel that include safety and sanitation considerations. Implementation of effective sanitation measures is a very high priority. Restoration of whitebark pine is also a very high priority for habitat restoration.

Refrain from stocking non-native fish species in high lakes and streams where native amphibian populations are at risk. Avoid stocking naturally fishless lakes that may play an important role in maintaining the genetic pool of amphibians in the subbasin. Suppress non-native fish populations, especially brook trout, where risk to native amphibians occurs. The highest priorities are lakes where amphibian populations continue to persist.

Evaluate the feasibility of repatriating mountain quail to native habitat in the subbasins. Maintain or restore the integrity of riparian communities associated with mountain quail habitat. Investigate potential threats from introduced Merriam’s turkeys to mountain quail and other native species.

Conduct inventories and establish long-term monitoring efforts for focal species and their habitats. These include old growth dependent species, riparian and aquatic associated species, security dependent species, and wide-ranging species. Rare species and species dependent on limited or degraded habitats are a high priority. Collaboration with other agencies and interested parties is important and will also facilitate evaluation of wide-ranging populations on larger scales.

Investigate migration and range extent of mountain goat, bighorn sheep, and wolverine populations and potential interactions with adjacent populations for more insight into population and habitat threats.

Determine the status of lynx in the extensive suitable habitat that occurs in upper Meadow Creek. Investigate harlequin duck status in Bear Creek and Meadow Creek, where suitable breeding and nesting habitat conditions occur. Develop inventory and monitoring strategies for amphibians, bats, neotropical migrants, and old growth dependent avian species including goshawks, white-headed woodpeckers, flammulated owls, and great gray owls. Develop a conservation strategy to address Coeur d’Alene salamanders and their habitat in the Selway corridor.

Collaborate with the Idaho Department of Fish and Game and the University of Idaho to develop a carrying capacity evaluation model that is responsive to the natural dynamics of habitat availability and corresponding elk population levels in the subbasin. This effort would contribute to better projections of tag allocations and demonstrate the need for restoration of more natural fire regimes and other habitat considerations.

ROADS

SUBBASIN ROADS FINDINGS

Roads in the subbasin reflect two substantively different development and management histories.

In the first category, roads were developed and are used for a variety of purposes including community and private development, timber harvest, and recreation. These types of roads are found in Middle Fork Clearwater River, Clear Creek, and O'Hara and Goddard Creeks ERUs, and to a lesser extent, the Lower Selway Canyon ERU. Despite a variety of uses that drive the development of roads in these ERUs, existing development remains relatively modest, with road density values remaining less than three mi/mi^2. These ERUs contain the majority of road mileages in the assessment area (around 80 percent).

In the second category, roads were developed and are used primarily for limited access needs. These types of roads are found in Middle and Upper Selway Canyon, North Selway Face, Meadow Creek, Running and Goat Creeks, Selway Headwaters, Deep Creek, Indian Creek, White Cap Creek, and Gedney and Three Links Creeks ERUs. Existing road densities in these ERUs remain below 0.5 mi/mi^2, several of them substantially so. These roads often are located in a backcountry or wilderness recreation setting. This setting is an important consideration in the management of these routes.

Road systems under Forest Service jurisdiction exhibit restriction levels that can be characterized as moderate to heavily restricted. ERUs with notable levels of miles restricted include Middle Fork Clearwater River, Clear Creek, O'Hara and Goddard Creeks, and Meadow Creek.

Several ERUs may have roads that are excess to the long-term transportation system needs. These are typically ERUs with greater amounts of existing roads including Middle Fork Clearwater River, Clear Creek, and O'Hara and Goddard Creeks ERUs. The tentative identification of roads that may be excess is limited to those under Forest Service jurisdiction.

The costs to maintain and manage the road system are a concern. Maintenance efforts that are deferred have the potential to contribute to resource effects and to limit transportation opportunities. Concerns about maintenance efforts relate especially to the sediment regime and fisheries resources, bridges, access management, travel opportunities, and safety. These concerns exist throughout the road system.

The potential exists to provide improved travel opportunities in the Clear Creek and O'Hara and Goddard Creeks ERUs through adjustment of the access management plan.

SUBBASIN ROADS RECOMMENDATIONS

The maintenance and management of roads that provide backcountry access should receive continued attention. Deferred maintenance on Road 317 accessing Coolwater Ridge should be addressed to reduce environmental impact and to preserve the access to this high elevation ridgeline. Continued maintenance on Road 285 accessing Green Mountain and Elk Mountain, commensurate with the capabilities of high clearance vehicles, is appropriate. Because Road 285 provides access to several trailheads, the needs of vehicles towing trailers should be accommodated. Road 468 should continue to accommodate the backcountry driving experience, allowing motorists to visit the Magruder corridor. Maintenance of the section of this road in the Deep Creek drainage should strive to minimize potential for surface erosion while accommodating the recreation need.

A reconfiguration or repatterning of the transportation system should be evaluated in the Clear Creek and O'Hara and Goddard Creeks ERUs, and possibly in the Middle Fork Clearwater River ERU. This reconfiguration should be based upon both watershed analysis and roads analysis recommendations. Reductions in overall road mileages through road decommissioning and utilization of ephemeral roads concepts should be incorporated in these ERUs. Consideration should also be given to reducing the amount of travel restrictions in these ERUs. Particular consideration should be given to increasing recreation opportunity on through routes such as Roads 286 and 1855 in the Clear Creek area and Road 1119 in the Goddard Creek area.

Throughout the subbasins road management and maintenance need to provide for user safety and watershed protection. Overall, the road system should reflect the minimum system needed to provide for administration and use of the national forest. Once this minimum system is identified, it is important that maintenance be kept current. Roadway brushing, surface maintenance, drainage maintenance, travel way width maintenance, and signing are all very important considerations for safe travel. Drainage maintenance, including provisions for fish passage, surface maintenance, and roadside vegetation management should be highlighted to provide watershed protection.

RECREATION, WILDERNESS, AND TRAILS

SUBBASIN RECREATION, WILDERNESS, AND TRAILS FINDINGS

Recreation

Diverse recreation opportunities available within the Selway and Middle Fork Clearwater subbasins attract increasing numbers of visitors, especially those who travel by motor vehicle. Motorists, recreational vehicle users, bicyclists and campers enjoy dispersed and developed sites along the Selway and Middle Fork Clearwater Wild and Scenic Rivers, along the Magruder, Fog Mountain, Elk Summit and Coolwater Roads, and in the canyons of the Bitterroot Mountains to the east. From portals along these routes, hikers and stock users can also access the Selway-Bitterroot or Frank Church-River of No Return Wildernesses. Shearer and Moose Creek Airfields, unique because they lie within the wilderness, are portals for pilots, hunters, fishing enthusiasts, and hikers. Anglers fish in high-elevation streams and mountain lakes in the summer months, and in lower elevation waters nearly year-round. Big game hunting by outfitters and private parties dominates fall recreational activities; snowmobiling, some hiking, and cross-country skiing are becoming very popular winter activities. Summer use includes swimming, boating and floating on the Selway and Middle Fork Clearwater Rivers, wildlife viewing, fishing, climbing, photography, hiking, and OHV (off-highway vehicle) use.

Observations and encounters indicate that visitor use in the Selway and Middle Fork Clearwater subbasins is increasing in more easily accessible areas and within about five miles of trailheads. The areas along the east slopes of the Bitterroot Range, the Selway River corridor, and the Magruder corridor receive intensive day and weekend use because of proximity to populated areas and accessibility. The interior of the area receives light use. Outfitting and guiding activities account for the major portion of recreational use, especially in the fall hunting season. Outfitters and guides report numbers of clients and use days; the Idaho Department of Fish and Game hunting and fishing licenses reflect use by hunters and anglers; and a float-season permit system accounts for use on the Selway River from May 15 to August 1. Otherwise, total visitor use cannot accurately be reflected because no general permit is in place, and registration is voluntary. Registration cards are sometimes available at trailheads, and in remote locations they are not systematically collected. Many visitors do not complete registration cards.

OHV users express the desire for more access to the subbasin. Increasing numbers of machines are encountered on roads and trails and motorized vehicle use has increased by an estimated 50 percent in the last ten years. Advanced technology has increased the potential for snowmobiles and other OHVs to access areas where it was impossible 2 to 5 years ago. Encroachment on wilderness areas and wildlife security could be issues associated with increased use of OHVs. Many floating enthusiasts advocate revision of the existing float permit system on the Selway River that would allow more than one launch per day. Hunting activity is declining, probably due to the allotment of tags by the Idaho Department of Fish and Game and declining populations of elk. Traditional outfitters and guides seek to offer more diverse activities, especially summer fishing trips, to attract clients.

The Lewis and Clark bicentennial observance has the potential to increase visitor use and recreational activity in the subbasins over the next 3 to 5 years. It is not possible to accurately project the numbers of visitors or impacts, though based on responses to visitor inquiries and the Oregon Trail Centennial visitor numbers, some agency sources predict as many as four million people will visit the area.

Wilderness

About 72 percent of the Selway and Middle Fork Clearwater subbasins is designated wilderness, including 978,000 acres of the Selway-Bitterroot Wilderness and 117,040 acres of the Frank Church-River of No Return Wilderness.

The Selway-Bitterroot Wilderness: An agency coordination team provides leadership and facilitates consistency among the seven districts and four forests included in the Selway-Bitterroot Wilderness (SBW). A wilderness coordinator and a Citizens' Task Force were in place until 1996 to assist in planning and implementing SBW management direction that would be amended to each forest plan. Before the plan was complete, the task group and the coordinator position were discontinued. In the SBW, a prevention of significant deterioration approach is applied to the management of the area. To reach the desired future condition, the LAC (limits of acceptable change) process defines indicators for resource, social and managerial settings to measure trends, and how social impacts affect ecological and natural processes. LAC provides for inventory and monitoring of wilderness trails and campsites. Those areas of the wilderness that do not meet forest plan and LAC standards are reported in the annual *State of the Wilderness* (SOW). About 132 campsites and trails throughout the SBW portion of the assessment area are currently classified as out-of-standard or identified as problem areas. The number of out-of-standard or problem areas reported does not necessarily accurately reflect existing conditions, because budget constraints prevent fielding an adequate work force to systematically inventory and monitor all campsites and trails. Some sites may be recovering and other non-inventoried or new sites might exist. Visitor contacts for education and opportunities for rehabilitation of out-of-standard sites are minimal.

The Frank Church-River of No Return Wilderness: In the Frank Church-River of No Return Wilderness, the recreation opportunity spectrum (ROS) characterization of primitive experience, setting and activity apply to wilderness recreation. Some high-use areas exceed visitor expectations for levels of encounters and human impacts. Understory vegetation loss and soil compaction are the most prevalent types of damage. The Frank Church-River of No Return Wilderness staff is working toward development of a management plan that would define standards and indicators for trail and campsite conditions.

The National Wilderness Agenda 2000: Traditionally, recreation, outfitter guide programs, and trails have defined the wilderness program, rather than the status of wilderness components such as soil, water, vegetation, fish, wildlife and rare plants. [A Forest Service Chief's Advisory Group was appointed in 1999 to develop strategies to meet the broad goals of the *Interagency Wilderness Strategic Plan* of 1995. In 2000, the Advisory Group's strategies were compiled in a document called *Contemporary Agenda for an Enduring Resource of Wilderness: Thinking Like a Mountain*. That document was revised and titled The *National Wilderness Agenda 2000* (*Thinking Like a Mountain*). It contains an expanded Forest Service *Vision for Wilderness* and emphasizes six major foci for improving overall ability to care for wilderness: (1) outreach, education and training; (2) wilderness inventory and monitoring; (3) information management; (4) priority resource issues; (5) program management and coordination; and (6) leadership.

Trails

About 1,200 miles of trail are on the inventory today, considerably fewer than in the past when large sums of money were appropriated specifically for trails that were often associated with fire and timber. Of the inventoried miles, crews are able to give attention to about 15 percent each year. According to the current forest plan, priority for trail maintenance is drainage, erosion control, and safety, but crews are not sufficient to accomplish that goal. The focus is on level I maintenance to clear the trail of logs so that visitors can pass. Miles of trails do not get the level of attention required by Forest Service policy because of budget limitations. Area visitor maps are deceiving and indicate many trails are available as secondary trails and maintained as prescribed, but budget resources cannot provide for maintenance other than on mainline routes. The Meaningful Measures/Infra process, currently underway, provides for inventory of miles and condition of the entire trail system by 2003.

SUBBASIN RECREATION, WILDERNESS, AND TRAILS RECOMMENDATIONS

Recreation

- Monitor activity, as use of OHVs continues to increase, considering encroachment upon wilderness areas, security to wildlife and vegetation, and potential conflicts with other users.
- Communicate with user groups openly, focus on education, and encourage self-monitoring.
- Consider reconfiguration of appropriate road and trails to accommodate motorized use.
- Establish a registration system or no-fee permit system at appropriate portals to more accurately interpret use and trends. It is necessary to increase inventory and monitoring of high-use areas and areas with potential for increased recreational use to determine problem areas and establish a basis for management decisions.
- Participate with interest groups and individuals to facilitate education and awareness and encourage self-monitoring within organized recreation groups.
- Maintain the present one-launch-per-day float permit on the Selway Wild and Scenic River and monitor increasing use and trends in the shoulder seasons.
- Develop a roaded access plan for recreation use on the river corridors and along Deep Creek.

Wilderness

- Implement a systematic and thorough inventory and monitoring program in the Selway-Bitterroot Wilderness. The information should be organized in a wilderness-wide database and utilized by management so that problem areas and out-of standard sites and trails are addressed. Rehabilitate those areas.
- In the Frank Church-River of No Return Wilderness, implement wilderness-wide standards and indicators for campsites and trails necessary to manage toward meeting the desired future conditions for ROS classifications. Outline the priorities for providing access, trail classification, and maintenance. (A management plan is being developed as of this writing.)
- Reinstate a planning group (formerly titled LAC Citizens’ Task Force) for the Selway-Bitterroot Wilderness, in cooperation with managers, specialists and researchers, in order to gain citizens’ perspectives and knowledge.
- Consider an agency position dedicated to coordination of wilderness management.
- The *Selway-Bitterroot Wilderness Management Direction* and subsequent updates were amended to forest plans; however, the *SBWMD* was not completed as intended by the original planning group. Resume that project to include special uses, expand on other incomplete sections, and respond to the dynamics of wilderness management.

- Use The Wilderness Act of 1964, and the strategies outlined in the *National Wilderness Agenda, 2000 (Thinking Like a Mountain*] as the foundation for wilderness programs and wilderness management decisions.

Trails

- Use Meaningful Measures/Infra data to develop major trail construction and maintenance plans, with emphasis on meeting standards as indicated by forest plans, inside and outside the wilderness.
- Analyze use patterns and determine classification of each trail (mainline, secondary, way) and level of maintenance required. Determine what trails will be removed from the trail system, adjust visitor maps and install appropriate signing.
- Provide handicapped access where possible.

CULTURAL AND HERITAGE RESOURCES

SUBBASIN CULTURAL HERITAGE FINDINGS

A large number of previously documented cultural resource properties (CRPs) exist within the assessment area. The numbers of prehistoric (Native American) and historic sites distributed throughout the subbasins are about equal. The prehistoric sites provide evidence about ways early inhabitants utilized the numerous resources available through time and in various locations in this region. Many of the historic cultural resource properties are Forest Service-related. These sites illustrate the extent to which the subbasin was developed in order to manage the landscape. Many of the sites in the assessment area are eligible for listing in the National Register of Historic Places, which indicates they hold special significance and are protected in order to preserve the unique locations where specific activities took place.

SUBBASIN CULTURAL HERITAGE RECOMMENDATIONS

The ultimate desired condition regarding the known cultural resource sites would preserve and protect all sites for future generations. These sites contain an unknown amount of information that could be significant to the history of the development of the area. Additional fieldwork in the assessment area, including various analytical techniques (core sampling, pollen analysis, radiocarbon dating, fire history studies, geology surveys, wildlife information, etc.) could reveal important information. Additional archaeological surveys and subsurface excavation projects within the assessment area need to be conducted in order to fully understand and document the past uses of the area by prehistoric as well as historic occupants. Excavations can help provide data. Surveys would address how proposed management actions would impact known cultural resource properties and would contain recommendations for ways to preserve and protect the known sites from disturbance or destruction.

Increased recreational use within the subbasin has the potential to negatively effect cultural resource protection. To mitigate this potential effect, public education should be increased. Within the river corridor where rafting is permitted, information about the sensitive nature of the area's fragile cultural resources should be included. Similar information should be made available at other areas as well, such as trailhead registration boxes, campgrounds, and the administrative sites.

There are numerous opportunities to interpret the Selway and Middle Fork Clearwater assessment area to the public. An educational effort would help ensure the past is not forgotten, and make people aware that much can be learned from studying the events that took place in this unique environmental setting within the Nez Perce National Forest. This public education would serve to mitigate effects on cultural resources by the public, who may otherwise unknowingly be degrading significant resources.

Very little is known regarding the Native American use of the upper and middle segments of the Selway canyon. The upper canyon contains what may be the oldest village known to the Nez Perce. This site is being impacted by erosion on an annual basis. Sample excavations and subsequent analyses should be performed before more of the site is lost. The resultant analysis would benefit many resource areas (wildlife, fisheries, botany, hydrology, etc.).

Much is known about the lower Selway subbasin (in comparison to the middle and upper portions) because this area is roaded and non-wilderness. Archaeologists have reviewed many forest projects to determine project effects on known cultural resource sites. Additional archaeological inventories are needed in the middle and upper portions of the Selway subbasin. These surveys should be broad-scale and should include the river canyon as well as upland settings. These findings would then be incorporated into the *Selway River Historic Preservation Plan*, which will allow for better management of the cultural resources within the subbasin.

COMPARISON OF SUBBASIN ASSESSMENT FINDINGS TO BROAD-SCALE FINDINGS FROM ICRB

The *Interior Columbia River Basin Assessment* contains evaluations of conditions and trends for 144.2 million acres in the interior Columbia River basin. The general findings of the *ICRB Assessment* are displayed below (following the bullets) for the following resources: forests and rangelands; hydrology and watershed processes; source wildlife habitat; streams, rivers and lakes; riparian areas and wetlands; fish; air quality; human uses and values; and American Indian rights and interests (*ICBEMP Ecosystem Review at the Subbasin Scale*, 1999). An explanation of how the interior Columbia River basin finding compares to conditions within the Selway and Middle Fork subbasins follows each general finding from the *ICRB Assessment*.

FORESTS AND RANGELANDS

- Interior ponderosa pine has decreased across its range with a significant decrease in old single story structure. The primary transitions were to interior Douglas-fir and grand fir-white fir.

  This finding is consistent with conditions and trends found within the Selway and Middle Fork Clearwater subbasins.

- There has been a loss of the large tree component (live and dead) within roaded and harvested areas. This decrease affects terrestrial wildlife species that are closely associated with these old forest structures. Western larch has decreased across its range. The primary transitions were to interior Douglas-fir, lodgepole pine, or grand fir and white fir.

  This is true for the ridges and lower relief roaded areas within the roaded and harvested portions of the assessment area. In steep canyon settings, the combined effects of fire suppression and poor timber access have resulted in a stable or increasing proportion of the large tree component.

  Loss of old, open ponderosa pine and Douglas-fir forests in the developed portion of the subbasin has decreased habitat for white-headed woodpeckers and flammulated owls.

- Western white pine has decreased by 95 percent across its range. The primary transitions were to grand fir and white fir, western larch, and shrub-herb-tree regeneration.

  This is true of the assessment area, although western white pine was seldom an important component. Grand fir, Douglas-fir and western red cedar have generally replaced it.

- The whitebark pine-alpine larch potential vegetation type has decreased by 95 percent across its range, primarily through a transition into whitebark pine cover type. Overall, however, the whitebark pine cover stand has also decreased, with compensating increase in Engelmann spruce and subalpine fir.

  Whitebark pine has decreased precipitously in the assessment area. Alpine larch is thought to have declined, as well, due to fire suppression. Engelmann spruce and subalpine fir have replaced these species in some areas. Other areas have reverted to alpine scrub.

- Generally, mid-seral forest structures have increased in dry and moist forest potential vegetation groups, with loss of large, scattered, and residual shade-intolerant tree components, and an increase in the density of shade-tolerant smaller diameter trees.

  This has been an important change in the assessment area.

- There has been an increase in fragmentation and a loss of connectivity within and between blocks of late seral, old forests, especially in lower elevation forests and riparian areas. This has isolated some animal habitat and populations and reduces the ability of populations to move across the landscape, resulting in long-term loss of genetic interchange.

  This has occurred primarily in low elevation dry and moist forests, on gentle terrain where harvest has been extensive.

  The most significant fragmentation of animal habitats is associated with agricultural and residential development of the private lands and road construction and timber harvest on federal lands in the lower portion of the subbasin. However, most of the subbasin is undeveloped and habitat connectivity and genetic interchange remain intact in these areas.

- Habitat for several carnivores and omnivores is in decline.

  The significant loss of whitebark pine and native salmon runs has decreased grizzly bear habitat quality in the assessment area. Habitat for ungulate prey species has declined due to restriction of early seral habitat distribution and patch size, some reduction in shrubland extent, and loss of recent burn patches as a result of fire suppression. Extensive weed infestations throughout the subbasin and agricultural and residential development in the lower subbasin have also contributed to the decline in winter range quality and security for carnivores and their prey. Fragmentation of old mesic forests due to road construction and timber harvest in the lower subbasin has impacted lynx denning habitat. However, old forest habitat extent has generally increased due to fire suppression throughout the remainder of the subbasin.

- Insects and disease always existed in forests, but the size and intensity of their attacks has increased in recent years due to increased stand density.

  The susceptibility to insect and disease of lower elevation dry forests has increased with increasing stand density and shift toward more susceptible Douglas-fir and grand fir. The susceptibility of lodgepole pine and whitebark pine to mountain pine beetle has increased with the extent of stands in older age classes. Increasing dominance of Douglas-fir and true firs has increased the extent of forests susceptible to root diseases.

- Dry forests have had an increase in fuel loadings, duff depth, stand density, and a fuel ladder that can carry fire from the surface into the tree crowns. As a result wildfire intensity has increased.

  The change in fuel characteristics appears to have occurred, based on departures in fire intervals and stand structure. There is not enough evidence to conclude that *wildfire intensity has increased, although anecdotal evidence exists for high mortality of large ponderosa pine in ground fires.*

- Noxious weeds are spreading rapidly, and in some cases exponentially, in most dry forest types.

  This finding is born out by this assessment, particularly where vectors for invasive plants exist, such as trails or roads.

- Cheatgrass has taken over many dry shrublands, increasing soil erosion and fire frequency and reducing biodiversity and wildlife habitat. Cheatgrass and other exotic plant infestations have simplified species composition, reduced biodiversity, changed species interactions and forage availability, and reduced the systems' ability to buffer against changes.

  Dry shrubland potential vegetation groups are rare in the assessment area, but cheatgrass has invaded areas of low elevation foothills grassland with similar effects.

  Weed infestations in xeric habitats have reduced the quality of ungulate winter range forage and have contributed to loss of native mountain quail habitat.

- Expansion of agricultural and urban areas on non-federal lands has reduced the extent of some rangeland potential vegetation groups, most notably dry grasslands, dry shrublands, and riparian areas. Changes in some of the remaining habitat patches and loss of native species diversity have contributed to a number of wildlife declines, some to the point of special concern (such as Columbian sharp-tailed grouse).

  The foothills grassland-shrub steppe of the lower elevations has been similarly affected by agricultural and residential development.

  Agricultural and residential development of xeric habitats has contributed to loss of native mountain quail in the Middle Fork Clearwater River and Clear Creek ERUs.

- Fire frequency has increased in some areas, particularly in drier locations where exotic annual grasses have become established. Increased fire frequency has caused a loss of shrubs and reduction in bunchgrasses.

  There is not good evidence for this finding. Heavy grazing and fire suppression may have resulted in relatively little change in fire frequency in areas dominated by exotic annual grasses.

SOURCE WILDLIFE HABITAT

- Source habitats for the majority of species in the Columbia River basin declined strongly (>20 percent) from historical to current conditions.

  Source habitats in the subbasin have probably not declined as sharply as those in the broader context of the Columbia River basin, although departures from historic conditions are significant in some parameters and locations.

- The strongest declines were for species dependent on low-elevation, old-forest habitats, species dependent on combinations of rangeland or early seral forests with late seral forests, and species dependent on native grassland and open canopy sagebrush habitats.

  These CRB findings are generally consistent with subbasin findings, although the loss of whitebark pine habitat is also significant. In the absence of historic and current species population data, changes in source habitats suggest probable changes in dependent populations. Open old ponderosa pine habitats have declined significantly. Early seral habitat has increased in extent but is more limited in distribution and patch size relative to historic condition. Roads and timber harvest have fragmented mesic old growth in the developed portion of the subbasin. Weed *infestations have significantly reduced native grass forage and habitat for mountain quail.*

- Primary causes of decline in old-forest habitats and early-seral habitats are intensive timber harvest and large-scale fire exclusion.

  These findings are consistent with subbasin findings. Most of the subbasin is undeveloped but has been impacted significantly by fire suppression throughout. Effects of timber harvest are significant in localized areas but are restricted to the developed portion of the lower subbasin.

- Primary causes for decline in native herbland, woodland, grassland, and sagebrush habitats are excessive livestock grazing, invasion of exotic plants, and conversion of land to agriculture, residential, and urban development. Altered fire regimes have also contributed to a decline in grassland and shrubland habitats.

  Livestock grazing is no longer an important influence in the federal portion of the subbasin, although sheep grazing was intensive historically in localized areas. However, private lands in the lower subbasin are significantly altered by livestock grazing and land conversion with associated invasions of exotic plants. The absence of fire has moderately decreased shrubland habitats in the subbasin.

- A variety of road-associated factors negatively affect habitats or populations of many species.

  Most of the subbasin is unroaded but this finding is consistent with conditions in the developed portion of the subbasin. Where roads access alpine environments and winter range in more remote locations, potential impacts to vulnerable species are also important.

- Human interactions with wide-ranging carnivores are generally negative and large areas of the Columbia River basin may not be used by wide-ranging carnivores because of this. Habitats for many riparian dependent terrestrial species, especially shrubland habitats have declined.

  More extensive development in the lower subbasin has increased human interactions with wide-ranging carnivores. Most of the subbasin, however, is remote and human interactions are primarily associated with hunting and habituation to camps and administrative facilities. Snowmobile access to remote, high elevation habitats may negatively influence lynx in localized areas. Decline in riparian habitat is primarily associated with roads and land conversion in the developed portion of the subbasin. In high lakes environments declines in amphibian populations are associated with the introduction of non-native fish species.

- Snag and down wood habitats in managed forested and riparian areas have declined.

  Snag production and dead wood recruitment in the subbasin has declined due to fire suppression. Timber harvest in the developed portion of the subbasin has also reduced snag and down wood habitat in localized areas.

HYDROLOGY AND WATERSHED

- Management activities throughout the watersheds in the ICRB project area have affected the quantity and quality of water and processes of sedimentation and erosion, thus affecting hydrologic conditions.

  The ICRB Science Assessment rated each subbasin within each ICRB ERU for hydrologic disturbance, hydrologic integrity and hydrologic potential for recovery. The finding of this landscape assessment indicate the ratings given for the Selway and Middle Fork Clearwater River subbasins were in error. The table below compares these ratings and discussion of the differences follows the table.

Table 2.1: Comparison of ICRB Ratings and Subbasin Ratings for Hydrologic Character within the Subbasin[1]

	Middle Fork Clearwater	Lower Selway	Upper Selway
Hydrologic Disturbance Condition	High (Moderate)	Low (Moderate)	Low
Hydrologic Recovery Potential	Low (Moderate)	High	High
Hydrologic Integrity	Low (Moderate)	High	High

1 Suggested amendments to the ICRB ratings, based on this assessment, are shown in parentheses.

Middle Fork Clearwater Subbasin Hydrologic Rating Departure from ICRB Findings

Hydrologic disturbance: *Hydrologic disturbance in the subbasins within the Central Idaho Mountains (an ecological reporting unit within the* ICRB*) were rated for four disturbance factors: road construction, surficial mining, dams, and cropland conversion. The Middle Fork Clearwater River is rated high for hydrologic disturbance. Findings from this subbasin assessment would give the Middle Fork Clearwater subbasin a moderate rating for hydrologic disturbance, instead of a high rating.*

Hydrologic recovery potential: *The Middle Fork Clearwater, considered as a whole, should have a moderate rating for hydrologic recovery potential. If road density is reduced, natural disturbance regimes such as fire are restored where possible, timber harvest entries timed to let stands recover, road encroachment reduced, and impact of residential development slowed, the Middle Fork has potential for moderate recovery from past hydrologic disturbance.*

Hydrologic integrity: *The hydrologic integrity rating using* ICRB *was rated as low. Due to the findings in this subbasin assessment, the rating should be moderate.*

Recommended Change: *The disturbance having the most effect on the Middle Fork Clearwater watersheds is roads. In general using the* ICRB *ratings, the Middle Fork watersheds have a high road density rating, with a few 6th code HUC watersheds having a very high rating. The high road densities are concentrated where timber harvest has taken place or in residential areas. Two other disturbance activities not discussed in the* ICRB *are timber harvest and fire suppression. These activities in combination with roads have produced a change from the historical hydrologic processes and streamflow regimes. There has been a change to press disturbances that have disrupted natural sediment processes and streamflow regimes (water yield). This includes chronic sediment in streams and repeated frequent harvest entries into watersheds, which disrupts water yield and natural streamflow regimes. Within the 5th and 6th code HUC watersheds tributary to the Middle Fork Clearwater River, timber harvest and road construction have had a large effect on the potential for the watersheds to recover, but this is true of only a few small 6th code HUC watersheds. Clear Creek is the only large watershed with moderate to high disturbance.*

Selway Subbasin Hydrologic Rating Departure from* ICRB *Findings

Hydrologic integrity: *Within the Selway subbasin analysis, findings show that the high hydrologic integrity for the upper Selway rating from* ICRB *findings agrees with* *the findings in this assessment. The rating for the lower Selway is also considered a correct rating except for the O'Hara and Goddard Creeks ERU, and this is such a small part of the area within the subbasin, the integrity rating should still be considered high.*

Hydrologic disturbance: *The high rating should be used with the recognition that the south half of the lower Selway subbasin would have a moderate rating for hydrologic disturbance, instead of low. This is due to high road densities and timber harvest levels, which have produced some level of chronic sediment and changes in streamflow regimes. The hydrologic recovery potential for the subbasin should remain high with a continued emphasis on recovery in the south half of the lower Selway.*

STREAMS, RIVERS, AND LAKES

- Banks and beds of streams, rivers, and lakes have been altered. In general, the changes have been greatest for the larger streams, rivers, and lakes.

  The above statement is not a main issue in the Selway and Middle Fork Clearwater subbasins. Roads are located adjacent to the Middle Fork Clearwater River and portions of the Selway River. Highway 12 along the Middle Fork Clearwater River, Forest Service Roads 6223 (Paradise), 468 (Deep Creek) and Selway River Road have had a low to moderate effect on the bed and bank of the river. In the wilderness and roadless portions of the Selway subbasin, there are no effects from roads. This differs from other subbasins where bed and banks have been highly altered on major rivers. A few reaches of streams have been impacted by road encroachment in the lower Selway subbasin on O'Hara Creek, and in the Middle Fork Clearwater River ERU on the lower reaches of Clear Creek. But unlike other subbasins in the ICRB analysis area, much of the Selway-Middle Fork Clearwater assessment area is wilderness and roadless, and has a low level of management. Impacted lakes are alpine lakes, and because much of the assessment area is wilderness the lakes receive low to moderate impacts from users' activities in lakeshore areas.

- Many Forest Service and Bureau of Land Management administered streams are "water quality limited" as defined by the Clean Water Act. On Forest Service-administered lands, the primary water quality problems are sedimentation, turbidity, flow alteration, and elevated temperatures.

  Streams listed as "water quality limited" within the Selway and Middle Fork Clearwater subbasins are listed for sediment concerns and they are a low priority for the state listing. On the lower Selway, the listed streams are currently being analyzed using the State of Idaho Department of Environmental Quality Subbasin Assessment Analysis process. Preliminary results show sediment is not a pollutant of high concern for most Selway streams. This is only preliminary data. This analysis has not been conducted by DEQ for the Middle Fork Clearwater "water quality limited" streams. In general, streams in the Selway and Middle Fork Clearwater subbasins are probably less impaired by sediment, flow alteration and elevated temperatures than stated above, and in general are closer to historic condition in the Selway subbasin, especially in wilderness and roadless areas where conditions have not been altered by human intervention.

- Streams and rivers are highly variable across the ICRB project area, reflecting diverse physical settings and disturbance histories. Nevertheless, important aspects of fish habitat, such as pool frequency and large woody debris abundance, have decreased throughout much of the ICRB project area.

  This finding is consistent with the findings of this subbasin assessment in terms of the variability of streams and lakes and disturbance histories across the analysis area. The changes in fish habitat documented in the ICRB *are not entirely consistent, however. Although there are specific areas where important aspects of fish habitat* *have changed or decreased, at the context of the entire assessment area, the existing condition of fish habitat is similar to the historic condition.*

RIPARIAN AREAS AND WETLANDS

- The overall extent and continuity of riparian areas and wetlands has decreased.

  The overall extent and continuity of riparian and wetlands has decreased the most in a few Middle Fork Clearwater face watersheds, Clear Creek, the O'Hara and Goddard Creeks ERU, and along Deep Creek. The roadless area and large wilderness area differ from the general findings as stated above for ICRB. The overall extent and continuity of riparian areas and streams is unchanged from the historic condition in wilderness and roadless areas.

- Riparian ecosystem function, determined by the amount and type of vegetation cover, has decreased in most subbasins within the ICRB project area.

  This statement is somewhat true in some watersheds in the Middle Fork Clearwater subbasin and the south side of the Lower Selway River. There has been a decrease in historic function of riparian zones in reaches in a few managed watersheds, mostly due to roads in lower stream reaches. In general, the subbasin contains large contiguous areas of undisturbed riparian vegetation that is near natural condition. In a few areas, change from historic conditions has occurred, similarly to that found within the ICRB project area, but in large areas, riparian vegetation is undisturbed and remains close to the historic condition.

- A majority of riparian areas on Forest Service and BLM-administered lands are either "not meeting objectives," "non-functioning," or "functioning at risk." However, the rate has slowed and few areas show increases in riparian cover and large trees.

  This assessment supports the above findings in localized areas within the roaded and harvested portions of the assessment area. Watershed restoration efforts have helped with watershed and stream function; these include riparian road removal, planting in riparian zones, implementation of PACFISH (Pacific Anadromous Fish Strategy) buffer strips, and a decrease in timber harvest.

- Riparian areas are important for about three-quarters of the terrestrial wildlife species. Wildlife numbers have declined in proportion to the decline in riparian habitat conditions.

  These findings are partially consistent with subbasin findings. Riparian areas are also important for most of the terrestrial wildlife species in the subbasin. Data for historic and current population levels is unavailable. Riparian habitat integrity throughout most of the undeveloped portion of the subbasin remains high and presumably supports species populations that approximate historic levels. Fire suppression may have affected riparian habitats for disturbance-dependent species.

FISH

- The composition, distribution, and status of fisheries within the planning area are substantially different than they were historically. Some native fishes have been eliminated from large portions of their historical ranges.

  This finding is not entirely consistent with the findings of this planning unit assessment. The existing composition, distribution, and status of fisheries within the planning area are not substantially different from the historic condition, with several exceptions. These include a lower abundance of anadromous fish, extirpation of some local subpopulations of westslope cutthroat trout from encroachment of non-native species, and possible loss of local adaptation in some cutthroat trout populations from introgression with introduced hatchery fish.

- Many native non-game fish are vulnerable because of their restricted distribution or fragile or unique habitats.

  This finding is probably not consistent with the findings of the assessment. Information concerning the status of non-salmonid fishes is limited in the Selway and Middle Fork Clearwater subbasins, but it is believed that their distribution and access to fragile or unique habitats is similar to the historic condition.

- Although several of the key salmonids are still broadly distributed (notably the cutthroat trout and redband trout), declines in abundance, loss of life history patterns, local extinctions, and fragmentation and isolation in smaller blocks of high quality habitat are apparent.

  This finding is not entirely consistent with the findings in the assessment area. The Selway subbasin maintains large blocks of interconnected, high quality habitat. Not only are salmonids broadly distributed across the subbasin, resident, fluvial, and anadromous life history strategies are evident throughout. Abundance of westslope cutthroat, steelhead/redband, and bull trout is locally high in many areas. Significant fluvial populations of westslope cutthroat trout and bull trout continue to exist in both mainstem rivers. Abundance of spring chinook salmon, however, has declined precipitously from historic levels.

- Wild chinook salmon and steelhead are near extinction in a major part of their remaining distribution.

  This finding is consistent with findings in the assessment for wild chinook salmon, but probably not for steelhead. Abundance of chinook salmon varies widely by year but is generally very low. Hatchery supplementation of the Selway population also occurs. Steelhead trout in the Selway and Middle Fork Clearwater subbasins are not at immediate risk of extinction, although abundance varies annually and has been in a declining trend for decades.

- Core areas for rebuilding and maintaining biological diversity associated with native fishes still exist within the Columbia River basin.

  This finding is consistent with the findings in the assessment area. The Selway subbasin in particular is considered an important core area for recovery of fishes in the Columbia River basin. Numerous 5th and 6th code HUCs exist within the Selway subbasin that serve as important core areas both within and outside the planning area.

AIR QUALITY

- The current condition of air quality in the ICRB project area is considered good, relative to other areas of the country.

  This is true for the assessment area. Periods of diminished air quality are probably less frequent and of smaller duration than in presettlement times, when more frequent fires occurred.

- Wildfires significantly affect the air resources. Current wildfires produce higher levels of smoke emissions than historically. Within the ICRB project area, the current trend in prescribed fire use is expected to result in an increase of smoke emissions.

  This is true for the assessment area. Increased use of prescribed fire and wildland fire for resource benefits can be expected to increase smoke emissions compared to the period of fire suppression, but they will still be less than presettlement times, and potentially less than with severe wildfires that may occur within a general policy of suppression.

HUMAN USES AND VALUES

- The planning area is sparsely populated and rural, especially in areas with a large amount of agency lands. Some rural areas are experiencing rapid population growth, especially those areas offering high quality recreation and scenery.

  This finding is consistent with the planning unit assessment area. There are no incorporated communities within the assessment area, but population growth is increasing at a moderate rate on rural lands and in the communities situated on the perimeters of the subbasin. The Selway and Middle Fork Clearwater Rivers attract increasing numbers of residents. Population growth is occurring most rapidly in the Bitterroot Valley in Montana, the area adjacent to the Selway subbasin on the east.

- Development for growing human population is encroaching on previously undeveloped areas adjacent to lands administered by the Forest Service and Bureau of Land Management. New development can put stress on the political and physical infrastructure of rural communities, diminish habitat for some wildlife, and increase agency costs to manage fire to protect people and structures.

  This finding is consistent with the planning unit assessment area.

- Recreation is an important use of agency lands in the planning area in terms of economic value and amount of use. Most recreation use is tied to roads and accessible water bodies, though primitive and semi-primitive recreation is also important and becoming scarce relative to growing demand.

  This finding is consistent with the planning unit assessment area, although primitive and semi-primitive recreation is not growing scarce. Seventy-two percent of the assessment area is roadless or wilderness and offers vast opportunities for primitive recreation experiences. However, most recreational use is concentrated in the areas that are easily accessed by roads, especially in the canyons to the east of the assessment area that are portals to wilderness. Outfitting, guiding, and river recreation contributes appreciably to local economic well being and diversity.

- Industries customarily served by agency land uses, such as logging, wood products manufacturing and livestock grazing, no longer dictate economic prosperity of the region, but remain economically and culturally important in rural areas. The economic dependence of communities on these industries is highest in areas that are geographically isolated and offer few alternative employment opportunities.

  This finding is consistent with the findings of this assessment.

- The public has invested substantial land and capital to develop road systems on agency lands, primarily to serve commodity uses. On forestlands, commercial timber harvest has financed 90 percent of the construction costs and 70 percent of maintenance costs. Recreation now accounts for 60 percent of the use. Trends in timber harvest and new road management objectives make the cost of managing these road systems an issue of concern.

  This finding is partially consistent with the findings of the planning unit assessment and is applicable in the western portions of the subbasin. The cost of managing these road systems remains an issue of concern. For most of the assessment area, however, existing access was not financed by commercial timber harvest. While anecdotal evidence indicates that recreation use now accounts for well over 60 per cent of use, there is no system in place for accurately monitoring all recreation use.

- For those counties that have benefited from federal sharing of gross receipts from commodity sales on agency lands, changing levels of commodity outputs can affect county budgets.

  This finding is consistent for the assessment area. Both Idaho and Ravalli Counties benefited significantly from higher levels of commodity output in the past. A steady rise in the services industries output since 1973, and retail sales since 1983, supplement county economies and compensate for some declines in commodity production.

- Agency social and economic policy has emphasized the goal of supporting rural communities, specifically promoting stability in those communities deemed dependent on agency timber harvest and processing. An even-flow of timber sales, timber sale bidding methods, timber export restrictions, and small business set-asides for timber sales have been the major policy tools of Forest Service-administered commercial forestlands.

  This finding is consistent with past practices in the assessment area. Seventy-two per cent of the assessment area is roadless or wilderness, where timber harvest and grazing are highly constrained or excluded. However, in potential harvest areas dramatic reductions in timber harvest have limited the extent to which the agency is capable of using the tools listed above to support rural communities.

- The factors that appear to help make communities resilient to economic and social change include population size and growth rate, economic diversity, social and cultural attributes, amenity setting, and quality of life. The ability of agencies to improve community resiliency depends on the effectiveness of agency land uses and management strategies to positively influence these factors.

  This assessment does not determine the extent to which agencies have the ability to improve community resiliency by effective land use and management strategies. Communities are complex and diverse. Resiliency and adaptability are generated within the communities themselves and how they relate to external influence.

- Predictability in timber sale volume from agency lands has been increasingly difficult to achieve. Advancing knowledge of ecosystem processes, changing societal goals, and changing forest conditions has undermined conventional assumptions underlying the quantity and regularity of timber supply from agency lands.

  This finding is consistent with findings of the assessment.

AMERICAN INDIAN RIGHTS AND INTERESTS

- Lands now administered by the Forest Service and Bureau of Land Management were the traditional homelands of affected American Indian Tribes. Land management actions and decisions on these lands affect the rights and interests of these tribes and their members.

  This finding is consistent with findings of the assessment. The Nez Perce Tribe has particular interests in salmon recovery, watershed restoration, preservation of important cultural sites, and maintenance of plant materials with cultural importance.

- American Indian tribes in the Columbia River basin depend on lands and resources administered by the Bureau of Land Management and Forest Service for a myriad of needs and uses ranging from subsistence uses and economic purposes to religious and cultural purposes.

  This finding is consistent with findings of the assessment, particularly for the streams and low elevation canyons.

- Agency social and economic policy has emphasized the goal of supporting rural communities, including tribal communities. The ability of agencies to assist tribal members and tribal communities depends on the effectiveness of agency land uses and management strategies to positively consider and influence these factors (tribal employment, subsistence, treaty and reserved rights, spiritual, cultural and social purposes).

  This finding is consistent with findings of the assessment. Cooperative efforts in assessment and improvement projects have emerged as an important vehicle for agency and tribe collaboration.

- There is low confidence and trust that American Indian rights and interests are considered when decisions are proposed and made for actions to be taken on Bureau of Land Management or Forest Service-administered lands.

  This finding is consistent with findings of the assessment.

- American Indian values concerning federal lands may be affected by actions upon forestlands and rangelands because of resulting changes in vegetation structure, composition, and density, and existing roads and watershed conditions.

  This finding is consistent with findings of the assessment.

- Indian tribes do not feel that they are involved in the decision-making process commensurate with their legal status. They do not feel that government-to-government consultation is taking place.

  This finding is consistent with findings of the assessment, but important progress is being made at broader scales in consultation and collaboration efforts.

- Culturally significant species such as anadromous fish and the habitat necessary to support healthy, sustainable, and harvestable populations constitute a major, but not the only, concern. American Indian people have concern for all factors that keep the ecosystem healthy.

  This finding is consistent with findings of the assessment, and the salmon provide a major focal point for cooperation toward their recovery.

DATA GAPS

SOCIAL AND ECONOMIC

Methods for more effectively utilizing the ethnographic approach to social assessment should be analyzed and developed to determine what values society places on healthy ecosystems and how society understands issues such as wildfire and wildlife.

The ethnographic approach to social assessment is relatively new in the assessment of land areas. A better understanding of the concept and how it can be useful is needed.

Information about employment in recreation-related businesses and other economic activity is needed. Data for the industrial and agricultural sectors alone will no longer be sufficient to reflect the economic condition of communities as they adapt to change.

WATERSHED AND HYDROLOGY

Stream morphology and reference reach data in the Selway subbasin and much of the Middle Fork Clearwater subbasin is limited or nonexistent. Most stream information used in this assessment was from GIS (geographic information system) data, aerial photographs, or extrapolated from the small amount of data that exists using professional judgment. Stream data is lacking for ERUs in the Selway-Bitterroot Wilderness, the Frank Church-River of No Return

Wilderness, and portions of the Middle Fork Clearwater River and Clear Creek ERUs. The lack of stream information parallels much of the information lacking in fisheries and should be considered together as a high priority inventory need. The focus for information should be where fisheries data is lacking. Refer to the aquatic species subbasin findings and recommendations in this chapter.

Within the context of the larger Clearwater basin restoration plan, there is a lack of coordination and planning for the Selway and Middle Fork Clearwater subbasins. Coordination of restoration efforts within the Clearwater basin and development of an encompassing restoration plan is a high priority. A strong partnership between the Clearwater and Nez Perce National Forests, Nez Perce Tribe, Clearwater Focus Watershed, and the universities is an important link for success. Completion of high priority ecosystem analyses at the watershed scale and this planning unit assessment (PUA) support this effort and will help prioritize restoration.

Transportation plan information is lacking in the lower Selway and Middle Fork Clearwater subbasins to prioritize roads for decommissioning. The first priority for information is the lower Selway, with a moderate priority in the Middle Fork Clearwater area. A partnership with the Clearwater National Forest to develop a road-decommissioning plan for the Middle Fork Clearwater is also a moderate priority. Monitoring information to evaluate how much sediment is generated during road decommissioning and stream crossing rehabilitation is lacking, but research is in progress. Continued partnership with research on the Horse Creek Road obliteration project is a very high priority.

Watershed condition inventories have focused, to date, on the south side of the lower Selway River. High priority areas in which to continue watershed condition inventories are the North Selway Face, Middle Fork Clearwater River, and Clear Creek ERUs. Inventory of stream zones with impacts from roads and timber harvest is a high priority. Soil restoration information about timber harvest units and other impacted soils is a moderate priority.

AQUATIC HABITAT AND SPECIES

Many streams and lakes in the assessment area, in the Selway subbasin in particular, have limited or no data. Comprehensive basin-wide stream surveys have not been conducted on most streams in the Selway-Bitterroot and Frank Church-River of No Return Wilderness Areas. Much of the information contained in this document and presented on maps is based on professional judgment, anecdotal accounts, and subjective observations. ERUs where habitat and fish distribution data are lacking include Otter and Mink Creeks, Marten Creek, Moose Creek, Pettibone and Bear Creeks, Middle Selway Canyon, Upper Selway Canyon, Running and Goat Creeks, and Selway Headwaters. Although portions of these areas may have been surveyed, substantial areas remain unsurveyed, particularly with a comprehensive data collection methodology. In the Middle Fork Clearwater subbasin, substantial unsurveyed areas exist in the Clear Creek and Middle Fork Clearwater River ERUs. Collection of fish distribution data, as a minimum, is recommended as a high priority.

Although the distribution of salmonids throughout the Selway subbasin is roughly known, the genetic integrity of these populations is unknown. Widespread hybridization in westslope cutthroat trout subpopulations from stocking of non-native salmonids is suspected. In addition, isolated redband trout populations may exist. The status of redband trout, and the extent of isolated resident subpopulations, is unknown. Genetic analysis of westslope cutthroat trout from subpopulations potentially affected by hybridization is recommended as a very high priority.

Although redd surveys for spring chinook salmon have occurred over the past 20 years, locations of preferred spawning areas for bull trout, steelhead trout, and westslope cutthroat trout are unknown. Redd and spawner surveys have not been conducted for these species. In particular, mainstem spawning by steelhead trout probably occurs, but has not been documented. Similarly, preferred bull trout spawning areas, with the exception of Wounded Doe Creek, are unknown.

Development of a partnership with the Idaho Department of Fish and Game and/or the Nez Perce Tribe to obtain this data is recommended as a high priority.

In addition, mountain lake surveys have not been conducted at most mountain lakes since 1987. A substantial number of lakes have never been surveyed. These lakes occur in the White Cap Creek and Selway Headwaters ERUs. Impacts from hatchery trout stocking in these lakes, if any, are unknown. Surveys of lakes in these ERUs are recommended as a high priority.

In the stream data that have been collected, survey methodology focused on identification of salmonid fish and their habitat. Information has not been collected about non-salmonid fish and invertebrate distribution, and habitat needs versus availability. Development of a methodology to collect these data, as well as implementation, is recommended as a high or moderate priority.

LANDSCAPE ECOLOGY

Up-to-date, more accurate maps and sample data on existing vegetation are the primary recurring needs for informed management. Within this general need, are particular needs for inventory and assessment of at risk and rare species, plant communities, and structural stages. Species that require additional inventory and assessment include whitebark pine, alpine larch, aspen and other deciduous tree species, foothills grassland species, western white pine, and coastal disjunct species thought to be in decline or at risk because of development in the lower canyon, including Pacific dogwood. Plant communities thought to be at risk include foothills grasslands, due to invasion by exotics. Structural stages thought to have declined include old open dry forest and cedar old growth. More site-specific inventory to better quantify the occurrence and condition of these species, communities, and structural stages is recommended.

The natural dynamics of certain components, particularly snags and down woody debris, need to be better understood, and capable of prediction under different management scenarios.

There is an acute need to develop methods to characterize plant community dynamics at the landscape level under natural, current, and alternative management scenarios. We need the ability to predict fire, drought, and pathogen effects on succession and patterns of landscape change.

FIRE

There is some uncertainty about the degree of departure of fuel conditions, and resultant fire effects on ecosystems. Inventory and assessment of the areas described as highly departed from historic fire regimes are recommended. Inventory and assessment of fuel conditions in the wildland-rural interface are also recommended. Improved ability to predict changes in fire effects, including fire size and intensity, watershed response, smoke production, mortality, weed expansion, altered successional pathways, and fuel dynamics, is recommended to better plan and prioritize areas for wildland fire use, prescribed fire use, or mechanical treatments like thinning or harvest. Inventory of fuel conditions in specific locations, around private inholdings and administrative sites, and near roadless and wilderness boundaries, is needed to better assess risk of fire spread. Inventory of fuel conditions is also needed in communities at risk of unacceptable fire effects: ponderosa pine, whitebark pine and alpine larch, and cedar old growth. Inventory of fuel conditions is also needed in aquatic stronghold areas where the effects of fire suppression appear to be marked: Running Creek, the Little Clearwater River, and Whitecap, Indian, and Deep Creeks.

WILDLIFE

Critical species habitats and habitat linkages need to be identified and monitored over time to address potential threats. These include important migration routes, natal areas, and wintering areas. Priorities should be established by addressing habitats and species most at risk. Specific needs for focal species and habitats are addressed in more detail in Appendix Q.

Old growth areas outside wilderness need to be evaluated and retention allocations designated on a landscape basis. These allocations should provide for species' needs and reflect the natural forest species diversity across the landscape.

Except for hunted species, little is known about the status and trend of wildlife populations in the subbasins. Many rare and security-sensitive species inhabit the subbasins and there is currently no established mechanism for ascertaining significant changes in populations. Potential threats to populations have been addressed in this analysis, but strategic long term monitoring is needed to evaluate the actual significance of these. Because much of the assessment area represents secure and intact habitat for many rare and vulnerable species, baseline information for these populations is also important for species across their range.

Although large areas of the subbasins are undeveloped, many potential threats exist that warrant further evaluation before management recommendations can be made. These include motorized vehicle use associated with areas and seasons in which species have increased vulnerability. Priorities include alpine areas where wolverines and mountain goats are sensitive to disturbance, high elevation winter habitats where snow machine access may influence lynx security, and important winter ranges that are associated with motorized use.

Information on status and trends of species potentially impacted by non-native species introductions, including amphibians associated with non-indigenous trout in high lakes, is also needed.

Information regarding the historic status of populations and habitats was limited for this assessment. Additional baseline information would contribute to future development of management objectives. A comprehensive inventory of existing data and ongoing investigations should be compiled for the area to add to the collective knowledge base and to avoid duplication of efforts with limited resources.

RECREATION, WILDERNESS, AND TRAILS

Numbers of miles on trail inventories are not currently accurate. Trail conditions and designations (mainline, secondary, and way) of all trails are not known. Trail designations are not always accurately displayed on visitor maps. A current inventory of the trail system is necessary to determine management needs. At this writing, Meaningful Measures/Infra process is underway and is scheduled to be complete in 2001.

Meadow Creek and Moose Creek are eligible for designation as Wild and Scenic streams. A suitability study has been considered, and preliminary discussions begun. Plans to complete that study and determine the status of those streams are necessary.

In designated wilderness, baseline inventories for numbers and conditions of campsites and trails are not complete. Current conditions of some sites are not known because systematic monitoring of sites has not occurred. In order to determine if wilderness areas meet the objectives of limits of acceptable change or standards as determined by forest plans, complete and accurate inventory data should be available.

During forest plan revision, the scenery management system will be implemented and it will replace the visual management system to describe the degree of acceptable alteration to natural landscape based on the importance of aesthetics. Scenic integrity levels are currently displayed and mapped as VQOs (visual quality objectives). A revised map to display the scenic integrity levels of the scenic management system will be needed.

Wilderness opportunity classes (Selway-Bitterroot Wilderness) are not currently displayed in a GIS map. An opportunity class map in GIS will be created for reference to those wilderness areas discussed in this document.

ECOSYSTEM ANALYSIS AT THE WATERSHED SCALE (EAWS) PRIORITIES

Priorities for assessment at the watershed scale are organized by subbasin and according to the established protocol that areas in relatively good condition with high potential will be secured first, and areas requiring substantial restoration investments will be secured second. Areas proposed for watershed assessment do not necessarily conform to ERU boundaries, but may include additional small drainages or face drainages where similar issues are present. Using these assumptions, the team identified the following priorities, which generally tend to confirm earlier recommendations.

The first tier for EAWS for the Selway subbasin:

- O'Hara and Goddard Creeks and the south half of the lower Selway River: assess this area as a secure aquatic stronghold.
- Meadow Creek and upper Running Creek: assess for security as an aquatic stronghold, access planning, restoration of whitebark pine, and wildlife security issues.
- Moose Creek: assess for restoration of aquatic and terrestrial species integrity and wilderness opportunity class.

The first tier for the Middle Fork Clearwater subbasin:

- Clear Creek: assess for restoration of aquatics.

The second tier of areas proposed for assessment addresses primarily terrestrial and social issues. Second tier for EAWS for the Selway subbasin include:

- Upper Selway Canyon, White Cap Creek and Deep Creek: assess for restoration of fire regimes, wildlife security, wilderness opportunity class, and weed control.
- Lower Selway Canyon, North Selway Face, and Gedney Creek: assess aquatic and terrestrial species integrity, wildlife security, and access planning issues.

The second tier for the Middle Fork Clearwater subbasin:

- The Middle Fork Clearwater River: conduct more detailed assessments and site specific restoration recommendations.

PROJECT OPPORTUNITIES

These are recommendations for projects for which there is both some urgency and relative analytical simplicity. They can go directly to development of a proposed action and environmental analysis, and probably will not require a watershed assessment.

- Development of brook trout management plans for Gedney and Three Links Creeks ERU and upper Running Creek.
- Prescribed fire for whitebark pine restoration in upper Running Creek or fire and mechanical treatments around Iron Mountain.
- Weed treatment and bunchgrass restoration in Middle Selway Canyon, Upper Selway Canyon, Deep Creek, and Indian Creek ERUs.
- Wilderness site restoration in Selway Headwaters, Moose Creek, and Gedney and Three Links ERUs.
- Prescribed fire of limited scope around inholdings, administrative facilities, and wilderness boundary zones.
- Road decommissioning in Middle Fork Clearwater ERUs: Bridge Creek, Smith Creek, Tahoe Creek and Swan Creek watersheds.

- Road maintenance and stabilization (priority roads).
- Additions and amendments to fire use plans: O'Hara Research Natural Area and West Meadow Creek.

PARTNERSHIP AND COOPERATIVE OPPORTUNITIES

This section identifies areas of research, inventory, monitoring, and restoration where collaboration can meet objectives of both the Forest Service and other entities. The Selway-Bitterroot and Frank Church-River of No Return Wilderness Areas provide unrivaled natural laboratories for characterizing landscape processes in a setting that is relatively intact and large enough that patterns of landscape variability can be meaningful.

Forest Service and university research programs are a natural focus of such partnerships. Enhancing communication between Forest Service staff and research project leaders is needed to ensure research is well coordinated, considers wilderness values in its execution, and findings are communicated so they result in improved resource management. A potential project is being explored under the leadership of the Rocky Mountain Research Station that would examine landscape scale patterns of distribution of aquatic habitat, disturbance regimes, and effects on fish populations and habitats. Informal working relationships with the Idaho Department of Fish and Game are good, but by collaborating more closely on standardizing methods of survey and data storage, the agency staffs could become more efficient. An agreement with research stations and local universities that defines responsibilities for coordination is recommended.

The growing commitment of the Nez Perce Tribe to aquatic restoration and protection of cultural values suggests opportunities for partnerships in watershed assessment and restoration, including stream and road condition inventories. Washington State University has been a partner with the Nez Perce Tribe in similar projects, and these partnerships offer the chance to acquire and use shared data, standardize survey methods, and involve students in shared inventory and analysis. A macroinvertebrate study tiered to the research study investigating effects of road obliteration in Horse Creek is one such project initiated with tribal involvement. Building on the Horse Creek research project has important benefits because of the wealth of data available from past studies and the instruments in place. There are numerous other resource issues where tribal collaboration would be beneficial to both partners, including wildlife surveys and cultural site protection and interpretation. The Meadow Creek watershed assessment and the district road-decommissioning program might be logical areas of focus for building stronger working relationships with the Nez Perce Tribe.

The social assessment for this document identified some community dissatisfaction with the separation of community members and Forest Service personnel. An approach to help bridge that gap would be to intensify Forest Service participation in school programs and to solicit greater involvement of local people in forest volunteer programs. There are good opportunities in trail and site restoration, weed inventory and control, and cultural site investigation and restoration, where local retirees, teachers, students, tribal members, and other interest groups including the Backcountry Horseman (BCH) and local OHV groups, could be more directly involved in on-the-ground activities, shared experiences, and relationships built around working together.

Outreach programs tend to be erratically supported and suffer when resources are limited, but this assessment finds that building and sustaining these relationships is as critical for good resource management as any other Forest Service activity. Working with outfitters and guides to assist them in providing appropriate information to clients that would enable them to distinguish between grizzly bears and black bears, coyotes and wolves, and brook trout and bull trout needs more emphasis.

Wilderness groups have a deep interest in the Selway-Bitterroot and Frank Church-River of No Return Wildernesses. This assessment attempts to make good use of their insights, and it should be used to renew their involvement in wilderness planning and LAC (limits of acceptable change) processes.

CHAPTER 2
BIOPHYSICAL AND SOCIAL CONCEPTS

This section introduces the biophysical and social concepts and terminology used in the assessment. The results of applying these concepts to the assessment area are presented in Chapters 4 and 5.

BIOPHYSICAL CONCEPTS

BIOPHYSICAL ENVIRONMENTS

Biophysical environments are the geologic, climatic, and landform settings that constrain ecological processes (Quigley et al., 1997). They describe ecosystems that function in a similar manner, with repeating patterns of geomorphology, climate, streams, vegetation, and natural disturbance processes. These repeating patterns define areas of similar ecosystem function that help the assessment team interpret and predict patterns of plant communities, wildlife habitats, stream channels, dominant disturbance processes, and successional pathways. In this assessment, landforms, climate, habitat type groups (potential vegetation), geology, and valley bottom morphology are used to build classification systems that help interpret and predict conditions and responses in the diverse landscape of the Selway and Middle Fork Clearwater subbasins.

Mapped classifications used in this assessment include habitat type groups (HTGs), vegetation response units (VRUs), aquatic landtype associations (ALTAs), and ecological reporting units (ERUs). ERUs are watersheds or aggregates of watersheds in the subbasins. Meadow Creek ERU was subdivided to account for measurable and significant biophysical differences within an ERU. These classifications are described in Appendix C.

CLIMATE

Climate is the basic part of the environment that affects soil development and vegetation dynamics. It includes temperature and precipitation regimes, humidity, wind, sunshine and solar radiation, and potential evapotranspiration. The climate of the assessment area is described in Chapter 4.

HABITAT TYPE GROUPS (HTGS)

Habitat type groups, or potential vegetation groups, are terms used to describe lands capable of supporting similar plant communities in the absence of disturbance. Habitat types tend to have predictable patterns of disturbance, succession, and productivity, although topographic setting of the habitat type group may also strongly influence disturbance and forest succession. Habitat types have been grouped for this assessment according to the pattern used by Applegate et al. (1995). Habitat type groups are shown in Map 31. Where field data were not available, the habitat type group was predicted using a terrain model.

VEGETATION RESPONSE UNITS (VRUS)

Vegetation response units are broad ecological land units that display patterns of habitat type groups (potential vegetation) and terrain that are similar within VRUs of the same type, and distinctive from other VRUs. VRUs have similar patterns of disturbance and successional processes. Patterns of plant community composition, age class structure, and patch size tend to fall within certain ranges for each VRU. VRUs are used in this assessment to estimate resource capabilities, ecological integrity, and responses to natural and human-caused disturbances. The components used to build the VRU classification system are habitat type groups (potential vegetation), landforms, climate, and presettlement disturbance processes (such as fire regimes). Brief descriptions of the VRUs for the subbasins are contained in Appendix B. VRUs are displayed in Map 30.

STREAMFLOW REGIME

Streamflow regime refers to the seasonal pattern and quantity of runoff and streamflow. Streamflow regimes of low elevation watersheds with steep slopes exposed to high solar radiation are likely to have shallow soils, rapid runoff, and be susceptible to rain-on-snow flooding. Summer flows may be very low. Streamflow regimes in areas of deep soils, at mid and high elevations, are likely to have slow and sustained snowmelt, deep groundwater recharge, and sustained base flows.

AQUATIC LANDTYPE ASSOCIATIONS (ALTAS)

ALTAs are used in this assessment to characterize the stream settings within the subbasin. They are shown in Map 10. This map displays historic aquatic settings that consider both terrestrial disturbance regimes, including fire and erosion, and aquatic disturbance regimes, including runoff character, flood timing, and how channels process peak flows and sediment inputs. ALTAs are similar in some respects to VRUs, but more heavily emphasize geology, stream pattern, and hydrologic regime. ALTAs are delineated on the basis of landform, geology, vegetation, and elevation because of the role of ground water temperature and base flows in limiting aquatic habitats, and the relative significance of rain-on-snow at lower elevations, and sustained runoff at higher elevations. ALTAs are determined by looking at not only the component landforms, but also the included channel systems, and in particular, their size and gradient.

STREAM CHANNEL TYPES

Stream channel types are classified based on observable features related to stream process and function. Basic characteristics that distinguish channel types include thread (single or multiple channels), entrenchment (access to floodplains), sinuosity, width-to-depth ratio, gradient, and substrate size (Rosgen, 1994). Channel types are significant because various stream types process energy (water) and sediment in different ways. A given set of disturbances, such as flood, drought, channelization, or changes in sediment yield can have widely varying effects depending on the channel type, as well as the magnitude of the disturbance. Within the subbasin, channel types are generally associated with the landscape setting and size of the stream. Channel types are described and diagrammed in Appendix D. Although not directly used in the Rosgen classification, the concept of valley confinement is important. This term refers to the width of the valley floor relative to the stream width. Natural streams flowing in unconfined valleys are generally meandering, relatively low gradient, have substantial floodplains, and are free to migrate across their valley floors over long periods of time. Conversely, streams flowing in confined valleys are usually more linear, have a steeper gradient, have discontinuous floodplains, and tend to remain in place over time.

ECOLOGICAL REPORTING UNITS (ERUS)

In a process similar to that used in the *Interior Columbia Basin Assessment* (Quigley et al., 1997), the Selway and Middle Fork Clearwater subbasins were divided into 19 geographic areas, or ecological reporting units (ERUs), which provide structure for describing where conditions occur and a sense of place. The assessment uses ERUs, HTGs, VRUs, and ALTAs to describe and locate biophysical environments, characterize ecological processes, discuss the effects of past management activities, describe present social and biological trends, and recommend future management strategies to achieve sustainable landscape conditions. The subbasins include the following ERUs: Clear Creek, Middle Fork Clearwater River, Lower Selway Canyon, North Selway Face, Gedney and Three Links Creeks, O'Hara and Goddard Creeks, Middle Selway Canyon, Moose Creek, Pettibone and Bear Creeks, Upper Meadow Creek, Lower Meadow Creek, Otter and Mink, Marten Creek, Ditch Creek, Running and Goat Creeks, Upper Selway Canyon, Indian Creek, Deep Creek, Whitecap Creek, and Selway Headwaters (see Map 3).

Biophysical Concepts of Landscape Dynamics

Historic Range of Variability

Ecosystems are not static; their conditions vary over time and space. The historic range of variability describes the dynamic nature of ecosystems. The historic range of conditions found in a given setting is used to understand the likely range of conditions found under natural disturbance regimes. A key assumption of this concept is that when systems are pushed outside their normal range, there is increased risk that biological diversity and ecological function may not be sustainable. In the Selway and Middle Fork Clearwater assessment, existing landscape conditions are compared to their historic (presettlement) range. “Presettlement” in this assessment refers to the time period prior to 1850. Since documentation covering the historic period is limited for the subbasin, it was necessary to estimate the range of historic conditions by extrapolating from more recent documentation and photos, and by applying scientific principles related to what is known about disturbance regimes.

Plant Succession

Plant succession is the progression in which plant species dominate a plant community over time after a major disturbance. Typically, many species will invade a site after a wildfire or timber harvest, but some will assert dominance early in plant community development, like fireweed or lodgepole pine. Later, other species will assume dominance, like subalpine fir or grand fir. Subsequent major or minor disturbances may have various effects on plant communities. A disturbance such as a low severity fire may retain a plant community in its current successional state, while a more severe event such as a stand replacing fire can return succession to an early state. A disturbance can also affect some plants in a community differently than others, as when a root disease kills grand fir and leaves western white pine.

Landscape Disturbance Processes

A disturbance is an event that causes a significant change from the normal pattern in an ecosystem; examples include fire, flood or drought (Pickett and White, 1985). The term “disturbance regime” refers to the frequency, severity, scale, and other attributes of a recurring disturbance (Hobbs and Huenneke, 1992).

Plant and animal species have typically evolved adaptations to survive in the disturbance regime typical of their environment. An example is the seed of lodgepole pine, which may be released from its cone only when the cone is heated by a hot forest fire. The trees are killed, but the species is sustained. Another set of adaptations is the migratory life history of many fishes, their tendency to occupy different areas of a stream or different streams during spawning, rearing, and adult life, and their tendency to stray into new streams (Rieman and McIntyre, 1993). These behaviors help fish avoid unfavorable habitats and find and use favorable habitats in an environment where favorable habitats shift in space and time with fire, flood, and other natural disturbances.

When humans add an additional disturbance regime such as timber harvest, road building, grazing, or other impacts on streams, and apply that regime across most of the landscape, the scale and ubiquity of disturbance dramatically alter the environment to which some fish and wildlife species are adapted.

Understanding the effects of changed disturbance regimes for terrestrial and aquatic systems is emphasized throughout the assessment. Restoration of the pattern of disturbance appropriate to a given setting was a key consideration in developing management themes and recommendations.

The following events are some of the more recognized disturbances that have shaped landscape conditions in the subbasin.

Erosion Processes

Mass erosion, primarily geologic creep, and to a lesser degree slumps and debris avalanches are the dominant upland erosion processes in natural forested landscapes. An exception to this is surface erosion after intense wildfires or other surface ground disturbances. Stream channel erosion is another important component, including both bed and bank erosion. Once material has been delivered to, or is mobilized in the channel system, it is subject to transport, storage, or deposition. The rates of these in-channel events vary widely depending on the timing and magnitude of the delivery, channel type, size of stream, and climatic factors.

Debris torrents are rapid movements of water, rock, soil, and vegetation down stream channels. Areas with high risk of debris torrents are generally confined to the channels within landtypes having steep slopes, and, in particular, shallow soils. Harvest or road building in shallow soils above these channels may contribute to the risk of debris torrents by increasing the water moving through the soil in these areas. Landslide-prone terrain is shown in Map 7.

Fire

Fire events of variable frequency, severity, and extent affect vegetation patterns over time and space. Wildfire in presettlement times is thought to have been a very significant element in shaping the landscape. The term “fire regime” is used to describe the role fire plays in an ecosystem. In this assessment it refers to the characteristic frequency and severity of fire. Presettlement fire regimes are mapped for this assessment based on potential vegetation and terrain (Map 34).

Volcanic Eruptions

The eruption of Mt. Mazama (now known as Crater Lake, in the Oregon Cascades) 6,700 years ago precipitated a fall of volcanic ash that has formed an important surface soil material in the subbasin. The ash's ability to hold moisture and resist erosion has increased soil productivity where it is present. The frequency and severity of volcanic eruptions are hard to predict, and ash as a soil resource must be considered irreplaceable. Ash-influenced soil surface layers are thickest in the lower Selway and Middle Fork Clearwater areas, and this contributes to the high productivity of those areas.

Floods

Floods can be characterized by their frequency, severity, and extent. Flood effects vary considerably depending on the stream channel type and valley setting. In unconfined valleys with low gradient, meandering streams, floods typically dissipate energy over low stream banks and across a wide floodplain. Floods in confined valleys with high gradient streams are typically high-energy events and can result in stream channel scour. Small streams can be subject to floods from regional-scale snowmelt or rain-on-snow events, or localized rainfall. Larger rivers, such as the mainstem Selway, are usually only responsive to regional events, such as spring snowmelt or widespread rain-on-snow, rather than localized summer thunderstorms. Road construction and other activities in floodplains can reduce the ability of the floodplain to dissipate flood energy, thus increasing the impact of flooding on stream channels and aquatic habitats. Flood frequency may increase timber harvest, fire, or road drainage systems, which shorten the time it takes water to reach a stream channel after rain or during snowmelt.

Insects and Diseases

Common insects and diseases that play a role in forest succession processes in the subbasin include bark beetles, defoliating insects, stem decays, and root rots. Pathogen and insect activity often advances forest succession by favoring shade tolerant tree species. This is because, although trees may die, no bare soil is exposed in which early seral species are likely to establish, and understory tree and shrub species typically remain in place. The activity of pathogens and insects can benefit ecosystems by promoting woody debris recruitment, providing food for many bird, insect, and small mammal species, recycling nutrients, and creating forest openings that increase habitat diversity. Native pathogens and insects played a key part in creating the diversity of forests which were present at the time of Euro-American settlement in the Selway and Middle Fork Clearwater subbasins, as elsewhere in the northern Rocky Mountains (Hann and Hagle, 1993).

Detrimental effects can result where pathogens and insects reduce existing shade to streams, cause the significant decline or loss of a species or structural stage in the landscape, or promote a rapid increase of fuel loadings, placing a large area at risk of severe fire. The level of activity for any particular pathogen or insect changes through time and depends on existing vegetation and climatic conditions. The *ICRB Science Assessment* (Quigley et al, 1997) concludes that forests in the interior Columbia River basin have become more susceptible to infestations of insects and outbreaks of diseases, because of increased stand densities and increasing dominance of more disease-susceptible late seral species. These changes in vegetation have occurred in the Selway and Middle Fork Clearwater subbasins as well.

Timber Harvest

Timber harvest is a human-caused disturbance that has a measurable frequency, severity and extent. In the Selway and Middle Fork Clearwater subbasins, timber harvest has occurred since the 1860s, but has been well documented only since about 1950 on national forest lands. The history of harvest on national forest lands in the subbasins is shown in Map 56.

Roads

Roads have no natural equivalent as a disturbance regime. Their watershed impacts are greatest at the time of construction, but continue throughout the existence of the road. The initial disturbance may be a source of sediment that enters nearby streams, or a road may constrain the stream channel where the road occupies the floodplain (see Map 11), or roads may reduce stream shading by removing trees from the streamside zone. Roads and their ditch lines may route water and sediment to streams more rapidly and efficiently than a natural channel system. They provide a disturbed substrate that invasive annual plants and weeds can readily colonize, and they may alter movement patterns of larger animals or act as barriers to movement of some plants and smaller animals. Roads provide convenient access for human uses, which may have favorable or unfavorable effects on ecological conditions.

The existing road system in the subbasins is shown in Map 60. The *ICRB Science Assessment* concludes that road densities are negatively correlated with fish populations, either because of direct road impacts, or because of the association of roads with other development. This information was used in the development of ratings for aquatic integrity. Road density can be used as one measure of the degree to which episodic (pulse) disturbance, characteristic of many natural systems, has been changed to a constant (press) disturbance, which is not natural to many aquatic systems. Road density classes are shown by sub-watershed in Map 17. This road density map incorporates all known and inventoried existing roads on national forest lands. The identification and inventory of roads is a continuing process.

Mining

Mining may occur as a singular or repeated disturbance. Mining activities can have long-lasting consequences for local landform and stream channel morphology, and streamside plant communities. Mining disturbance has been of little consequence in the Selway and Middle Fork Clearwater subbasins.

Grazing

Grazing of herbaceous and woody vegetation occurred historically from wildlife, and occurs today from native and introduced animals, including domestic livestock. Historically, grazing disturbance varied with grazer populations and forage levels that changed with plant community composition, climate, and predator population levels. Presettlement grazing patterns could be locally intense, but seldom of long duration. In contrast, season-long grazing of large numbers of sheep and cattle occurred in the early twentieth century, usually in areas where fires had created transitory range. Grazing is discussed in Chapter 4.

Aquatic and Terrestrial Species Population Dynamics

Aquatic

Aquatic species, particularly the fish species considered in this assessment, have a population structure and function that has evolved within disturbance-based ecosystems. The disturbances these species have evolved with include fires, floods, drought, vegetative succession, erosion, and stream channel changes. These species have developed alternate response strategies, such as resident and migratory life histories. The mix of these two strategies within subpopulations accounts for the specific setting in which populations have developed. The balance between local adaptation within subpopulations and the intermixing of genetic material within a metapopulation is another example of disturbance adaptation. Additionally, the intermixing within a metapopulation provides for refounding or rebuilding populations affected by local disturbances. The long-term viability of these species is dependent on their ability to sustain these types of adaptive population dynamics.

Terrestrial

Population dynamics of most terrestrial wildlife species within the assessment area are significantly influenced by the effects of natural disturbances, especially fire. Variability in disturbance regime is responsible for much of the habitat diversity found in natural landscapes. Generally, the more diverse the habitat, the greater the number of species that can coexist. Species population size and distribution vary in time and space in response to natural variability in disturbance regimes. Human influences within the assessment area, including fire suppression and habitat conversion and fragmentation, are additive to natural disturbances and can artificially influence species population dynamics by favoring some and impacting others.

Social Concepts

Sense of Place

The way people relate to and understand an area is referred to as a sense of place. Peoples' perceptions of place give that area special meaning to them, their community, and their culture. Research shows that place attachment is passed down through generations, becoming part of peoples' heritage. Place is an integral component of community life because collective definitions of socially important places help to form and maintain community bonds and priorities. This assessment identifies places within each ERU that hold special attachments for people.

Interest Groups

Certain groups of people have special relationships with the land in the study area, because of their interests and values.

Communities

The historical, socioeconomic, and cultural factors of local communities influence how citizens of those communities have used and valued the lands in the assessment area.

Recreation Opportunity Spectrum

The recreation opportunity spectrum (ROS) is a framework that is used to inventory and communicate the land's recreational attributes. The size of an area, its distance from roads or trails, and its degrees of naturalness are some of the attributes considered when classifying settings for recreation potential. Examples of ROS categories found in the subbasin include rural, roaded modified, roaded natural, semi-primitive motorized, semi-primitive nonmotorized, and primitive. ROS classification allows land managers to identify and categorize a variety of recreation areas that will appeal to people with varied desires and recreational expectations. The recreational user can then choose from a range of possible recreation settings, dependent on individual desires, equipment and skills. ROS classes are described in Appendix G.

Wilderness Opportunity Class

Wilderness opportunity class is a land classification that describes the expected level of human experience in terms of solitude, challenge, and management activities experienced within the wilderness. Wilderness opportunity classes are described in detail in Appendix G. These classes are characterized by the degree of modification of the natural environment and processes, opportunities for isolation and solitude, and likelihood of contact with other people and administrative or management activities. Scenery Management System

The scenery management system (SMS) evolved from and replaces the visual management system (VMS). Society values high quality scenery, especially scenery with natural appearing landscapes. The scenery management system presents a vocabulary for managing scenery and a systematic approach for determining the relative value and importance of scenery in a national forest. Ecosystems provide the environmental context for this scenery management system. The system is used in the context of ecosystem management to inventory and analyze scenery in a national forest, to assist in the establishment of overall resource goals and objectives, to monitor the scenic resource, and to ensure high quality scenery for future generations.

Visual Quality Objectives

Similar to the scenery management system (SMS), visual quality objectives (VQOs) describe the desired level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area and degree of acceptable alterations of the characteristic landscape. At this writing, the SMS is replacing the VMS, and the subbasin has not yet been mapped in the context of SMS definitions. Therefore, the scenery quality map in this assessment (Map 59) displays the VQOs as defined by the visual management system. That information will be referenced until implementation of the scenery management system is complete. Appendix P compares the VQO landscape characterizations and vocabulary with that of the SMS.

Rural-Wildland Interface

The rural-wildland interface refers to the interactions of people and wildlands. There are risks associated with these interactions, which can be considered in two categories. First, there are risks to the ecological integrity of an area from human impacts. As roads and introduced plants and animals increase near wildlands, the risks to the integrity of ecosystems increase. Second, peoples' personal assets and the elements they value may be put at risk as human habitation near or within the wildland setting increases. An example is the risk to private property near or within the wildland setting from wildfire.

Social and Economic Resiliency

Social and economic resiliency measures the capacity for human adaptability to change, how humans organize themselves both in a community sense and how they relate to their biophysical environment (Quigley et al., 1996). Community interests, values and economies are dynamic, so general indicators of resiliency are difficult to establish. County data for Idaho County, Idaho and Ravalli County, Montana are used to describe broad trends in social and economic resiliency.

CHAPTER 4
HISTORIC AND EXISTING CONDITIONS

Chapter 4 contains analyses and descriptions of social, biological, and physical conditions as they existed historically, and compares historic conditions to current conditions.

Social conditions include land settlement and occupation, land uses, transportation and access systems in the assessment area, and a social assessment of stakeholders. Social changes occurred as Euro-American settlers moved into the subbasins, which were occupied by Native Americans. Land use changed from hunting and gathering to agriculture, mining, and logging, and most recently to a more dispersed economy that includes recreation and tourist businesses, among others. Road systems grew from trails and early wagon roads to administrative roads and roads connected with timber harvest, some of which are now being decommissioned. Trails have changed from traditional or functional uses to recreational uses, and a large portion of the assessment area has been designated as wilderness.

The assessment of historic and existing biological conditions and processes includes climate, air quality, geology and soils, hydrology and watersheds, aquatic habitat and species, landscape ecology, and terrestrial wildlife habitat and species. Fire suppression, as compared to historic fire regimes, appears to have had the most far-reaching effect of any factor on most of the biological elements of the assessment area. This is because the historic fire cycles, now disrupted, regulated pulse disturbances in the watersheds, not only affecting stream channels and water quality, but also changing plant communities and aquatic and terrestrial species habitat. Timber harvest and road building have affected terrestrial and aquatic conditions in some watersheds, causing shifts to press disturbance regimes. Portions of the area continue to function as strongholds for aquatic species.

LAND SETTLEMENT AND OCCUPATION

The Selway and Middle Fork Clearwater subbasins have seen numerous changes in land use patterns through the course of human involvement over the past 8,000 to 10,000 years. The region has experienced several waves of occupation over time, by groups of people including Native Americans, fur trappers and other mountain men, homesteaders, and early day Forest Service employees. These people interacted with the environment in various ways, extracting resources and manipulating it to their benefit.

PREHISTORIC OCCUPATION

Prehistorically, Native American groups, consisting mostly of ancestral Nez Perce (also known as Nimiipuu), but also including the Salish, and perhaps the Shoshone and Bannock) occupied this area throughout their seasonal movements. The first trails were created by these groups along the rivers and streams to areas including hunting and gathering areas in upland settings, adjacent areas such as the mountains and valleys of western Montana and east central Idaho, and the Salmon and Columbia River country. The first people to occupy this area may have arrived 8,000 to 10,000 or more years ago. The homes of the first known inhabitants of the Selway and Middle Fork Clearwater subbasins were temporary. Ancestors of the Nimiipuu inhabited the subbasins, and although they established seasonal and permanent villages, the people moved about the vast area to locations where more abundant food sources could be found according to the seasons. The Nez Perce Tribe continues to have interests in various portions of the assessment area.

The types of prehistoric Native American sites that can be found within the Selway and Middle Fork Clearwater subbasins include camp sites, possible village sites, hunting, fishing, and other food gathering sites, travel routes, and locations that may have religious or spiritual significance. These previously occupied areas are located throughout the Selway and Middle Fork Clearwater subbasins, from the highest elevations to the lowest river valleys. Artifacts associated with the activities which took place at all of these types of sites can also be found in the region.

Very few of these sites have been excavated to date. However, sample excavations have occurred at a few sites along the Selway River in recent years, and they have produced materials that have yielded radiocarbon dates relating to the time of occupation of particular locations. From a site in the Moose Creek vicinity, two radiometric dates have been obtained. This site appears to have been occupied on at least two different occasions, around 2,580 and 1,150 years ago (Sappington and Turnipseed, 1997, p. 187). From another site located further up the Selway River, one prehistoric occupation is dated to about 3,060 years ago (Sappington and Turnipseed, 1997, p.190). From one site on the Selway River just upstream from its confluence with the Lochsa River, dates of about 1,070 (Armstrong, 1999) and about 700 years ago (Beta Analytic, 1999) were obtained.

Several sites along the Lochsa River, which is adjacent to the Selway and Middle Fork Clearwater assessment area to the north, have also been excavated, and radiocarbon dates have been obtained from them as well. One site was initially occupied between 10,000 and 8,000 years ago, and the densest occupation occurred between 6,700 and 4,500 years ago. Still later, the site was occupied up until about 2,500 years ago. At another site just upstream from the confluence of the Lochsa and Selway Rivers, occupation dates range from about 2,800 to 150 years ago (Sappington and Carley, 1989, p. ii). There are also sites that have been used by Native Americans up to the present time. From these few examples, it is clear that the Selway and Middle Fork Clearwater subbasins have been occupied repeatedly over the last 10,000 years. The Selway and Middle Fork Clearwater subbasins were also major thoroughfares for traveling, as evidenced by the overall number and types of sites and artifacts found in the area.

EARLY EURO-AMERICAN OCCUPATION

The first Euro-Americans to establish a presence in this region were fur trappers, who were followed by missionaries, in the early to mid-1800s. Fur trapping continued into the 1900s, although on a smaller scale than in previous years. In the 1860s, gold was discovered in several areas of what are now the Clearwater and Nez Perce National Forests. Thousands of eager miners came through the region. There were attempts to extract gold within the Selway and Middle Fork Clearwater subbasin assessment area, but those efforts produced little in the way of economic gain for the individual miners.

With this influx of people to the region, new trails and wagon roads were created, while existing routes were improved to accommodate the wagons and pack strings now regularly using these routes (USDA, Meadow Face EAWS, Draft, 1999, p. 78).

As the regional gold rush subsided, the next wave of settlers came. When they first arrived, all of the lands were in public domain. If land seemed appropriate for settlement, it was surveyed and divided into lots. The Homestead Act of 1862 allowed any person who was the head of a family or over age 21, and was a United States citizen or had declared the intention to become one, to secure a patent (deed) to 160 acres of the surveyed public domain. They could prove their claim by living on the land for five years, cultivating it, and making improvements.

Homesteaders, cattlemen, sheepmen, and other ranchers and farmers arrived in the area. They generally established their homesteads and other facilities on the lower slopes and along the main rivers and streams. Houses, barns, sheds, fences, and other improvements to the land were constructed to support year round occupation. Several of these homesteads remain in private ownership to this day along the upper Selway River between Paradise and Moose Creek.

By the late 1800s, communities outside the Selway and Middle Fork Clearwater subbasins (such as Elk City, Darby, and Hamilton) had been established to facilitate trade for miners and other settlers. By the early 1900s, “neighborhoods” developed in areas within the subbasins.

TWENTIETH CENTURY OCCUPATION AND FOREST SERVICE MANAGEMENT

BUREAU OF FORESTRY AND BITTER ROOT FOREST RESERVE

The U.S. Department of Interior’s Bureau of Forestry, which became the Forest Service in 1905, became a presence in the area in 1897. This was to affect the character and subsequent development of the Selway and Middle Fork Clearwater subbasins thereafter. President Grover Cleveland designated all of the Lochsa-Selway country in Idaho, along with other lands in Montana as the 4,147,200-acre Bitter Root Forest Reserve in 1897. Starting in 1906, lands within the Forest Reserve could be authorized for homesteading only if they were valuable for agriculture. At this time, the General Land Office administered the forest reserve, while the U. S. Geological Survey performed the surveying and mapping efforts. John B. Leiberg of the U. S. Geological Survey created the first map of this region in 1898. The Forest Service secured land that suited its purpose for administrative sites and withdrew it from the public domain in 1907 and 1908.

One of the first rangers in this area was George Ring, who was appointed to the position in 1899. He was instructed to patrol for fires and to suppress any he discovered. His territory included what is now most of the Clearwater National Forest. As the fledgling Forest Service was developing, additional "rangers" were employed. Fighting fires was their main objective, but other projects were also undertaken. Ranger Ring began clearing trails, and in 1905 supervised the initial construction of the Selway Trail (Parsell, 1990).

FOREST SERVICE AND AREA NATIONAL FORESTS

In 1905, the Forest Service was an official agency. It was originally part of the Department of the Interior, and after much discussion and internal pressure the Forest Service (and the previously created reserves) was transferred to the Department of Agriculture. In 1907 Frank "Major" Fenn, a political appointee, oversaw the area.

By an act of congress, on March 4, 1907, the forest reserves were changed to national forests. On July 1, 1908, an executive order changed the Bitter Root name to Bitterroot, and the former Bitter Root Forest Reserve was divided into the Bitterroot, Nez Perce, and Clearwater National Forests (Biddison and Smolinski, 1988). In 1911, the fledgling Nez Perce National Forest was tapped for some of its land to create another national forest, the Selway (Cochrell, 1960, p. 102). As many as seventeen ranger stations were established in the region and included Pete King, O’Hara, Number One, Tahoe, Bear Creek, and Three Forks. Communication between these stations relied upon telephone lines, or on the rangers traveling on the trails by horse or on foot to the next closest station to relay news. These original ranger stations were simple log cabins where tools and other fire fighting equipment was stored, and where men were stationed during the fire season (Parsell, 1990). Today, few of the original ranger stations exist, since their functions have been combined into several larger offices where access is much easier than before.

SETTLEMENT AND DEVELOPMENT

By 1919, all the lands now in private ownership in the Lowell, Pete King and lower Selway areas were occupied. Life was difficult in this wild, remote country. Without commercial electricity, medical services, or teachers, the people of the Selway and Middle Fork Clearwater subbasins lived off the land and improvised to meet their needs. Settlers had to clear land before attempting any agricultural activities. Only the hardy could meet the challenge. After the Forest Service began building trails, cabins and telephone lines, things became easier. Seasonal jobs were available and many local people became the Forest's first employees and "managers." Today, most of these homesteads support recreation-based developments of some kind. Of those who struggled to homestead on land along the Selway and Clearwater Rivers, only one small parcel of land remains in the ownership of descendants of its original settlers (Parsell, 1990).

The U. S. government probably never thought that people would attempt homesteading in the distant lands of the Moose Creek area. A few men and women ventured deep into the backcountry where only the Nez Perce and a few prospectors and trappers had been before. Ten plots were patented starting in 1920, and ownership changed many times on most of those plots. The Wilderness Act of 1964 limited road building and access, and by 1976, the U. S. government had purchased all but four of the original homesteads. Four private inholdings, all served by airstrips, remain today.

More recently, other activities have been undertaken in the Selway River area. Numerous roads and trails were constructed in the area, and all eventually connected the existing ranger stations and adjacent communities together into a larger network of travel and communication routes. The first road up the Selway River was begun shortly after the Forest Service established permanent administrative sites there. A road between Goddard Bar and O'Hara Bar was blasted out in about 1911. By 1924, the Selway Road had reached O'Hara Ranger Station, and it reached Selway Falls in 1926. A road survey was made from Selway Falls to Moose Creek, but no money was available for that section (Parsell, 1990, p. 19). Surveys were completed for a railroad line as far as Pinchot Creek.

CIVILIAN CONSERVATION CORPS PROJECTS AND FACILITIES

During the 1930s, the Civilian Conservation Corps (CCC) established two camps along the Selway River and was instrumental in continuing the development of the region. In 1934, a seasonal tent camp was established at Glover Creek and the majority of enrollees stationed there originated from Chicago. Projects accomplished from this camp included the construction of steel bridges across the Selway River and Meadow Creek, and initial construction on Fog Mountain, Indian Hill, and Falls Point Roads. This camp was only used for two years and was replaced by the year round camp at O'Hara Bar (Parsell, 1990, p. 33).

The 200-man O'Hara camp was established in 1935 below the ranger station on O'Hara Bar. The enrollees built twelve new buildings at what is now Fenn Ranger Station, as well as bridges, roads, and telephone lines. They also did some trail and lookout construction and were an important part of the fire control organization. The O'Hara camp was eventually closed in 1942. The Forest Service used these facilities from 1942 to 1946. The buildings continued to be used into the 1960s until they became unsafe. In 1969, all the remaining buildings were burned (Parsell, 1990, p. 36).

LAND AND RIVER STATUS DESIGNATIONS

The flurry of activity to develop land, build roads and railroads, to harvest timber and develop wood products was curtailed by designating much Selway basin land as a primitive area in 1936, followed by the Wilderness Act in 1964. In 1968, the Wild and Scenic Rivers Act set guidelines to regulate how private and public lands would be developed or managed along the river corridors. The Selway, Middle Fork Clearwater, and Lochsa Rivers have all been designated as Wild and Scenic Rivers.

OTHER DEVELOPMENTS

Other developments have been made along the Selway River, including campgrounds that still exist today and a fish hatchery which only functioned until the early 1950s. Several campgrounds were established in the 1940s, and most of the rest were established in the 1950s and 1960s. The Boyd Creek Hatchery was built in 1938, failed due to water supply problems, and was closed in 1951. The concrete ponds were covered over, the buildings demolished or moved, and by the early 1960s the present Boyd Creek Campground was developed at the site.

PRIVATE RESIDENCES AND LANDS ALONG THE RIVER CORRIDORS

PRIVATE RESIDENCES

Three ownership patterns exist along the Selway and Middle Fork Clearwater River systems. They are: (1) an extensive length of continuous national forest ownership; (2) intermingled public, private and Native American land outside the national forest boundary; and (3) scattered small parcels of state and private lands within the national forest boundary.

The Wild and Scenic Rivers Act determines use within one-quarter mile on each side of the high water mark of the Selway, Middle Fork Clearwater, and Lochsa Rivers. Any lands that are adjacent to or can be seen within the corridor are also subject to the intent of the act, with "emphasis given to protecting … esthetic, scenic, historic, archaeological, and scientific features" (Wild and Scenic Rivers Act, 1968). The Forest Service bought scenic easements for much of the land along the wild and scenic river corridors to assure that development would be well planned and that clean, clear water would remain. Those easements are specific to each individual property and delineate specific requirements regulating improvements, appearance, and development. A few landowners opted no to sell scenic easements to their property, and operate independently from the explicit terms of easement contracts.

One hundred and eighty single-family residences are allowed under easement on the Lochsa and Middle Fork Clearwater Rivers. Presently, more than 90 residences exist, and over 80 remain to be constructed. Along the Selway River, easements allow for 61 single-family residences. Thirty-eight have been built, and approximately 23 remain to be constructed.

PRIVATE LANDS

Four private inholdings exist within the Selway-Bitterroot Wilderness. The Seminole Ranch was patented in 1921. The land ownership has changed four times, and there is potential for development outside the requirements of a scenic easement there. The Selway Lodge, near the Shearer administrative site, operates under a scenic easement, and the Forest Service has a trail easement through the property. The North Star Ranch and the Running Creek Ranch on the upper Selway River have no scenic easements.

Traditionally, ranchers have owned and occupied land below the national forest boundary and in the Clear Creek area. Those ranches varied in size from 500 to 5,000 acres and were utilized for large herds of cattle and logging. Today, many ranchers have sold their ranches or subdivided their land. Cattle herds have been reduced to smaller numbers, and timber extraction is greatly reduced from previous levels. Those buying land and moving to the area include business owners, teachers, Forest Service employees, construction workers, and some people from areas outside of Idaho.

FOREST SERVICE ADMINISTRATIVE STRUCTURES AND FACILITIES ALONG THE RIVER CORRIDORS

RANGER STATIONS, GUARD STATIONS, AND ADMINISTRATIVE SITES

When the Interior Department’s Bureau of Forestry became the U. S. Forest Service in 1905, the rangers of the Bitter Root Forest Reserve received instructions to select suitable administrative sites. Homesteaders and miners were rushing into the lands the government had opened up for claiming, and the Forest Service needed to act quickly to establish strategic sites that "were reasonably accessible to the forests and the settlements, that had ample horse feed, a good water supply, and that were situated on either flat land or land with a gentle slope" (Schumaker, 1969). It was a large task, considering the area included all the land from the Lolo Trail to the Salmon River, and that it had been in a reserve where little or no development or change from a primitive state had occurred.

In order to administer the remote lands of the four national forests (Bitterroot, Nez Perce, Clearwater, and Selway) that had been created in the Selway and Middle Fork Clearwater subbasins by 1911, the area was divided into several districts. District boundaries were reformed, combined, or otherwise changed as necessary to meet management needs. As many as seventeen ranger stations and guard stations were established throughout the districts. Some of those sites served as various district headquarters, and although others were never officially district offices, they served as a base of operations or shelters for passing Forest Service personnel for a short while. The most prominent ranger stations were Bear Creek, which later was moved to Shearer; Moose Creek; O'Hara; Number One; Pete King; Meadow Creek; Fenn; and Selway Guard Station. The Magruder and Paradise sites were important to Forest Service administration in the eastern portion of the assessment area.

Some ranger stations were abandoned and others were burned or moved. O'Hara was district headquarters for the Selway District until 1940, and the buildings there were named to the National Register of Historic Places. The ranger's residence there accidentally burned in 1991. Station Number One (after 1909, named the Middle Fork Ranger Station) was located at the present junction of Smith Creek Road and Highway 12, which at that time was at the end of the road. It was an important supply distribution center and bustling administrative site. Its usefulness became less significant as road construction continued up the Middle Fork Clearwater toward Montana. After the site was abandoned, the buildings were destroyed except for the main cabin, which was moved to a resort in Lowell and now serves as a bed and breakfast unit. The Pete King Station was built in 1916, in the vicinity of Lowell, which is now located along Highway 12. It was a supply headquarters for the Selway Forest and the Middle Fork District until 1924, when it was supplanted by the Idaho Department of Transportation, and the Forest Service buildings were burned.

Seven remaining stations presently serve two national forests and three districts.

Bear Creek and Shearer

Bear Creek could have been the earliest station constructed. The date is uncertain, but there was Forest Service activity there in 1910. Other buildings were built there in 1916, when Bear Creek became a district, and another was added in 1922. Bunkhouses were built in the early 1930s. When Bear Creek and Moose Creek Districts combined in 1934, Bear Creek became a guard station. Sometime after 1960, two buildings from Bear Creek were moved to Shearer, three miles away, and are used as Forest Service administrative sites today. In 1988, plans were made, but not carried through, to keep an attendant there. There are no good records to verify visitor use at Shearer, but air traffic and use by outfitters and other members of the public have increased, according to observations by pilots, Forest Service personnel, and recreationists.

Three Forks and Moose Creek

The abandoned Shissler cabin was standing at Three Forks (near the confluence of the East and North Forks of Moose Creek), in the heart of the Moose Creek country, when Forest Service crews passed through the area in the early 1900s as they built trails to outlying parts of the Forest. It was a convenient stopover, and became known as a ranger station. It is shown as such on a 1911 Selway Forest.

When the new Moose Creek District was established in 1920, the ranger, Jack Parsell, moved headquarters to the present site of the Moose Creek Ranger Station, about five miles downstream from Three Forks, and built a large combination cookhouse and administrative office building. Among buildings added were: a ranger's house, bath house, warehouse, tool storage shed, woodshed, fire cache, residence, gas house, chlorinator house, saw filing shed, bunk houses, and parachute loft. Most of those buildings remain today.

Both Moose Creek and Bear Creek Districts were administered from Moose Creek after 1932. That year an airstrip was built at Moose Creek, and a longer, 4,100-foot field was added in 1957. Moose Creek became a work center and administrative site when the offices were moved to Grangeville, year-round, in 1970. From March to November, a pack string supplies the station about once every week when wilderness rangers, administrators, construction crews, and trail crews work out of the station. The Moose Creek Ranger Station is on the National Register of Historic Places, and is maintained to perpetuate the rustic character of the 1920s. Propane lights have been added to some buildings. There is a Remote Weather Observation Station (RWOS) located on the site.

Meadow Creek

Meadow Creek Ranger Station was built around 1924, and replaced Anderson Butte as an administrative office. It was in operation for about ten years, under the direction of one district ranger during the entire period. The Forest Service nearly burned it in the 1960s, but decided instead to restore it. Today, one of the two cabins at the site is available for use by Forest Service trail crews and other Forest Service personnel. A cabin is also available as a rental unit for visitors.

Selway

The Selway Guard Station was built in 1907, at the end of Selway River Road where it met Fog Mountain Road. When the road was extended to Selway Falls, the cabin was dismantled and moved to its present location. It continues to serve as a packing station for trips into the upper Selway area. It has also served as a visitor information center and backcountry ranger base station.

Fenn

The Bitter Root Forest Reserve took over abandoned buildings and land at Goddard Bar in 1902. When it was decided that the Forest Service would not establish an administrative site there, the agency proposed to exchange 35 acres of that land for land within the Clearwater National Forest owned by the Clearwater Timber Company. The Water Power Act of 1920 would not allow the Forest Service to dispose of the land because it was a potential hydroelectric power site. Nine years later, the Civilian Conservation Corps (CCC) began construction of Fenn Ranger Station at that site. The Fenn Ranger Station was built to accommodate the Selway and the Middle Fork Ranger Districts, and employees from the Pete King, Number One and O'Hara Ranger Stations moved there in 1935. It remained the Selway District Ranger Station after the Middle Fork District was discontinued in 1956. Since the Selway and Moose Creek Districts combined in 1995, it has served as headquarters for the Moose Creek Ranger District. It was named to the National Register of Historic Places in 1990. When it was built, it served as a model for the modern ranger stations that would replace the original log structures. It is still considered a showplace, and is a classic station set on a serene flat overlooking the Selway River.

Since Fenn Ranger Station was built to accommodate two ranger districts, two residences were built on the compound to house the respective district rangers. A third house was moved from the Boyd Creek Fish Hatchery in 1962 and placed next to the ranger dwellings. Moose Creek District employees, including the ranger, have since occupied those homes. Other housing for district employees is available in four trailer homes that have been installed within one-half mile of Fenn Ranger Station and at Cedar Flats (Parsell, 1990).

Magruder

The station began as a tent camp prior to 1919, and a road along Deep Creek was built to service the area after the widespread forest fires of 1910 and 1919. It was first known as the Deep Creek Ranger Station when an office/residence and ranger's house were built. The CCC added a barn, corral, and woodshed, and the name was changed to Magruder Ranger Station. The original road was improved in 1936 and Magruder was connected to Elk City by a one-lane road. Today, the ranger's house is used as a rental site for forest visitors and the other buildings serve as an administrative site for the West Fork Ranger District. Magruder is on the National Register of Historic Places.

Paradise

Paradise Guard Station, barn and corral were built in the 1920s. The site is located at the end of Paradise Road 6223, and serves as a portal to wilderness trails and the launch site for river rafting on the Selway River. A large outfitter camp operates year round nearby. West Fork District trail crews and field personnel base at the station during the summer work season.

LOOKOUTS

The disastrous fires of 1910 forced the fledgling Forest Service to reorganize forest boundaries and to find better ways to deal with finding and fighting fires. Men who worked out of backcountry stations were sent to the mountaintops where they stayed in tent camps for the entire summer. Supplies came to them by pack strings. Lookout "towers" were usually trees, and the lookout men communicated by heliograph and the nearest phone, which was often several miles away.

By 1916, lookout buildings began to replace tent camps, and at the zenith of the lookout era there were over 200 lookout stations in the Selway country (Kresek, 1985). Phones were installed in ranger stations and connected by miles of telephone wire to phones in selected lookout towers, and crews constructed roads and trails to the summits where the lookouts were located. Lookout men not only found fires, they hiked miles to fight them. They also maintained trails and phone lines.

After the peak of lookout construction activity in 1939, the use of and need for lookouts declined. Men were sent to the war (in many cases, women were assigned to replace them); airplanes, sophisticated radios and video cameras, infrared sensing, and weather reporting satellites became more widely used to detect and fight fires; and so began the extinction of the legendary fire lookouts. The need for the dependable, dedicated lookout person was nearly eliminated.

The Forest Service eliminated all but 21 of the lookouts in the Selway area. Some lookouts were merely abandoned, but most others were considered hazardous and the Forest Service burned them during the 1960s and later. Today, only seven staffed lookouts exist in the Selway basin. On the Nez Perce National Forest they are: Gardiner, Shissler, Indian Hill, and Coolwater Lookouts; on the Bitterroot National Forest Salmon Mountain, Spot Mountain, and Hell's Half Acre Lookouts remain staffed. Eight other lookouts are still in place, and three of those are used only for emergency situations. The Lookout Butte site is maintained as a rental for the public.

Now the Forest Service is reconsidering the value of lookouts. Fixed area observation has some advantages. Lookouts are in a position to observe fire activity all day and night, compared to the few minutes an observer in an aircraft has as the craft passes over. Lookout stations are often portals to the wilderness and receive many visitors. Lookouts can supply geographic and historic information as well as education about fire and wilderness. Lookouts are a connection to the past, present and future of the forest. People see the lookout as a symbol of the old Forest Service, of heroes and adventure, and of dedicated, hardy people who worked on the land (Crawford, 1999). The merit of lookout stations is evidenced by the fact that some forests (in Oregon, for example), are building new structures for fire observation.

RECREATIONAL FACILITIES

Campgrounds

Developed campgrounds along the Selway and Middle Fork Clearwater Rivers and the Magruder Corridor (see Map 55) are popular among all recreational user groups. The accessibility offered by roads facilitated the development of sites that were considered favorite spots by hunting enthusiasts, tribal members, and cattle and sheep owners. Civilian Conservation Corps groups improved and used many of these sites in the 1930s, and since then they have developed into campgrounds offering a range of facilities, from toilets and picnic tables to trailer spaces and hookups for recreational vehicles.

Campgrounds and road conditions along the 16-mile stretch of Selway River Road 223 reflect a transition from a rural to a primitive recreational opportunity setting. Most campgrounds within the basin are available for use on a first-come, first-served basis; only a few require fees or reservations. Riding and pack animals are allowed in most sites long the Magruder Corridor and the Selway River. Stock facilities (loading docks, water tanks, and feed bunks) are provided in several sites. Developed sites along the Selway River have been hardened and renovated, and some are being made handicapped-accessible in a four-year project, which was started in 1999 and is expected to be finished in 2003.

Use records for some years are available for some sites along the Selway and Middle Fork Clearwater Rivers, covering the time from the week before Memorial Day through the week after Labor Day. An increase in use of the campgrounds along the Selway River could occur with the Lewis and Clark Bicentennial event. If such an increase in use occurs, a sign to indicate campground occupancy will be provided within the first mile of Selway River Road 223, and increased agency presence would be necessary. Currently, one recreation technician monitors visitor use, provides education, and supplements law enforcement during use seasons. Vandalism and resource damage have remained static over the past ten years.

LAND USES

NEZ PERCE TRIBE LAND USE TREATY RIGHTS

Historically, the Nez Perce Tribe was one of the largest groups of native people within the Columbia Plateau region of the Pacific Northwest. The tribe occupied lands over 13 million acres that included all of the Clearwater River drainage, the Wallowa Mountains, and the upper portions of the Salmon River drainage. The first treaty between the United States and the Nez Perce people was signed on June 11, 1855, establishing a 7.7 million acre reservation.

In 1860, gold was discovered within the Nez Perce Reservation near present-day Orofino. This discovery resulted in a massive influx of miners, which led to conflicts and disputes between the Nez Perce and the Euro-Americans. The United States sought to negotiate another treaty. This treaty reduced the size of the Tribe's reservation. Although the treaty was resisted by several Nez Perce leaders, it was ultimately executed on June 9, 1863. The reservation was reduced to about 780,000 acres.

A third treaty between the Nez Perce Tribe and the United States was formalized on August 13, 1863. One of the provisions in this treaty was the allotment of lands within the reservation to individual tribal members.

In 1887, the General Allotment (Dawes) Act established mandatory allotments of reservation lands. Individual parcels were divided among tribal members, usually in amounts deemed sufficient to practice an agricultural way of life. After allotting lands to tribal members, the remaining areas were opened to homesteading or purchase by settlers.

The process of the United States entering into treaties with Native American tribes was terminated by an act of Congress in 1871. However, formal agreements between the United States and Native American tribes were still needed. In an 1893 agreement, the Nez Perce ceded all the unallotted lands within the limits of their reservation to the United States. The allotment process affected tribal land holdings, resulting in a checkerboard pattern of land ownership within the reservation. Today, the allotted lands make up the majority of the reservation lands. Presently, the Tribe and tribal members own about 90,000 acres of the 780,000-acre reservation created in the Treaty of 1863. None of the subsequent treaties between the United States and the Nez Perce people altered or affected the rights reserved in the original 1855 treaty, except for the lands reserved and ceded.

WILDERNESS

The Selway and Middle Fork Clearwater subbasin assessment area covers 1,394,613 acres. Of that, approximately 72 percent (about 1 million acres) is roadless or designated wilderness. The Selway-Bitterroot Wilderness (SBW) and a portion of the Frank Church-River of No Return Wilderness (FCRONRW) make up a large portion of the assessment area.

The Selway Bitterroot Primitive Area was established in 1936, and was being managed much as a present-day wilderness in 1939 under USDA regulations. The National Wilderness Preservation System Act was passed in 1964 and the Selway Bitterroot Primitive Area, minus 635,000 acres, became the Selway-Bitterroot Wilderness.

The Wilderness Act of 1964 challenges agency managers "to secure for the American people of present and future generations, the benefits of an enduring resource of wilderness." The act states in section 2 (c) (2) that wilderness "has outstanding opportunities for solitude or a primitive and unconfined type of recreation." Section 2 (c) (1) notes that wilderness "generally appears to have been affected primarily by the forces of nature."

The Wild and Scenic Rivers Act of 1968 ensured that the Selway, Lochsa, and Middle Fork of the Clearwater Rivers would remain wild and free-flowing even though they flow beyond and outside of designated wilderness boundaries.

SELWAY-BITTERROOT WILDERNESS MANAGEMENT

After the Selway-Bitterroot Wilderness was established in 1964, about eleven years of transition passed before a SBW management plan was put in place. In 1982, the plan was revised and renamed the *Selway-Bitterroot Wilderness Management Direction*, and included as an appendix in the forest plan of each of the four forests (Nez Perce, Bitterroot, Lolo, and Clearwater) responsible for SBW administration. In 1992, the *Management Direction* was further revised to incorporate recreation, trails, and airfields. In 1996, the plan was amended to combine forage and vegetation sections that also addressed weeds. That plan provides the current management direction for the SBW. Other sections, including special use permits, were intended to be included in the *General Management Direction*, but the wilderness planning group dispersed before those sections were completed.

A Forest Service SBW leadership structure was established to facilitate consistency in quality management, and to coordinate decision-making and forest plan implementation to meet the management challenges presented by a wilderness that encompasses four national forests and seven ranger districts. The Coordination Team is made up of: the Leadership Policy Council, which includes the forest supervisors of the Bitterroot, Clearwater, and Nez Perce National Forests; the steering group, consisting of area district rangers; and the Implementation Team, which is made up of the resource assistants in each district. A wilderness coordinator position was created to serve as advisor to the steering group and staff; this position has been vacant since 1997 due to lack of wilderness funding.

In 1987, a Citizens' Task Force was appointed to formulate management recommendations and a framework to portray the desired future condition of the SBW using the limits of acceptable change (LAC) planning system. "The [LAC] planning concept melds the expertise of managers, specialists, and researchers with the perspective and first-hand knowledge of all user groups to develop workable management direction" (*SBW Management Direction*, 1992). The dynamic LAC process is an ongoing cycle: plan, implement, monitor, and evaluate. See Appendix G for a detailed explanation of the nine-step LAC process and definitions of opportunity classes.

Together, the SBW Coordination Team and Citizens' Task Force addressed how recreation and other resources should be managed to assure the ongoing character of the wilderness. The groups considered wilderness elements such as trails management, visitor management, and aircraft and airfield management. Areas within the SBW were classified into four different opportunity classes and are managed to meet the limit of acceptable change prescribed for each designated opportunity class. Descriptions and indicators of the desired resource, social and managerial setting for each opportunity class are found in Appendix G. A monitoring plan requires completing a baseline inventory on each wilderness campsite and trail, and that all sites be monitored on a five-year rotation. That work is complete on some districts, and partially complete on others. An annual State of the Wilderness report (SOW) is compiled, and areas that do not meet LAC standards and forest plan management direction are listed. Management decisions are made to attempt to improve those areas and move them toward the desired future condition.

In 1994, 127 campsites and trails did not meet forest plan LAC standards; in 1995, 186 sites and trails did not; and in the 1999 SOW, 132 sites or trails in the SBW were listed as out-of-standard or problem areas. The most recent reports do not necessarily reflect conditions on the ground because many sites are not systematically visited or monitored. Extensive and consistent monitoring is difficult because the SBW is large and campsites are scattered and remote. Budget constraints have limited the numbers of wilderness field people and wilderness rangers available to accomplish monitoring in the field, rehabilitation work at out-of-standard sites, and office work such as recording and analyzing data, map making, and planning. Also, the window of opportunity for reaching some sensitive areas is very small because of weather conditions at higher altitudes.

The LAC Citizen Task Force discontinued input into SBW management in 1996, and the wilderness coordinator position was eliminated because of a limited wilderness budget in 1997. Wilderness leadership became the responsibility of the involved District Rangers on a rotating basis.

Wilderness Fire Policy

The Selway-Bitterroot Wilderness was the first wilderness area in the Forest Service to allow natural fires to burn freely. Forest Service pilot programs were started in the White Cap Creek and Bear Creek drainages. The SBW has been under a wilderness fire plan since 1976. Fires have been allowed to burn in the SBW every year since, except 1989, when all wilderness fire plans were revised to meet new direction in response to the controversial 1988 fire season. The Frank Church-River of No Return Wilderness Fire Management Plan was initiated in 1985, and has remained in force except for in 1989.

Fire has been allowed to play its natural role in the Selway-Bitterroot and Frank Church-River of No Return Wildernesses to a greater extent than in any other wilderness in the lower 48 states. Fires have been allowed to burn to replicate natural processes. However, not all fires are allowed to burn, and every fire must meet strict prescription criteria. Fires that threaten life and property, or threaten to escape wilderness boundaries are suppressed. During periods of preparedness levels IV and V (high fire activity and high demand for fire-fighting resources), regional and national level Forest Service authority is applied, and fires are usually suppressed if resources are available.

FRANK CHURCH-RIVER OF NO RETURN WILDERNESS MANAGEMENT

In 1980, the Congress created the River of No Return Wilderness with passage of the Central Idaho Wilderness Act. In 1984, the late Senator Frank Church's name was added. The Bitterroot National Forest manages that small portion of The Frank-Church River of No Return Wilderness (FCRONRW) within the Selway subbasin. Managers use the recreation opportunity spectrum (ROS) as a tool for wilderness recreation planning and the Frissell and Cole methods for inventorying numbers and condition of recreation sites. A management plan that recognizes a need for change is being drafted to address new issues that have emerged since the 1984 FCRONRW plan was approved. Decisions will be made in all resources on which goals, objectives, indicators, standards and monitoring requirements to adopt (*FCRONRW Draft Environmental Impact Statement*, 1998).

NATIONAL WILDERNESS MANAGEMENT ISSUES AND POLICIES

The focus on wilderness issues at the national level will affect wilderness management decisions in the SBW and the FCRONRW. A Forest Service Chief's Advisory Group was appointed in 1999 to develop strategies to meet the broad goals of the *Interagency Wilderness Strategic Plan* of 1995. In 2000, the Advisory Group's strategies were compiled in a document called *Contemporary Agenda for an Enduring Resource of Wilderness: Thinking Like a Mountain*. The wilderness agenda in that document is organized around six major emphases critical to improving Forest Service ability to manage the wilderness resource: (1) education, training and outreach; (2) wilderness inventory and monitoring; (3) information management; (4) priority resource issues (air quality, water quality, recreation use, native fish and wildlife, exotic species, fire, ecosystem restoration, rangeland and grazing, and private land interests); (5) program management and coordination; and (6) leadership. Also, in January 2001 the Forest Service Chief announced that a national wilderness director will be appointed, 100 wilderness stewards will be funded, and a commitment to funding wilderness and river rangers will be made to assure that they are on the land and the water.

RECREATION

Recreational use of the Selway and Middle Fork Clearwater subbasins is significantly increasing and becoming more diversified. Seventy-two percent of the area in the subbasins is designated wilderness and roadless, and continues to attract visitors seeking special places and experiences. Recreational activities and use patterns are changing.

Traditionally, recreation has been principally seasonal. In summer and early fall, local residents enjoyed hunting, fishing, berry picking, horse and mule pack trips, family camping and outings, hiking and backpacking. Non-residents began coming into the subbasins to visit the backcountry and wild rivers as national and worldwide attention was focused on the unique natural attractions. Commercial recreation services flourished and offered experiences in river rafting, kayaking, hunting, and fishing. Backcountry and wilderness airstrips receive moderate to heavy use. There is a waiting list of those who want to rent cabins and lookouts that are available for public use.

While traditional activities are still popular, the public is demanding more diversified opportunities. River rafting, mountain biking, rock climbing, history, wildlife watching and photography trips are steadily gaining popularity. Year-round recreation evolves as the public seeks more trails and opportunities for off-highway vehicle (OHV) use, snowmobiling, skiing, and snowboarding. Motorized vehicle use (OHVs, motor homes and campers) is expected to significantly increase. Hang gliders and yet-to-be-invented devices will likely show up as enthusiasts expand their horizons to include pristine or little explored, less populated places.

Visitors to the Selway basin can be divided into two significant groups. One group includes regional residents from areas within a three-hour drive, including Lewiston, Moscow, and Boise in Idaho; Clarkston, Pullman, and Spokane in eastern Washington; and Missoula and the Bitterroot

Valley in Montana. These visitors come for both weekends and for extended periods of time (up to two weeks). Some of these visitors prefer the Highway 12 and 95 corridors for the higher development levels of the roads and for the private and public sector recreation facilities, but many prefer the numerous dispersed opportunities and less-developed sites found in the canyons and on the ridges away from the Highway 12 and 95 corridors. These visitors utilize the area several times each year, often for different recreation objectives, depending on the season. The second group includes people from areas such as Minneapolis, California, Nevada, Utah, Seattle, Portland, and Colorado. These visitors typically visit once each year and usually for a special interest such as rivers, wilderness and backcountry, hunting, or solitude opportunities (*Northern Region Recreational/Tourism Assessment & Strategy*, 1994).

Visitor use in the Selway and Middle Fork Clearwater subbasins is difficult to accurately assess. There is no permit system in place except for hunters and anglers (licenses issued through the Idaho Department of Fish and Game and the Montana Department of Fish, Wildlife, and Parks), and Selway River float use. Two campgrounds record visitor use. Numbers of aircraft that land at backcountry fields are not closely monitored, with the exception of Moose Creek. Visitor use is expected to increase as tourists celebrate the bicentennial of the Lewis and Clark expedition through 2005.

ROADLESS AREAS

There are two inventoried roadless areas within the Middle Fork Clearwater subbasin and four inventoried roadless areas within the Selway subbasin. A summary of the management emphases for these roadless areas is shown in Tables 4.1 and 4.2 below. None of the inventoried roadless areas on the Nez Perce National Forest were recommended for wilderness designation.

Table 4.1: Management Emphases for Inventoried Roadless Areas in the Middle Fork Clearwater Subbasin

Roadless Area Name and Number	Size in Acres	Primary Management Emphasis from Forest Plan
Middle Fork Face #1842	10,170	A management combination of timber production, visual quality and big game winter range forage production. The Middle Fork Clearwater Wild and Scenic River corridor makes up the entire northern boundary of this inventoried roadless area.
Clear Creek #1844	11,876	A management combination of big game winter range forage production and timber production.

Table 4.2: Management Emphases for Inventoried Roadless Areas in the Selway Subbasin

Roadless Area Name and Number	Size in Acres	Primary Management Emphasis from Forest Plan
Rackliff-Gedney #1841	90,173	Increase forage on potential big game winter range and manage for timber production while improving potential deer and elk winter range.
O’Hara-Falls Creek #1226	25,326	A management combination of increasing forage on potential big game winter range and timber production. The O’Hara Creek Research Natural Area is located within this roadless area.

Roadless Area Name and Number	Size in Acres	Primary Management Emphasis from Forest Plan
West Meadow Creek #1845C	107,512	This large roadless area contains about 10 management areas. The three management emphases that are most often represented are timber production, maintain visual quality, and big game winter range forage production.
East Meadow Creek #1845D	94,203	Manage to provide for high quality fish and wildlife habitat and water quality. Provide opportunities for high quality, semi-primitive, dispersed recreation. Lands are classified as "unsuitable" for timber production. Defer timber harvest and road construction.

Since the forest plan went into effect in October 1987, four timber sales have been harvested in three of these roadless areas. An estimate of the effects of these timber sales is shown in Tables 4.3 and 4.4, below.

Table 4.3: Timber Harvest and Road Construction in Inventoried Roadless Areas in the Middle Fork Clearwater Subbasin Since 1987

Roadless Area Name and Number	Size in Acres	Timber Harvested Since 1987?	Roadless Area Cutover Acres	Roadless Area New Road Construction Since 1987
Middle Fork Face #1842	10,170	Yes	549	None, all helicopter logged.
Clear Creek #1844	11,876	Yes	150	3.9 miles

Table 4.4: Timber Harvest and Road Construction in Inventoried Roadless Areas in the Selway Subbasin Since 1987

Roadless Area Name and Number	Size in Acres	Timber Harvested Since 1987?	Roadless Area Cutover Acres	Roadless Area New Road Construction Since 1987
Rackliff-Gedney #1841	90,173	Yes	359	None, all helicopter logged.
O’Hara-Falls Creek #1226	25,326	No	0	0
West Meadow Creek #1845C	107,512	No	0	0
East Meadow Creek #1845D	94,203	No	0	0

OUTFITTING AND GUIDING

Early outfitters in the Selway country catered almost exclusively to hunters. Following World War II, outfitters and guide services expanded as recreational use increased. Outfitters were not required to hold permits and operated independently of direction or management by federal or state agencies. There were few restrictions and no boundaries for areas of operation. The leave-no-trace concept and the minimum impact ethic were not well known, and favorite camping spots received continued, heavy use. Structures and caches appeared. Fences, corrals, water systems, and toilets were constructed, and large groups of people and stock with heavy tents and cookware were common. Garbage dumps, tree stumps, exposed roots, overgrazed meadows, compacted soils, and polluted water were left behind (*Outfitter-Guide Administration Guidebook*, 1997).

The Idaho Outfitters and Guides Association was established in 1954, and outfitters came under the jurisdiction of that agency, federal agencies, and state fish and game licensing boards. The Idaho Outfitters and Guides Licensing Board issues permits to outfitters who are governed by the bylaws of the Idaho Outfitters and Guides Association (IOGA). Outfitters who operate on national forests are also responsible to the authority of an operating plan. The outfitter, IOGA, and the Forest Service cooperate to develop an outfitter operating plan that is administered by the Forest Service (see Map 57 for outfitter and guide camp locations). The Idaho Department of Fish and Game allots game tags to outfitters, and state hunting regulations apply. The Wilderness Act of 1964 and increased visitor use brought attention to developing ways to use the backcountry with less impact. Diversified activities opened new opportunities for outfitting, including river float trips, fishing, and photography trips. Agencies, special interest groups and some outfitters pioneered the new low-impact ethic, and espoused the "pack-it-in, pack-it-out" philosophy. Outfitters must comply with specific land-use guidelines as outlined in their permits and the Code of Federal Regulations, and must be in compliance with wilderness use standards as prescribed by forest plans.

Nineteen non-river outfitters in the Selway and Middle Fork Clearwater subbasins offer traditional (hunting and fishing) services. Fees for operation on public lands are assessed by the Forest Service and are based on three percent of each outfitter's gross earnings. That revenue is appropriated for outfitter-related administration, to improve trails, and to generally benefit outfitter operations. Information from district outfitter and guide files from 1995 to 1998 refers to average total outfitter use, not average use per outfitter. It indicates that combined outfitter use in the assessment area (Nez Perce and Bitterroot National Forests) averaged 5,395 client use days per year. Combined outfitter average gross annual revenue for that period was $1,478,460. Three percent of the combined gross earnings paid to the Forest Service for operation on federal lands averaged $44,354 per year. Ninety percent of outfitter clients are from outside of Idaho, and about two percent of the hunting public uses outfitter services. Outfitted clients have a higher hunting success rate than the regular public (Goosman, 2000). Four river outfitters offer one launch a day for rafting and kayaking parties on the Selway River. Illegal outfitter operations exist, but are difficult to identify and prosecute.

Focus is gradually changing from traditional outfitting to diversified activities, ranging from fitness trips to historical interpretation tours. As fish and game agencies cut back on licenses and tags to address the decrease of some game populations, outfitters and guides must increase fees and/or look for a new kind of customer. There is an increasing demand by outfitters for fishing. Institutional outfitting is on the increase. Outward Bound, the National Outdoor Leadership School (NOLS), and university groups seek educational opportunities and adventure. There is no charge or minimal fees for these groups. The Lewis and Clark Bicentennial is expected to greatly impact those outfitters that border or have areas near U. S. Highway 12. The changing trends in recreational use are impacting outfitters, who will need to meet the challenge of offering and marketing diversified services.

Although there are occasional lapses in low-impact land use techniques, most outfitters are improving their efforts in this area. Most want to be perceived as caretakers of the land, by both the public and the Forest Service.

MINING

Part of the reason that the Selway and Middle Fork Clearwater subbasins remain largely undeveloped is that valuable mineral deposits were not found there by prospectors in the 1800s, and have not been found there since. Also, large tracts of land were withdrawn from mineral entry through the Wilderness Act of 1964 and the Wild and Scenic Rivers Act of 1968.

The geology of the areas surrounding the Selway and Middle Fork Clearwater subbasins is rich in gold and other valuable metal, especially the area around Elk City. The first major gold discoveries in the Elk City and Pierce areas occurred in 1861, but there has never been a major discovery or even a minor producing mine in the Selway and Middle Fork Clearwater subbasins.

Several metals of interest have been found in the subbasins in limited quantities, including: gold, kyanite, talc, iron, titanium, cobalt, and nickel. None of these mineral finds went beyond the prospecting stage, and the minerals did not occur in economically viable deposits. These minerals require sizeable deposits to merit development.

In the area around Green Mountain Lookout, there were some copper prospects investigated by a company in the late 1960s. The company built approximately 22 miles of road near Granite Peak, and did both trenching and core drilling. Since then, the Forest Service has attempted to seed the roads, and has blocked them from public use. There is some interest in copper near Green Mountain, but nothing of the size required for development has been found.

FOREST PRODUCTS GATHERING

NON-TIMBER

Roots, berries, trees, shrubs, mushrooms, edible and medicinal plants, nuts and herbs are found throughout the subbasins. People within and adjacent to the assessment area utilize these products for personal use, and some use them for commercial purposes. Members of the Nez Perce tribe collect trees, plants, roots and berries for traditional uses. Commercial gathering of forest products is prohibited within wilderness areas.

Within the subbasins, gathering non-timber forest products for recreational or personal use is not regulated, and data regarding the demand for these products and the types and amounts available does not exist. However, according to anecdotal information from forest workers' encounters with individuals participating in non-timber forest products gathering, participation in such activities can be characterized as being low. Gathering mushrooms and berries seems most dominant. Future demand is expected to remain low.

Collection of non-timber forest products for commercial purposes is regulated and requires a permit. Most commercial collection permits are issued for wild mushrooms and floral greens. The number of commercial permits issued is very low and seldom exceeds one or two permits every few years. The low demand for commercial permits can be attributed to the fact that there is not a local wholesaler or collection point for the various forest products. It is predicted that future commercial demand for these products will remain low. Periodic increases in commercial demand for specific products may occur in the future.

An exception to the low demand for commercial non-timber forest products permits involved the collection of Pacific yew bark that occurred in the early 1990s. Several commercial permits were issued throughout the Selway and Middle Fork Clearwater subbasins for the collection of this material. Pacific yew bark was used in the production of the anti-cancer drug taxol. Demand for

Pacific yew bark significantly decreased when a synthetic substitute was developed. There are currently no commercial permits issued for Pacific yew bark collection.

TIMBER-RELATED

Timber-related forest products such as cedar shakes, posts and poles, and fuel wood are also gathered throughout the Selway and Middle Fork Clearwater subbasins. Collection of these materials is prohibited in wilderness areas and is generally confined to areas within close proximity of travelable roads.

The Selway basin has a high occurrence of cedar habitat types, and the collection of cedar trees for manufacture into roofing shakes, fence rails, and fence posts for personal and commercial use occurs. Collection of these materials is regulated and permits are required for personal and commercial gathering. The demand for post and pole material is greater than that for roofing shakes, and the demand for cedar products in general varies considerably from year to year. The Fenn and Lochsa Ranger Stations typically issue less than 10 permits each annually, allowing the removal of 20 to 30 cunits (one cunit is approximately 100 cubic feet). These permits are mostly for personal use. Future demand for these products will likely follow current trends, continuing to vary from year to year.

Fuel wood gathering is important for heating the homes of many people living within and adjacent to the assessment area. Fuel wood for commercial and personal is one of the most common forest products taken from the area. Commercial and personal fuel wood gathering is regulated and permits are required to remove this product from the forest. Permits for fuel wood removal allow the holder to gather fuel wood on any forest within the Forest Service's Northern Region. Given this consideration, it is difficult to determine the amount of fuel wood actually removed from the Selway and Middle Fork Clearwater subbasins. Approximately 30 permits are issued from the Fenn Ranger Station and 200 permits are issued from the Lochsa Ranger Station annually for personal use. Given an average of three cords per permit, and assuming all the Fenn permits and about 50 of the Lochsa permits are used to collect fuel wood within the Selway and Middle Fork Clearwater subbasins, this would amount to approximately 240 cords of fuel wood removed annually.

Fuel wood gathering is considered a commercial venture when the wood will be sold. Hiring help to cut and gather personal use fuel wood is not considered a commercial venture, even though money is exchanged. Very few commercial fuel wood permits are currently issued within the Selway and Middle Fork Clearwater subbasins. An occasional permit may be issued for approximately one to five log truck loads of fuel wood (5 to 50 MBF or 10 to 100 cords). Just one to two of these commercial permits may be issued every few years, and they typically are issued for areas with dead trees that have succumbed to wind, insects or disease and are accessible by road.

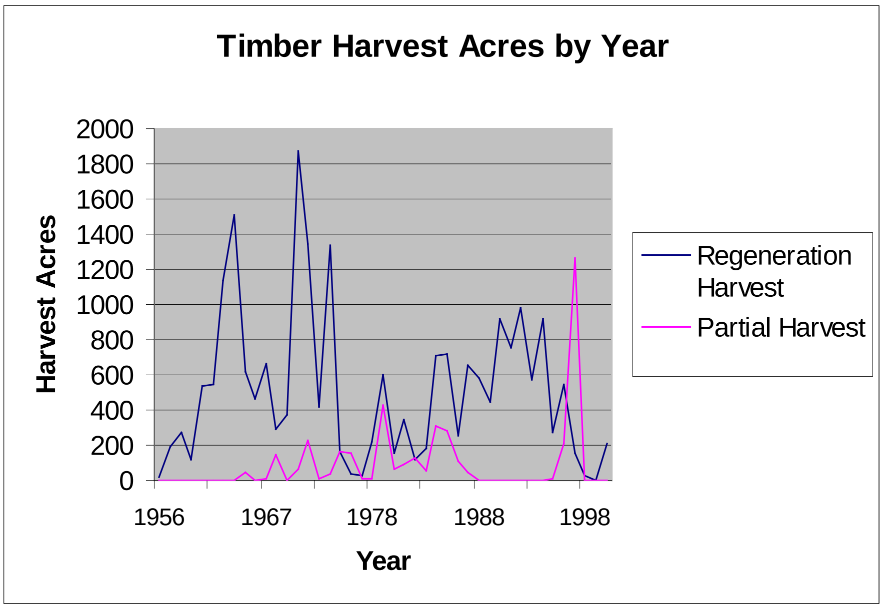
TIMBER HARVEST

As early as 1890, cedar logs were cut and floated down the Selway River and sold. The first advertised timber sale was in the area of Smith and O'Hara Creeks in 1913. By 1923, the Selway Forest had a full-time timber sale administrator working on sales in the Smith Creek area, but little quantitative data are available. By 1956, logging activity was intense on the ridge tops above the north side of the lower Lochsa River, the south side of the lower Selway River, and both sides of the Middle Fork Clearwater River. Timber sale preparation and administration, along with road design and construction, became the major Forest Service activities from the 1950s through the 1980s, and the wood products industry became the area's largest employer.

Figure 4.1 displays numbers of annual timber harvest acres for the Nez Perce and Clearwater National Forests in the Selway and Middle Fork Clearwater subbasins, so far as they are known, from 1956 to 2000. Some harvest occurred in the 1930s as well, but is poorly documented.

Harvest activity peaked in 1970, when over 1,800 acres were logged, using mostly clearcut methods. Clearcut opening size also peaked during this time at about 90 acres. Average opening size declined to about 20 acres in the 1990s. A total of 22,420 acres of land have been affected by regeneration harvest on the two forests within the Selway and Middle Fork Clearwater subbasins, and 3,859 acres have been subject to partial harvest. From the 1930s through the 1980s, partial harvest, including thinning and some salvage, occurred at relatively low levels compared to levels of that type of harvest in the 1990s.

Figure 4.1: Timber Harvest Acres by Year within the Selway and Middle Fork Clearwater Subbasins on the Nez Perce and Clearwater National Forests



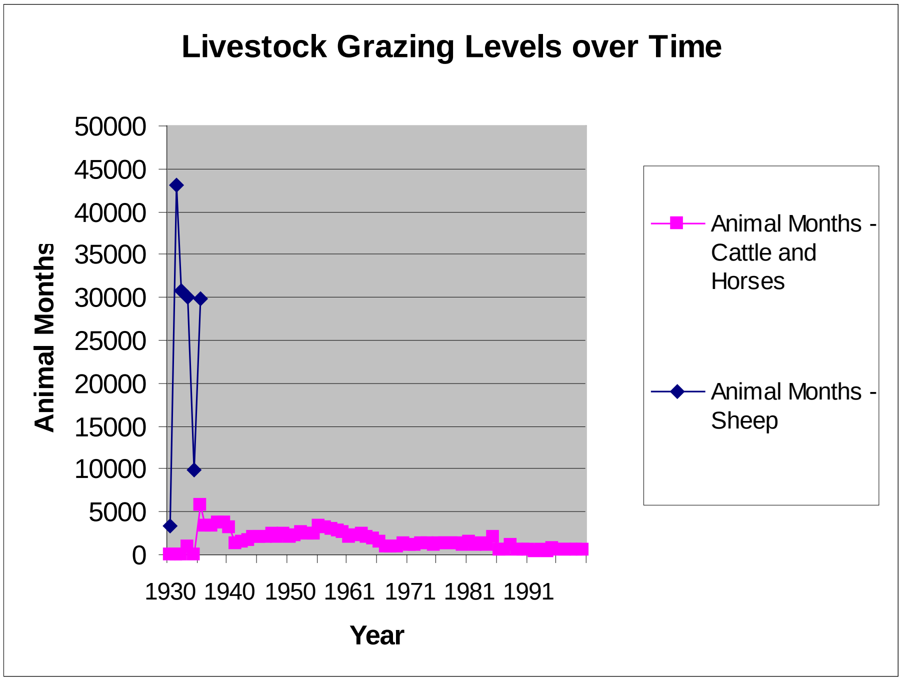
Large areas of the Selway subbasin have been withdrawn from timber harvest activities through the creation of the Selway-Bitterroot and Frank Church-River of No Return Wilderness areas and the designation of numerous roadless areas.

LIVESTOCK GRAZING

Livestock grazing began with the earliest travelers and settlers, but grazing is not well documented prior to about 1930. The forest fires of the early twentieth century resulted in abundant sheep and goat range for several years. Figure 4.2 shows animal months (months of use by an animal) for cattle and sheep for the Nez Perce National Forest according to available records. These records are thought to have some gaps, both in the period during which grazing occurred and in the numbers of animals. Numbers peaked at over 43,000 animal months in 1935, and declined as the young shrubs grew too tall for animals to reach and trees became established on old burns. The sheep market also declined after about 1940, and very little sheep grazing has occurred since then. The areas most heavily used included: Coolwater Ridge, Indian Hill, Green Mountain, Otterson Creek, Buck Lake Creek, Schwar Creek, Butte Creek, Simmons Creek, upper Meadow Creek, and the East Fork of Meadow Creek.

Cattle and a few horses were grazed in the Middle Fork Clearwater River, Clear Creek, Tahoe, Glover Ridge, Boyd Creek, Iron Mountain, Hamby Creek, Green Mountain, and Anderson Butte areas. Grazing was sustained at high levels from about 1935 through 1964; available records indicate 2,000 to 3,000 animal months per year on the Nez Perce National Forest during this time period. The areas of highest and most prolonged use have been the Clear Creek and Tahoe areas. Grazing has declined as small operations have become unprofitable, transitory range has declined, and requirements for herd management to meet environmental standards have increased.

Figure 4.2: Livestock Grazing Levels After 1930 for the Nez Perce National Forest



CULTURAL AND HERITAGE RESOURCES

The Selway portion of the assessment area contains numerous locations where human activity has taken place, and has been subdivided into three zones in order to better understand the human factors of each zone. These zones are the Upper Selway, Middle Selway, and Lower Selway. The Upper Selway Zone extends from the Selway River headwaters down the Selway River to and including Moose Creek and its tributaries. The Middle Selway Zone comprises the area from Moose Creek downstream to the wilderness boundary at Race Creek. The Lower Selway Zone contains the roaded portion of the Selway subbasin, from Race Creek downstream to the confluence with the Lochsa River.

Within this large area, 99 cultural sites have been formally documented. This includes 45 prehistoric Native American sites, 38 historic Euro-American sites, and 16 multicomponent sites (sites containing both Native American and Euro-American materials). Overall, 73 of these sites are eligible for inclusion in the National Register of Historic Places (NRHP). Two sites, Fenn Ranger Station and Moose Creek Ranger Station, are listed on the NRHP. Twenty-two sites have been determined to not meet eligibility requirements for inclusion in the NRHP, and four sites remain unevaluated.

The Upper Selway Zone contains 22 documented cultural sites. Four sites are prehistoric and 14 are historic. Seventeen sites are eligible for the NRHP, and five are not. Prehistoric site types include campsites, rock art, a rock shelter, and travel routes. Historic sites include ranger stations, homesteads, trapper cabins, river crossings (trams), guard stations, a grave, and travel routes.

The Middle Selway Zone contains 14 documented sites, the smallest number in any of the three Selway zones. Seven sites are prehistoric, three are historic, and four are multicomponent. Eleven of these sites are eligible for the NRHP, one is not NRHP eligible, and two sites in this zone remain unevaluated. Site types in this zone include prehistoric campsites, rock art, a rock shelter, and travel routes. Historically, forest fire lookouts, ranger stations, cabins, a grave, and travel routes were utilized here.

The Lower Selway Zone contains 63 documented sites, the largest quantity in any of the Selway zones. Of these, 34 are prehistoric, 21 are historic, and eight are multicomponent. Forty-five sites are eligible for the NRHP, sixteen are not eligible for the NRHP, and two remain unevaluated. Site types in this location consist of prehistoric campsites, food processing sites, lithic scatters, and travel routes. Historic sites here include ranger stations, cabins and other structures, forest fire lookouts, a fish hatchery, and travel routes.

TRANSPORTATION AND ACCESS

The transportation system in the Selway and Middle Fork Clearwater subbasin assessment area is composed primarily of road systems and trail systems. In addition, airstrips are a component that provide an important means of access into the middle reaches of the Selway drainage, with public airstrips at Moose Creek and Shearer, and private airstrips at Running Creek, North Star Ranch, Selway Lodge, and Seminole Ranch.

ROADS

HISTORICAL DEVELOPMENT

Road development began in the western portions of the assessment area, with the earliest development proceeding from the Kooskia area in the late nineteenth century. One of the earliest roads was the Elk City Wagon Road, which provided access from Kooskia to Elk City in the late 1800s. This route lies along portions of the western margins of the Selway and Middle Fork Clearwater subbbasin assessment area. Road database records for the Nez Perce National Forest indicate that road construction in the Clear Creek drainage occurred as early as 1900. It is likely that road development in the Middle Fork Clearwater area had been initiated by that time as well.

Road development to provide access to fire lookouts occurred in the 1920s and 1930s throughout much of the Selway and Middle Fork Clearwater subbasins. Most of these roads still exist, and retain much of the character of their original configuration. They are typically managed at maintenance level II (maintained for high clearance vehicles). These routes include: Coolwater Ridge Road 317, Fog Mountain Road 319, Indian Hill Road 290, American River-Selway Road 443, South Nez Perce Trail Road 468 (also known as Magruder road), Elk Mountain Road 285, and Green Mountain Road 285A.

Subsequent to these initial developments, road development continued throughout the twentieth century, both in support of private development and in support of commercial timber harvest. Ecological reporting units (ERUs) that have experienced continued twentieth century road development include Middle Fork Clearwater, Clear Creek, and O'Hara and Goddard. While these ERUs have received road development throughout the twentieth century, they still contain inventoried roadless areas as well.

MAIN ROADS

Main roads within the Selway and Middle Fork Clearwater subbasins consist of a combination of state, county, and highway district roads, and Forest Service roads. State and county system roads are public roads, while Forest Service routes are not, although the agency now is considering options to designate portions of the system as public roads. Road locations can be seen on Map 60, Main Roads Display. Descriptions of individual main roads are provided in Tables 4.5 and 4.6.

Table 4.5: Main Roads: State, County, and Highway District Routes

Road Name and Number	Road Surface	Road Description and Use
U. S. Highway 12	Double lane, paved.	An arterial that traverses through the assessment area from the city of Kooskia along the north bank of the Middle Fork Clearwater River upstream to the community of Lowell.
Clear Creek Road 515	Bituminous surface road upstream to the crossing of Clear Creek	Runs from the city of Kooskia up the Clear Creek drainage and eventually provides connection to the town of Clearwater. This route provides access to the Clear Creek fish hatchery as well as to residents in the western third of the Clear Creek drainage.
Leitch Creek Road 1842	Bituminous surface road	Provides access to the Tahoe Ridge area, the Nez Perce National Forest, and the community of Big Cedar. It is tributary to Clear Creek Road 515.
Big Cedar Road 1842	Primarily gravel surface	Provides access from Tahoe Ridge to the community of Big Cedar and on to the area of Potato Hill.
Clear Creek Cutoff Road	Lower reaches of this road are bituminous surface	Provides access from the Big Cedar Road 1842 to Clear Creek Road 515.
Harris Ridge Road	Gravel	Provides access to state and private lands on the north side of the Middle Fork Clearwater River.
Sutter Creek Road	Gravel	Provides access to state and private lands on the north side of the Middle Fork Clearwater river.
Selway River Road	Bituminous surface	The road is managed by the highway district from its junction with U. S. Highway 12 at Lowell upstream to the mouth of O'Hara Creek.

Table 4.6: Main Roads: Forest Service Routes

Road Name and Number	Road Surface	Road Description and Use
Selway River Road 223	Gravel	A Forest Service road from the end of the highway district section at the O'Hara bridge to its terminus at Race Track. This road is considered an arterial, as it provides primary access to the lower reaches of the Selway subbasin, including primary trailheads into the Selway-Bitterroot Wilderness.
Hamby Fork Road 651, and Swiftwater Road 470	Both gravel surface	Provide connection from Selway River Road 223 to road systems in the South Fork Clearwater and Clear Creek areas, respectively.

Road Name and Number	Road Surface	Road Description and Use
Tahoe Road 286 Lodge Point Road 653 Hamby Loop Road 1129	Gravel surface arterial Gravel surface collector Gravel surface collector	All three roads provide access along the north and east portions of the Clear Creek drainage as well as connection to the Swiftwater and Hamby systems.
Sears Creek Road 1106, and West Fork Clear Creek Road 650	Both gravel collectors	Provide access to trailheads and lands in the western portion of the Clear Creek drainage. These roads provide a motorized vehicle loop opportunity and have recently been stabilized to provide for all-weather use.
Smith Creek Road 101	Gravel surface arterial	Provides access to the Clearwater National Forest from U. S. Highway 12 from a point downstream from Syringa.
Boundary Ridge Road 464	Gravel surface collector	Generally follows the hydrologic divide between the South Fork Clearwater River and the Selway River. It provides connection to several collectors on either side of the divide.

SEMI-PRIMITIVE ROADS

In addition to the higher-volume travel routes in the Selway and Middle Fork Clearwater assessment area, there is a system of roads that provides important recreational opportunities. These roads were typically constructed by the Civilian Conservation Corps in the 1930s, and exist today in much the same condition as when they were originally constructed. Table 4.7 provides details on these roads.

Table 4.7: Semi-Primitive Forest Service Routes

Road Name and Number	Road Surface	Road Description and Use
Coolwater Ridge Road 317	Native material	Provides access to the high elevation area between the Lochsa and Selway Rivers. Parts of this route are alternately on the Clearwater National Forest and the Nez Perce National Forest.
Fog Mountain Road 319	Native material	Provides access to the high elevation areas around the upper reaches of Gedney Creek. It also provides trailhead access to the Selway-Bitterroot Wilderness.
Indian Hill Road 290	Native material	Provides access to Indian Hill Lookout, overlooking the middle reaches of the Selway Canyon and Meadow Creek.

Road Name and Number	Road Surface	Road Description and Use
South Nez Perce Trail Road 468 (also known as the Magruder Corridor Road and the Montana Road)	Native material, with some gravel the first 14 miles on the west side, and some gravel and bituminous surface in the deep Creek section on the Bitterroot National Forest.	Provides connection from Red River Ranger Station on the Nez Perce National Forest to the Darby Ranger Station on the Bitterroot National Forest, traversing 101 miles of backcountry along the way. Traveling this route provides a unique opportunity to travel between two large wildernesses, the Selway Bitterroot and the Frank Church River of No Return.
Elk Mountain Road 285, and Green Mountain Road 285A	Native material	Provide access to high elevation areas near the heads of Meadow Creek, Goat Creek and Running Creek. They also provide access for backcountry and wilderness trailheads.
Road 6223	Native material	Provides access along the upper reaches of the Selway River downstream from Magruder crossing. It is an important access for river recreation and river administration.
Road 224	Native material	Provides access to Hell's Half-Acre Lookout.

Magruder Corridor

Perhaps the most famous of the semi-primitive roads is South Nez Perce Trail Road 468, which passes through a narrow strip of land between two wilderness areas known as the Magruder Corridor. The Nez Perce people established a southern route to move to and from their hunting and gathering grounds in what is now Montana. In the 1930s, the Civilian Conservation Corps constructed the road that connects Elk City, Idaho to Darby, Montana, roughly paralleling parts of the Nez Perce's southern travel route. The Magruder Corridor was created in 1980 when the Central Idaho Wilderness Act was passed and land south of the road became what is now known as the Frank Church-River of No Return Wilderness. The road passes through a narrow non-wilderness corridor that divides the Selway-Bitterroot Wilderness and the Frank Church-River of No Return Wilderness. It is a rough, steep, and winding road, with no services for 117 miles, and usually is closed by snow from early October to July. Some of the area was prepared for timber sales prior to 1980, and 14 miles of the road were paved for that purpose.

WILDERNESS PORTALS

Several routes, while not in the Selway and Middle Fork Clearwater subbasin assessment area, provide important portal access to lands in the assessment area. Table 4.8 provides details.

Table 4.8: Forest Service Routes: Wilderness Portals

Road Name and Number	Road Surface	Road Description and Use
Elk Summit Road 360	Native material	Provides trailhead access to areas in East Fork Moose Creek area. It starts from U. S. Highway 12 near Powell Ranger Station on the Clearwater National Forest.
Road 429	Native material	Provides trailhead access into the area around the head of Bear Creek. It originates from U. S. Highway 93 in the Bitterroot Valley.

ROAD SYSTEM CHARACTERIZATION

Road Density

There are approximately 997 miles of road, either existing or decommissioned, in the Selway and Middle Fork Clearwater assessment area (Infrastructure Database, 2000). Of this figure, approximately 280 miles are located on lands other than National Forest system lands (primarily in the Middle Fork Clearwater and Clear Creek ecological reporting units), and 717 miles are on Nez Perce, Clearwater, and Bitterroot National Forest lands and are administered by the Forest Service. Distribution of these roads by ecological reporting unit (ERU) is shown in Table 4.9.

Table 4.9: Road Mileage and Density by Ecological Reporting Unit (ERU)

ERU	Total Miles	Road Density (miles per square mile)
Middle Fork Clearwater	304.36	2.61
Clear Creek	299.83	2.95
Lower Selway Canyon	37.45	1.23
Middle Selway Canyon	13.43	0.14
Upper Selway canyon	23.76	0.14
O'Hara and Goddard	185.3	1.84
Meadow Creek	65.18	0.27
Otter and Mink	0.03	0.0
Marten Creek	0	0.0
Ditch Creek	0	0.0
Running and Goat	10.61	0.09
Selway Headwaters	13.87	0.06
Deep Creek	22.59	0.40
Indian Creek	0.32	0.01
White Cap Creek	1.65	0.01
Pettibone and Bear	0.07	0.0
Moose Creek	0.05	0.0
Gedney and Three Links	8.48	0.09
North Selway Face	10.10	0.29

As can be seen in Table 4.9, the majority of roads occur in the western ERUs, including Middle Fork Clearwater, Clear Creek, and O'Hara and Goddard. There are additional roads present in most of the other ERUs as well.

Road Maintenance Levels

Roads throughout the Selway and Middle Fork Clearwater subbasins are maintained at various levels. The maintenance levels are described below, and Table 4.10 provides a summary of maintenance levels by ERU. The numbers in the table are from the Nez Perce National Forest Infrastructure Database (2000), and have been rounded for clarity.

Maintenance Level 0: Maintenance not applicable. Road has been decommissioned.

Maintenance Level I: Basic custodial care. Closed yearlong. Brush has grown in on many of these roads.

Maintenance Level II: Suitable for high clearance vehicles. Open to highway vehicles seasonally or generally requiring a high clearance vehicle to negotiate.

Maintenance Level III: Suitable for passenger vehicles. Usually gravel surface, single lane.

Maintenance Level V: High degree of user comfort. Generally have an asphalt surface.

Maintenance level information not available: Roads are generally privately owned and operated.

Table 4.10: Selway and Middle Fork Clearwater Subbasin Road Maintenance Levels in Miles by Ecological Reporting Unit

ERU	Maintenance Level					
	0	I	II	III	V	Information not available
Middle Fork Clearwater	< 5	22	0.6	13	24	238
Clear Creek	<10	105	35	68		88
Lower Selway Canyon		9	4	16	9	1
Middle Selway Canyon			10	3		
Upper Selway Canyon			18	6		
O’Hara and Goddard	31	81	23	50		
Meadow Creek		31	22	12		
Otter and Mink			.03			
Marten Creek						
Ditch Creek						
Running and Goat			11			
Selway Headwaters		0.5	9	4.5		
Deep Creek			16	6.70		
Indian Creek				0.3		
White Cap Creek				1.7		
Pettibone and Bear						0.07
Moose Creek						0.05
Gedney and Three Links			8.5			
North Selway Face			9.8	0.3		
TOTALS		248.5	166.93	181.5	33	326

Travel Management and Excess Roads

As can be seen in Table 4.10, above, much of the road system in the more developed ERUs receives maintenance level I, basic custodial care. At this maintenance level (corresponding to a closed travel management prescription) efforts are made to inspect drainage structures and to keep surface drainage functional. Efforts are not necessarily made to clear brush from roads or to keep roads passable to highway vehicles; consequently many of these roads are grown in with vegetation to varying degrees. Many of the roads in this category are dead ends. Preliminary transportation planning indicates a portion of these roads may be excess to the transportation system.

Modest levels of road decommissioning have occurred in the Middle Fork Clearwater River and Clear Creek ERUs, while a somewhat greater level of decommissioning has occurred in the O’Hara and Goddard ERU. All of this decommissioning has taken place within the last 10 years.

The maintenance level III roads reflect much of the core road system while the maintenance level II roads reflect much of the backcountry access.

The mileage and percentage of roads that have travel restrictions in each ERU are displayed in Table 4.11 (mileages have been rounded to provide for clarity). Road miles represented as restricted in the table have some level of vehicle or season of use restriction placed upon them. Roads represented as open have no restrictions on them. Because travel prescription information is not readily available for much of the area outside of the National Forests, the “open” descriptor is used as a default for such areas. Also displayed in table 4.11 is an indication of roads that could be considered excess to the needs of the transportation system. This information is relative only to the roads on national forest lands. It was developed based upon tributary acreage for timber harvest. As such it can be considered a coarse screen only. Specific roads will need to be identified through roads analysis and project-specific NEPA analysis.

Table 4.11: Travel Management and Potential Excess Roads

ERU	Total Miles	Excess Miles	Miles Open	Miles Restricted	Percent Restricted
Middle Fork Clearwater	304	19	232	72	24
Clear Creek	300	86	172	128	43
Lower Selway Canyon	37	0.9	27	10	27
Middle Selway Canyon	13	0	3	11	80
Upper Selway Canyon	24	0	13	11	45
O’Hara and Goddard	185	52	57	92	61
Meadow Creek	65	5.3	19	46	70
Otter and Mink	0.03	0	0.03	0	0
Marten Creek	0	0	0	0	0
Ditch Creek	0	0	0	0	0
Running and Goat	11	0	11	0	0
Selway Headwaters	14	0.05	9	5	35
Deep Creek	23	0	15	7.4	33
Indian Creek	0.3	0	0.3	0	0
White Cap Creek	1.7	0	1.7	0	0
Pettibone and Bear	0.07	0	0	.07	100
Moose Creek	0.05	0	0.05	0	0
Gedney and Three Links	8.5	0	0.05	8.4	99
North Selway Face	10	0	0.2	9.8	98

Restriction levels (percent of road miles with some level of vehicle or season of use restriction placed upon them) tend to be higher in ERUs with greater amount of road, although in some of the lesser developed ERUs the percent restricted is variable due to the small amount of road present. O’Hara and Goddard ERU and Clear Creek ERU can be characterized as being heavily restricted.

The amounts of road that may be excess to the needs of the transportation system also tend to be higher in ERUs with greater amounts of existing roads. For ERUs that have received timber harvest in the past, potential reductions in road mileages of 10 to 30 percent may be appropriate.

TRAILS AND TRAILHEADS

TRAILS

Historical Development and Use

Native Americans established the first trails in the Selway and Middle Fork Clearwater subbasins, often following routes used by large animals. Prospectors, trappers, and railroad surveyors expanded the network of trails. The Forest Service constructed new trails to transport materials for installing telephone lines, building lookouts, and constructing bridges and administrative sites. Hunters, outfitters and firefighting also drove trail construction and maintenance. In the 1920s and 1930s, trails could be found on most major ridges and up most major drainages. Roads were built in the 1930s and 1940s, many to access timber for harvest, and this changed the pattern for trail construction and use. Roads came to connect segmented pieces of trail.

Trail construction and maintenance flourished in the 1930s when large forces of Civilian Conservation Corps workers were employed, and again in the 1960s through the work of the Job

Corps. Trail conditions and numbers of maintained trails began to decline in the 1970s. Prior to the decline in volume of timber harvest, fire and timber monies supported trail construction.

The traditional practical and functional use of the extensive existing trail system is evolving into recreational use. There are three national recreation trails in the Selway and Middle Fork Clearwater subbasins: Anderson Butte, East Boyd-Glover-Round Top, and Meadow Creek Trails. The historic Nez Perce Trail passes through the area. The trail system continues to be reduced from its historical mileage due to lack of use and reduced maintenance funding. The Forest Service no longer supports large work crews and firefighting forces. The public today prefers shorter scenic loop trips that can be accomplished in a weekend to four days.

Off-highway vehicle (OHV) use of trails and roads in the Selway and Middle Fork Clearwater subbasins is estimated to have doubled in the last ten years. Pressure is increasing to make more trails available for bicycles, 4-wheelers, snow machines, and other motorized use. Hundreds of miles of existing roads in the assessment area are available for OHV use, and fifty miles of trail have been constructed for OHV use over the last ten years. OHV users do not always want to be on roads; they sometimes seek a trail experience.

Trends indicate that use of trails deep within the backcountry will decrease. More recreationists indicate a preference for quick and easy forest access and trails where OHV use is allowed. They tend to use trails within five to ten miles of trailheads. Serious hikers and some backcountry stock users prefer to take the longer, more challenging trips on secondary and way trails.

Many visitors choose not to use trails because they have other options for enjoying their forests. The scenic highways and roads within the Selway and Middle Fork Clearwater subbasins offer exceptional opportunities for viewing wildlife and enjoying spectacular vistas from the comfort of family automobiles.

Funding and Maintenance

A total of 1,157.5 miles of trail are currently on district inventories across the Selway and Middle Fork Clearwater subbasins (see Map 61). Those numbers do not necessarily reflect the miles of trail that are used or maintained. All forests are in the third year of a Meaningful Measures/Infra process to inventory current mileage and conditions of all system trails. By 2003-4, trail management decisions will be based on an accurate assessment of existing trails.

Currently, trails specialists estimate that about 15 percent of all mainline and secondary trails get attention each year as they attempt to balance a vast trail system against meager financial resources. Budgets allow for minimum trail maintenance resources that are not sufficient to maintain trails to the specifications of forest plans. Most trails do not get attention beyond level 1 requirements. System trails on the Nez Perce National Forest, inside and outside the wilderness, are to be maintained to the standards or levels explained below, according to the Forest Plan.

Maintenance Levels for Wilderness and Non-Wilderness Trails on the Nez Perce National Forest

Level I - (Opening): Minimal amount of clearing, route marking, structure repair and drainage to provide for usability, safety, and resource protection.

Level 2 - (Normal): Intermediate level of clearing, route marking, structure repair and drainage. Includes moderate tread repair, brushing and rehabilitation of drainage structure.

Level 3 - (Heavy Maintenance): Significant amounts of work described in Levels 1 and 2. Maintenance cost allowed up to 30 percent of the average cost of new construction.

Table 4.12 describes trail maintenance levels for wilderness and non-wilderness trails on the Nez Perce National Forest.

Table 4.12: Trail Maintenance Levels for Wilderness and Non-Wilderness Trails on the Nez Perce National Forest

Trail Class	Minimum Service Level Standard	Full Service Level Standard
Mainline	Level 1 annually Level 2 every 3 years	Level 2 annually Level 3 every 5 years
Secondary	Level 1 every 2 years Level 2 every 5 years	Level 1 annually Level 2 every 3 years Level 3 every 10 years
Way	Level 1 every 5 years	Level 1 every 3 years Level 2 every 6 years
Snow	Level 1 annually Level 2 every 5 years	Level 1 annually Level 2 every 3 years

Maintenance Priority and Frequency for Trails in the Selway-Bitterroot Wilderness

Table 4.13 displays trail maintenance priorities and frequencies for the Selway-Bitterroot Wilderness.

Table 4.13: System Trail Maintenance Priority And Frequency for the Selway-Bitterroot Wilderness

Management Area	Complete Log Clearing	Partial Log Clearing	Drainage Work	Woody Vegetation Removal	Tread Work
Opportunity Class 1	N/A	N/A	N/A	N/A	N/A
Opportunity Class 2	None	Priority 3, on a 3 to 5 year cycle	Priority 1, on a 3 to 5 year cycle	Priority 4, on a 5 year cycle	Priority 2, as needed
Opportunity Class 3	Priority 2, annually	Priority 1	Priority 1, annually or as needed	Priority 3, on a 3 to 5 year cycle	Priority 2, annually
Opportunity Class 4	Priority 2, annually or more as necessary	Priority 1, annually or more as necessary	Priority 1, annually or more as necessary	Priority 3, annually or more as necessary	Priority 2, annually or more as necessary

TRAILHEADS

At twenty-two trailhead sites in the assessment area, signs and bulletin boards provide visitor information and an opportunity for visitor registration, and restrooms and horse facilities are available. Most signs were constructed and placed starting in the 1930s and later improved. Trailheads are maintained every two years and when repair is necessary, and signs are usually removed in the winter, reconditioned, and replaced.

Those trailheads in more remote areas are difficult to maintain because of snow loads and vandalism. Many are below standards and bulletin board information is not up-to-date. Signs encourage visitors to register, but many do not, and Forest Service personnel are seldom available to systematically collect registration cards at distant trailheads.

At popular trailheads, especially those used by hunters and outfitters, several dispersed campsites exist. Tree stumps, large impacted areas, and fire rings exist, and often there is evidence of constructed corrals or other improvements. Trash, building materials, water lines, and other cache items remain in some abandoned outfitter camps and other dispersed sites near roads. During hunting season, there are reports of crowded parking situations at some trailheads. At other times during the year, parking is not a problem. Work loads do not allow Forest Service personnel to systematically monitor, clean or restore all trailhead sites.

A research project on the Bitterroot National Forest in 1993 queried visitors as they exited at trailheads. The information gathered suggests that messages presented on trailhead bulletin boards might not be an effective tool to educate and inform visitors. Visitors usually do not have an opportunity to speak with agency personnel before departure on trails because no formal registration or permit system is in place. More information is needed to determine how best to communicate critical information to recreationists.

AIRFIELDS

In 1931, the Forest Service built the first airstrip at Moose Creek, and in 1933 and 1934 built another on land purchased from Phil Shearer. Airstrips were also constructed at Moose Ranches, Trout Creek, North Star, Running Creek, Selway Lodge and Seminole Ranch, all private inholdings. Except for Moose Ranches and Trout Creek, all are in use today. Private and public use of aircraft predated the primitive area classification in 1936. Therefore, the Wilderness Act of 1964 made exceptions for backcountry airstrips and allowed their continued use. The Forest Service does not regulate private airfields and air traffic on national forest and wilderness lands, but basic FAA (Federal Aviation Administration) regulations apply.

The Wilderness Act provides for administrative (general management, fire, emergencies, other agencies), commercial (outfitters), and private use of public airstrips within wilderness, subject to restrictions and regulations. According to the 1992 *Selway-Bitterroot Wilderness General Management Direction*, federal airfields in the wilderness portion of the assessment area are to function as internal portals for users pursuing wilderness-dependent activities. The *General Management Direction* further states the following in relation to wilderness airfield management:

> Administrative access to wilderness will be managed by the minimum tool principle. Pack stock and foot travel will be preferred. Private use will be managed to discourage short-term visits and proficiency landings. No specific standard will be assigned for length of stay; rather, when total users exceed acceptable levels, management methods will be imposed to reduce use that is not wilderness dependent. Existing proportions of use by commercial, private, and administrative landings will be used as a standard. These proportions will be based on four years of data from each airfield. Levels of use will be monitored to avoid further erosion of wilderness values. The impact of flights on other users will be stressed rather than the number. (p. 0-2)

Data is available for Moose Creek landings, but monitoring at Shearer has been discontinued due to lack of funds. Maintenance facilities may be provided at federal fields to meet safety standards but with the least possible departure from natural conditions. Airfield conditions will be monitored by photo points and transects and will not be permitted to worsen, but may be improved from the current level (*Selway-Bitterroot Wilderness General Management Direction*, 1992).

Records available since 1975 show that airstrip use at Moose Creek has decreased. Weather conditions, the presence of smoke, and fire suppression activity significantly affect airstrip activity erratically influence flight data. This is reflected in the records for landings at Moose Creek since 1975. There has been some inconsistency in definition of administrative and commercial flights and in numbers of days per season that flights were recorded during the period of record; and data for 1996 and 1997 are not included. Trends can be determined from the available flight monitoring data, however. Until 1981, total flights averaged about 750 per field season (April through October). From 1981 through 1988, total flights averaged about 980 per field season.

Since 1989, flights have averaged about 564 per field season. Private aircraft use now accounts for the highest percentage of use (increased from as low as 36 percent to about 80 percent of total use), and is returning to use levels of the 1980s. Outfitter use decreased sharply after 1991 (from as high as 37 percent of total use to 11 percent), and administrative use declined most significantly (from a high of 24 percent to one percent of the total landings). The balance of use consists of other administrative uses, such as fire suppression and use by other agencies.

Available landing data indicate that although total numbers of flights at Moose Creek have decreased since 1975, average private use is increasing while administrative use decreases. Airstrip use by outfitters fluctuates as the number of outfitters who operate in the area changes.

No data are available for use at Shearer Airfield. General condition of the airstrip, overflights observed at Moose Creek, and observations by visitors at Shearer indicate that use is increasing and conditions deteriorating.

The Forest Service Region 1 Air Center in Missoula sends inspectors to Moose Creek and Shearer annually to make observations and recommendations for maintenance and use.

BRIDGES

Due to the topography of much of the assessment area, consisting of narrow canyons and steep slopes, bridges are an important component of the trail and road systems in the Selway and Middle Fork Clearwater subbasins. Bridges are used on all major transportation systems, including state, county, and Forest Service systems. Their maintenance is an important component of the management of these systems. Without these bridges much of the existing transportation system would be unusable, and use patterns would be dramatically altered. Table 4.14 provides an overview of the bridges spanning the main rivers. Additional bridges occur on state, county, and Forest Service systems crossing smaller waterways.

Table 4.14: Bridges Spanning the Major Waterways of the Selway and Middle Fork Clearwater Subbasins

System	Location	River	Bridge Type
State Highway	Kooskia, Highway 13	Middle Fork Clearwater	Steel Truss
County Road	Kooskia	Middle Fork Clearwater	Steel Truss
Private Road	Syringa	Middle Fork Clearwater	Suspension
Private Road	Various from Kooskia to Syringa	Middle Fork Clearwater	Tramways
County Road	Lochsa mouth, Road 223	Lochsa	Steel Girder
Forest Service Road	Swiftwater Creek, Road 470	Selway	Steel Truss
Forest Service Road	O’Hara Creek, Road 651	Selway	Steel Girder
Forest Service Road	Selway Falls, Road 443	Selway	Steel Truss
Forest Service Road	Magruder Crossing, Road 468	Selway	Steel Girder
Forest Service Trail	Moose Creek, Trail 437	Selway	Suspension
Forest Service Trail	Selway Lodge, Trail 4	Selway	Suspension

System	Location	River	Bridge Type
Forest Service Trail	Running Creek, Trail 4	Selway	Suspension
Forest Service Trail	Near Fire Creek, Trail 3	Selway	Steel Girder
Forest Service Trail	Magruder, Trail 26	Selway	Steel Girder
Forest Service Trail	Wilkerson Creek	Selway	Wood Stringer

Maintenance of trail bridges in the wilderness environment can present difficult management considerations. Often, due to the physical size of bridge materials, coupled with the remote location of these structures, motorized or mechanized support is required to complete needed repairs. This difficult management environment will continue to exist in the future and will continue to need to be addressed on a case-by-case basis. Designs are being evaluated, however, for bridges made from sections small enough to be packed in to a bridge construction site by horses or mules. Current designs allow for spans up to 36 feet in length to be constructed using packable sections. This technology may provide alternatives to using mechanized bridge construction and repair support in at least some locations.

SOCIAL, ECONOMIC, AND DEMOGRAPHIC CONDITIONS

STAKEHOLDERS IN THE SUBBASINS

Stakeholders in the Selway and Middle Fork Clearwater subbasins are those who have a share or interest in what happens in the subbasins. Stakeholders are the people who live in or near the subbasins (or who live elsewhere) and use the subbasins for various purposes --- commercial, recreational, and spiritual.

People who live within the area are few. The small, unincorporated communities of Lowell and Syringa are the only concentrations of human population (30 to 40 persons each) within the boundaries of the Selway and Middle Fork Clearwater subbasin assessment area. However, the residents and towns situated within 5 to 20 miles from the subbasins hold major historic, economic, spiritual, and recreational connections with those lands and rivers. Grangeville, Kooskia, and Elk City (Idaho County) are portals in Idaho. Darby and Hamilton (Ravalli County) are portals to the assessment area in Montana.

PURPOSE AND OBJECTIVES OF THE SOCIAL ASSESSMENT

PURPOSE

The objective of this social assessment is to learn how and why people's values, beliefs, needs, wants, sense of place, lifestyles, and use, in terms of national forest lands, are changing. It provides insight into public perceptions of the dynamics of national forest management. Primary social assessment goals are as follows:

- Recognize stakeholders' needs and demonstrate to the public that the Forest Service is sensitive to opinions and perceptions.
- Highlight places of special stakeholder interest.
- Characterize the overall social setting.
- Identify trends.
- Provide information to enable the Forest Service to understand and address issues in order to improve credibility and trust.

- Investigate the ways people prefer to be involved.
- Ascertain ties to the land, emotions evoked and values that led to perceptions.
- Provide information that will be useful across the board for specialists and managers.

Traditionally, the Forest Service has provided strong technical solutions to natural resource problems. To develop an improved conceptual approach to manage change in park and wilderness areas, the University of Washington College of Forest Resources, the National Park Service and the USDA Forest Service convened an Ecosystem Management Workshop in 1987. A perception that repeatedly surfaced at the workshop was that participants with biological expertise tended to under-appreciate the role that people play in defining both the problems and solutions for park and wilderness issues. People are both managers and components of park and wilderness ecosystems. The biocentric orientation dissipated as the workshop progressed (Johnson and Agee, 1988.)

OBJECTIVES

The social assessments can better equip Forest Service managers to address changing social, economic and biophysical conditions. A social assessment can help managers address issues and promote collaboration with the public as the Forest Service prepares to revise the forest plan.

The social assessment document can gather information and describe:

- The social and economic environment
- Public wants, needs, desires, and values
- Public perceptions about Forest Serve land management

The social assessment results can help managers understand:

- How social conditions are linked to, affect, and are affected by natural resource conditions
- What social changes and effects are likely to result from resource management actions and changing resource conditions

The social assessment can provide:

- Criteria to evaluate risks and tradeoffs
- Criteria for decision-making, and
- A method to incorporate people’s needs, wants and desires into ecosystem management.

METHODOLOGY

This social assessment is based on an ethnographic interview methodology. Ethnographic interview methods were used to collect qualitative data using an interview protocol that was administered to a targeted sample of individuals within, and who visit the study area of the Selway and Middle Fork Clearwater subbasins. This approach is built around the idea that the way of life of a people and how they evaluate their world are facts to be discovered, not assumed. It is significant that an ethnographic study is used to develop a description and analysis of events from the point of view of the persons within a social setting being studied.

This methodology should not be confused with a survey, whose purpose is to produce statistical information about attitudes and opinions or demographics. Ethnography is about how and why people invest meaning in the ideas they have. An important difference between survey and ethnographic methods is that a survey provides the categories of response for the subjects and an ethnographic interview asks the subjects for the categories and their meanings. Qualitative data, not quantitative data were collected. Neither method is inherently more scientific or preferable. Ethnographic methods are a valid and useful approach (Bernard, 1988).

APPROACH FOR DATA COLLECTION

"There are more avenues to reach people than ever before, but there's no substitute for face-to-face communication." --- Andrew Gilman, Com-Core Consulting Group, Washington, D.C.

Opinion leaders (persons knowledgeable about their community and natural resource issues within the assessment area) were selected by mailing a question form to all persons and groups on the Nez Perce, Bitterroot, and Clearwater National Forest mailing lists. Approximately 80 people responded, indicating they would participate in a public meeting, by phone, or by talking to someone face-to-face. That list of 80 people, categorized according to interest groups, was presented to the Selway assessment core team, and each core team member selected 30 names. Those selections were tallied and a list of the most frequently selected 50 people was established to contact for interviews. When three or more people from the original list suggested other contacts, appointments were made for discussions with those people, as well. Usually, the discussions lasted between 45 minutes to 2 hours. A total of 60 people were interviewed by one Forest Service representative from February through April of 1999 (see Appendix N for a table of names, interest groups, and geographic areas). The following questions were used to open the discussions:

- With what areas of the Selway and Middle Fork Clearwater subbasins are you familiar?
- What activities do you do there?
- Where is the place you most like to go? Why is it a special place?
- What have you seen change (on the ground or in management)?
- What would you like to see changed?
- How would you manage the area?

Following are two summarizations of how people relate to the land within the Selway and Middle Fork Clearwater subbasins. First, communities of place: the history, socioeconomic, and cultural factors of the communities of Kooskia, Grangeville, Elk City, Lowell, Syringa, Hamilton, and Darby.

Next, interest groups: the discussions with opinion leaders from a variety of interest groups. This section reflects the relationships that members of certain interest groups have with the land in the study area, their concerns, and their perceptions of Forest Service management. A more detailed summary of responses from various interest groups is found in Appendix N.

COMMUNITIES OF PLACE

IDAHO AND RAVALLI COUNTIES

Idaho County, Idaho and Ravalli County, Montana have experienced dramatic social and economic changes since settlement in the late 1800s. Those communities most directly tied to the Selway and Middle Fork Clearwater subbasins, which include Kooskia, Grangeville, and Elk City in Idaho and Darby, Hamilton and Victor in the Bitterroot Valley of Montana, share a common history and evolution in response to changes in land use and management. All emerged as the westward movement of men and women flooded the area in search of gold. Populations waxed and waned with exhausted supplies then new discoveries of precious minerals. Lumber was first cut to support mining operations. By the 1900s, railroads carried trading goods and supplies, lumber, livestock and flour to and from these communities whose success became tied to agriculture. Relatively few hardy people populated a vast land base and most shared uncomplicated common values that were tied to resource extraction. It was a new and difficult concept for the native Nez Perce people who occupied the basin when the influx of settlers arrived.

FOREST SERVICE ROLE

The U.S. Forest Service came to own the largest percentage of the land and played a dominant role in the harvest and growth of timber. The post WWII housing boom encouraged a dramatic increase in logging. Timber harvest in the national forests was right up to the allowable cut figure that jumped from 12.5 million board feet in 1957 to 63 million bf in 1966 on the Bitterroot National Forest. The Forest Service was guided primarily by the principle of sustainable yield; clearcut, terrace and plant. Six miles of road per square mile were built in order to get the cut out. Jobs related to timber were abundant and usually lucrative.

Interest groups were basic and few. The lumberjack heritage remains a part of each community. Small towns offered a sense of place for ranchers and farmers tied to land. Outfitters and guides catered to tourists who sought to hunt and fish in remote lands that teemed with elk and trout. The Forest Service was a major player in the social history of the Selway and Middle Fork Clearwater subbasins and also greatly influenced economic health. Few laws governed the use of natural resources.

NATURAL RESOURCES AND VALUES

Those who made a living from natural resources in the twentieth century found those resources to be generous, but not boundless, and their exploitation had consequences they hadn't anticipated. Large segments of the public began to recognize the rate of logging and some Forest Service practices threatened forest esthetics, wildlife, clear water, and other values. National attention was drawn to large acreages of underdeveloped land and clean, clear, free-flowing streams were viewed as national assets. People who lived outside the area began to exert influence over "their public lands". Local conservation-minded citizens took a stand. Idaho's Senator Frank Church led congressional hearings that focused on Forest Service management. The Forest Service responded and promised to reduce clearcuts and mileage for new roads and hired landscape architects to design cutting units with less visual impacts. The Forest Service expanded its management to include more than timber sales and acknowledged that public involvement was critical in its decision-making. Well-organized conservation groups pressured congress and local entities, while timber industry groups formed and campaigned to defend cutting.

ECONOMICS

Change was inevitable. The wealth of once-profitable mines "dried up"; land use focus withdrew from timber harvest; population increase and immigration from populated areas in the east and on the coasts caused the vast land base to shrink; development grew along the rivers and in small communities; demand for recreation in a unique setting flourished. Those few, basic values and lifestyles associated with extraction of resources --- hard work, honed specialized skills, rugged individualism, independence and a strong sense of freedom --- characterized the citizens of the Selway and Middle Fork Clearwater subbasins before the mid-1900s.

Today, values, lifestyles, and beliefs are much more complicated. The natural resources of the subbasins are also valued for breathtaking scenery, pristine rivers, perpetuation of natural ecological processes, wilderness experiences and other diverse recreational experiences. There are also emerging economic lifestyles and those who seek to prosper from real estate, tourism, businesses, service industries, manufacturing, and trade. Since the mid 1900s, many laws have been in effect that govern use of the subbasin area. Conflicts and questions abound when the realm of values, beliefs and lifestyles are so diverse. The challenge to Forest Service management increases proportionally to a wider array of interest groups. See Appendix O for demographic and economic information.

INTEREST GROUPS

Stakeholders in the Selway and Middle Fork Clearwater subbasins have varied interests and attachments to the rugged, forested lands. Evidence of the departure from historically few numbers of interest groups is the wide diversity of the nineteen groups identified for this assessment. These groups are:

- Interest in timber harvest
- Business owners
- Elected officials
- Local residents
- Interest in motorized recreation
- Interest in non-motorized recreation and backcountry hiking
- Riders and pack stock users
- Interest in water recreation
- Interest in hunting, fishing and camping
- Members of environmental groups
- Historians and long-time residents
- Outfitters and guides
- Interest in wilderness attributes
- Interest in preserving cultural and archaeological sites
- Pilots
- Citizens with private inholdings
- Former US Forest Service administrators and staff
- Selway Assessment core team members
- Nez Perce tribal members

Two to five people from each group (many interviewees represent more than one interest group) were interviewed and asked to discuss the following items:

- Values, beliefs, attachments, and lifestyles
- Perceptions of Forest Service management
- Concerns about the present and future

A sample of more specific comments and concerns of those individuals interviewed from each of the 19 groups is included in Appendix N. Comments are generally paraphrased and quoted where indicated. The opinions and comments of those opinion leaders interviewed do not necessarily represent the entire population of those non-interviewed citizens who might also fit into the category. A brief summary of all responses from all categories is shown below.

VALUES, BELIEFS AND LIFESTYLES

The opinion leaders expressed a wide range of ideas on values, beliefs, and lifestyles, both within and between user group categories. The statements below summarize some of the ideas expressed by opinion leaders during interviews (see Appendix N for more details).

- The value of the landscape and its resources is important.
- The traditional attributes of self-reliance and independence are valued.
- Excessive government regulation is sometimes considered a threat to traditional lifestyles.
- An outdoor lifestyle related to work and to recreation is important.
- Rural lifestyles provide security, freedom from the stress associated with metropolitan lifestyles, and community support.

- Special interest groups have organized in response to specific issues. Conflict sometimes causes polarization among groups. Long-time residents act through their connections with one another and newcomers tend to act through formal organizations.

PERCEPTIONS OF USFS MANAGEMENT

The 60 opinion leaders interviewed generated the following management issues. They are reported in order of frequency mentioned. The comments are usually paraphrased, sometimes quoted as indicated, and other narrative interpretations are added. See Appendix N for specific responses by various user group categories.

The Forest Service has been an integral part of the social and economic structure of Idaho and Ravalli counties since the early 1900s. It has profoundly affected the economic health of and manages the major portion of land in the Selway and Middle Fork Clearwater subbasins. There are strong sentiments about the agency among residents who hold diverse values. Opinion leaders discussed: (1) The effectiveness of the agency as a manager; (2) the competency of leadership; (3) the involvement of the Forest Service in communities; and (4) public trust.

Effectiveness as Forest Managers

Many expressed frustration with Forest Service planning and studies and the observation that many agency employees spend a lot of time in meetings, in front of computers, and driving green rigs up and down the highway rather than working on the ground. Some have been part of citizen task force groups and feel that much time was spent in planning and little in implementation. They feel their efforts and the tax payers' money is wasted. There is a general lack of understanding about the work requirements of the Forest Service and the legal restraints that the agency works within.

These perceptions suggest the public needs more information and involvement in Forest Service activities to understand how groups and individuals have often "tied the hands" of local managers.

Consistency of management policy is considered a problem, because the public does not know what to expect when administrations change. Experience has taught the public that every time a district ranger position changes, policy changes as well. Funds are wasted because of lack of institutional memory, and much work has to be started over and new studies done. Several felt that personnel, especially leaders, were promoted and moved on before they were ready. Such a rapid climb up the career ladder did not give agency employees enough time to get to know the ground or the public.

Competency of Forest Service Leadership

Most opinion leaders feel that leadership competency is directly tied to knowledge of the land base and of the public it serves. As described above, rotating personnel makes knowledge of the land more difficult. There is some concern that university degrees are not a substitute for "common sense" and that leaders do not tap the knowledge and resources of long-time residents who "know the land." Several former FS employees think the qualification standards for leadership positions are lower than in the past. They see the agency as "going downhill."

Those individuals were associated with the agency from 5 to 20 years ago and are not always familiar with the complex issues and challenges that leadership currently faces.

A former administrator recognized that the "mood of the Forest Service is changing, that rangers are expected to be figureheads, to attend meetings where they meet the public, and to be active in the political community." He feels that is just as important a role as being on the ground; but ideally, leaders could do both.

Forest Service Involvement in Communities

Those who have lived in the area for most of their lives remember how the Forest Service personnel used to be more obvious members of the community; they stopped by for a cup of coffee or attended social events. There is sentiment that Forest Service people keep to themselves, in their own cliques, separated from the their neighbors without investing in "social capital." They understand that personnel who do not remain in one position for more than two to three years cannot develop strong community ties. While many individual agency employees are involved in community activities, they do not seem to get personally and socially involved with other citizens. When the district or forest supervisor's office gets involved in community activities it seems impersonal or "political."

These perceptions, which may be different than actual involvement, warrant further consideration by the agency. There are contradictions, however, because local people expect and depend upon the Forest Service to respond to fire and to emergency situations.

Public Trust

While some individuals within the Forest Service are perceived to be trustworthy, mistrust increases in proportion to levels of agency management. It is understood that when new personnel are named to management positions, policy will probably be revised. "One ranger tells us one thing; the next one comes along and changes it." Another comment is that "often the Forest Service makes a deal to satisfy everyone, and then changes it later on." A very common complaint is: the Forest Service asks for public comment, then ignores it.

When the agency attempts to compromise the interests of diverse groups, those whose agenda is not satisfactorily fulfilled interpret it as inequity or disregard.

CONCERNS ABOUT THE PRESENT AND THE FUTURE

The opinion leaders interviewed generated the following resource management issues. The issues are compiled in order of frequency mentioned and include: (1) wilderness, (2) access, (3) biodiversity, and (4) special uses. The comments are usually paraphrased, sometimes quoted as indicated, and other narrative interpretations are added. See Appendix N for specific responses by various user group categories.

Wilderness

Designated wilderness is the subject most often mentioned among interviewees. The Selway-Bitterroot (SBW) and Frank Church-River of No Return (FCRONRW) Wilderness areas are considered by some interviewees to be both "unique" and "special for being so rugged, remote and vast," and also a "treasure unlike any other area." Several interviewees spoke very emotionally as they described their attachment to "special places." Various opinion leaders were directly involved with the composition and implementation of the Wilderness Act of 1964, and they are concerned about departures from the original intent of that legislation. Others were part of a citizens' task group (1987-1992) that assisted agency management in developing standards and limits of acceptable change for the Selway-Bitterroot Wilderness. Many voice strong feelings about reinstating that group; saying that it had vision and that it was the cohesive force that gave direction to wilderness management. "Implementation of the LAC [limits of acceptable change] process is important to ensure that degradation of wilderness does not occur; that Wilderness remains to provide for 'a primitive and unconfined type of recreation that contains ecological, geological or other features of scientific, educational, scenic or historical value' [as stated in the Wilderness Act of 1964]." Several fear that the wilderness is being compromised and that the Wilderness Act is being interpreted to fit political needs.

Some consider fragmentation in management (two forests and six districts on the SBW) a disadvantage. Most feel that wilderness needs strong leadership and an identity separate from recreation. They support appointing a SBW and FCRONRW coordinator as well as a director at the national level as a solution to "saving wilderness."

Historical resources are embroiled in the biocentric and anthropocentric discussions of wilderness philosophy. While some opinion leaders advocate obliteration of all human-built structures in the wilderness (one stating that "the ultimate historical site IS wilderness"), others believe that human beings and their history there are an integral part of the land. "We cannot take the human factor out of wilderness. It is our heritage, and we don't recognize that."

Aviation use within the wilderness is a contradiction for some who hike or ride into the backcountry. There is often misunderstanding about how airplanes are allowed in an area where bicycles and other mechanical means of transport are not permitted. The aviation community adamantly defends their use of Moose Creek and Shearer airstrips, opposes airfield restrictions, and supports maintaining a camping area near Moose Creek. Many pilots believe that flying allows for their personal "wilderness experience," and that diverse airstrip conditions offered by the several backcountry fields provide levels of wilderness expectations much as opportunity classes do for hikers or horse riders. Some wilderness visitors feel that aircraft noise is excessive and intrusive, especially at Moose Creek.

Access

The use of roads and trails in the assessment area is an important concern of many opinion leaders. While some think they are being "shut out" of public lands, just as many think that public lands are too accessible and that a permit system should be in place. The area is extremely important to stakeholders for hunting, fishing, and other recreation, but they also value the natural beauty, scenic quality, and rural lifestyle. Stakeholders seem to be more concerned about the health of the land than in the past, and are willing to sacrifice some freedom of access. Most agree that trail maintenance needs improvement, and note that the mileage of usable system trails has significantly decreased. Traditional use that took pack strings and long-distance hikers into the heart of the backcountry is diminishing. A frequent hiker has noticed that about 75 percent of the people he met on the trails were day hikers and that most trail and campsite use is on the fringes of the backcountry, within the first five miles of the trail system. As off-highway vehicle (OHV) use has been observed to be increasing at a rapid rate, opinion leaders express concern about how motorized use will be managed. OHV interest groups feel they are sometimes discriminated against, and believe that more miles of trail should be available for their use. Although there are sometimes conflicts between some user groups, most agree that trails should remain open for everyone. For most interest groups other than hikers, the availability of trails is more important than the issue of who is allowed to use them. Some recreationists feel that impacts by stock use are the most significant and lasting. Horse riders feel that if more trails were maintained and available for use, trail and campsite use could be dispersed and result in less resource damage.

Although 72 percent of the assessment area is wilderness or roadless, the forest road system is an important issue for many interviewees. These interviews took place before the "roadless policy" was announced in 2000; therefore, concerns surrounding that decision are not included. How and where road obliteration takes place is a concern. Most interviewees do not understand exactly how road obliteration decisions are made and how road-related erosion problems are addressed. There are considerable opportunities to educate and inform the public about roads issues.

Biodiversity

Nearly all stakeholders are seriously concerned about the spread of noxious weeds and feel the situation is out of control. People see weeds along the wild and scenic river corridors, along almost every trail, deep within the wilderness, and in meadows where wildlife formerly grazed on native grasses and forbs. The consensus is that aggressive action should be taken, but that the

Forest Service hesitates to respond. It is difficult to understand the complex biological issues associated with weed treatment on public lands.

Protection of the biodiversity of small populations of rare species is very important. One person suggests that "zoning" lands for their best uses would be a good approach to protection of diversity. The subbasins' unique stronghold for native fish species is highly valued. Most interviewees agree that introduced non-native species should be dealt with, but do not consider eliminating recreational fishing opportunities in high mountain lakes and streams an option. They see a solution in stocking with native species. Some regard indicators such as long-toed salamanders and spotted frogs as insignificant "slimy little reptiles." People are concerned about protecting and recovering salmon and other species, but usually do not consider how that applies to maintaining genetic integrity.

The reintroduction of grizzly bears and wolves presents other concerns. Hunters consider grizzlies and wolves a threat to elk and deer populations that they feel already suffer from the pressures of other predators and habitat loss. Many feel that the grizzly bear is dangerous to recreatonists and threatens the safety of local residents and domestic animals. Others explain that the grizzly bear is a natural part of the area ecosystem and feel that "we'll just have to get used to them and start changing our ways now."

Fire remains a controversial issue. Most stakeholders understand that fire is necessary for forest health and to minimize threats of overly severe fire events, but object to fire when it is in close proximity to their property, when it "blackens the landscape and ruins the scenery," and when it "pollutes" the air.

Special Uses

Outfitters and Guides: The Idaho Outfitters and Guides Association regulations are considered to be demanding and more restrictive than those of other states, according to outfitters who operate in the assessment area. While some outfitters feel that they are discriminated against and treated differently from the public, several opinion leaders consider outfitters to be enjoying special privileges and to be very possessive of their areas. Some individuals say that outfitter activity drives agency management decisions.

Timber: Timber harvest has traditionally been the fabric of the local economy. Most opinion leaders' lives have been either directly or indirectly influenced by logging. Those who discussed timber during the interviews all agree that there are areas where logging could and should be done, but that it should be done with discretion. Within that same group, there was no mention during the interviews of the ecological implications of timber harvest except for its role in creating habitat for the declining elk population. Stakeholders are especially sensitive to limiting visual disturbance, particularly in popular visitor areas along highways and river corridors.

Private Inholdings: Of the several homesteads established in the assessment area in the mid-1900s, four private inholdings remain within wilderness boundaries. There is much speculation about subdivision and development of those lands. Wilderness advocates fear that owners not under the jurisdiction of scenic easements will take advantage of commercial development on those unique "last great places." Today's landowners visit their wilderness homes a few weeks or months out of the year, and generally have strong feelings about the rights they enjoy as private property owners.

Individuals With Alternative Viewpoints: Some stakeholders who have hiked, ridden, or driven through the forests over the years explain how they are meeting up with some unusual "folks in the woods these days." In the past it was not a concern, but today, they feel uncomfortable about, and sometimes threatened by, some individuals they encounter. One hiker met three different "eccentric people" who told him they wanted to give up their life-style in civilization and that they had come to "live in the woods."

SOCIO-ECONOMIC CONDITIONS

IDAHO COUNTY

The Selway and Middle Fork Clearwater subbasin assessment area is within Idaho County, the largest and nineteenth most populous county in the state of Idaho. Idaho County has a population density of 1.8 persons per square mile, and 83 percent of the land in the county is federally owned. Population growth has been erratic over a thirty-year period, showing sharp declines in the early 1980s, but steadily growing at an average rate of about 2 percent (Regional Economic Information System, 1998).

The average annual growth rate of per capita personal income (PCPI) was 4.5 percent in 1996, lower that the state of Idaho's, but about the national average. Idaho County had a PCPI of $15,693. Earnings of persons employed in Idaho County increased 4.6 percent. The largest industries in 1996 were: durable goods manufacturing, 20% of earnings; state and local government, 14.8 percent; and services, 14.8 percent. Timber industry employment was 11.25 percent of the county total and 27.32 percent of total county industry output. Employment associated with grazing and minerals was minimal. Over the past 30 years, government employment has been largest, followed by manufacturing (timber-related and other), which fell to an all-time low in 1982 and has been fluctuating in an upward trend since. The service industry has grown to surpass farming, manufacturing and retail trade (Bear Facts-Regional Information System, Bureau of Economic Analysis, 1998; Implan Model Year Data, 1996). Appendix O provides more information.

RAVALLI COUNTY

Ravalli County, Montana borders the assessment area on the east at the crest of the Bitterroot Mountains. In the past, before wilderness designation, the lands within the assessment area were important for timber and for grazing, and for Forest Service operations based from communities in the Bitterroot Valley. After 1964, the year of the Wilderness Act, those communities evolved into bases for recreational use. Services, retail trade, and durable goods manufacturing account for current economic earnings. Population growth is increasing at a considerable rate. People are attracted to the Bitterroot Valley, seeking the quality of life that the scenic, rural area offers. Long-time local residents feel that their traditional lifestyle is threatened, that the once quiet beauty of the valley is changing, and that the area is taking on the appearance of suburbia.

Much of the recreational use of the assessment area originates in the canyons along the Bitterroot Divide. Roads reach trailheads and popular campsites where large numbers of visitors enjoy motorized recreation use, hiking, riding, and rock climbing. Some local citizens are concerned that the significantly increasing use threatens special places.

OTHER ASSOCIATED COMMUNITIES

Residents of Missoula, Montana enjoy recreation in the assessment area. Substantial numbers of university students and staff visit the Selway and Middle Fork Clearwater subbasins. In addition to the University of Montana, centers for scientific research and education are located in Missoula. Research and planning activities associated with wilderness studies, fire ecology and operations, and environmental organizations originate in Missoula.

The University of Idaho at Moscow has similar ties to this land base. In addition to being a favored recreation site, it is a living research laboratory. Students in forestry, biological sciences, and recreation often serve apprenticeships in the assessment area.

SUMMARY OF SOCIO-ECONOMIC CONDITIONS

The population and economic changes in the assessment area will influence a response to natural resources issues. The following statements are based on information from these sources: U.S. Census Bureau data; Idaho County 1996 Implan Model Year Data; the Economic Assistance

System: Idaho County; and the REIS CD-ROM, U.S. Department of Commerce (see Appendix O).

- The population of Idaho County declined from the 1980s to the 1990s and began a steady increase thereafter. Estimates of current population change (1990-1999) indicate a 9.2 percent increase.
- Population composition is changing as new residents are in-migrating and high school graduates are out-migrating. More of the total population is older.
- The number of housing units has increased, and the number of persons per household has decreased. The number of people involved in agriculture employment or farm ownership has declined. Land is being taken out of agricultural production and put into subdivisions and development. Real estate value has increased.
- Logging and the production of wood products is a significant economic contribution to the communities, however, employment opportunities in the timber industry are declining. Small, private business ownership has increased.
- Economic diversity is important to community resiliency. Employment in service industries continues to increase. Recreation and tourism is a potential source of economic growth.
- Hunting (outfitting and guiding), firewood cutting, and gathering (berries, weaving materials) are economically significant.
- Forest Service employment is a major contribution to the economy. Summer seasonal employment is an important source of jobs.

ASSESSMENT OF HISTORIC AND CURRENT ECOLOGICAL CONDITIONS AND PROCESSES

CLIMATE, AIR QUALITY, GEOLOGY, AND SOILS

CLIMATE

The following discussion of the climate of the Selway-Bitterroot Wilderness is taken from a USDA publication, *Weather and Climate of the Selway-Bitterroot Wilderness* (Finklin, 1983). The general climate of the Selway and Middle Fork Clearwater subbasins is transitional between a north-Pacific maritime climate and a continental climate. The maritime influence is noted particularly by the autumn and winter peak in cloudiness and precipitation over most of the area, although the influence of the maritime climate decreases gradually west and south of Moose Creek Ranger District. July and August are normally the clearest and driest times of the year. January is usually the wettest month, with precipitation ranging from 3 to 10 inches. May and June are spring and early summer high precipitation months, and based on the years 1940 to 1970, monthly averages lie between 0.8 inches at lower elevations to 10.0 at higher elevations.

Precipitation

Precipitation on the Selway River near the Fenn Ranger Station is 38.64 inches annually at an elevation of 1,550 feet, as shown below on Table 4.15. This is the westernmost boundary of the Selway subbasin, close to the mouth of the Selway River. Precipitation at Kooskia for the same period of record shows an annual precipitation of 24.84 inches at an elevation of 1,300 feet. The precipitation and snowfall record at Kooskia is representative of the dryer breakland canyons and low elevation valleys on the lower Middle Fork Clearwater River. Nez Perce Camp is representative of the more southern high elevation, lower precipitation areas; it is at an elevation of 6,587 feet with an average annual precipitation of 35.10 inches. Precipitation is as high as 60 to 85 inches in the Bitterroot Mountains on the Selway-Bitterroot Divide. The average annual precipitation of combined rain and snow is 84.5 inches at Lost Horse, which is on the Selway-

Bitterroot Divide. Precipitation at Mountain Meadows at an elevation of 6,360 feet is lower than Lost Horse with an average annual precipitation total of 47.6 inches.

Table 4.15 shows the monthly average precipitation for the years 1961 to 1990, and average annual snowfall in inches for the Fenn Ranger Station on the lower Selway River, and Kooskia, Idaho on the Middle Fork Clearwater River. The monthly average precipitation is shown for Nez Perce Pass, Mountain Meadows, and Lost Lake.

Table 4.15: Monthly Precipitation 1961 to 1990: Fenn Ranger Station; Kooskia*, Idaho; Nez Perce Camp, Montana; Mountain Meadows, Idaho; and Lost Lakes, Idaho

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Annual
Fenn RS Av. Total Precip. (in.)	4.96	3.46	3.79	3.62	3.42	3.03	1.08	1.52	2.33	2.93	4.20	4.32	38.64
Av. Total Snowfall (in.)	20.2	9.7	2.9	0.3	0.0	0.0	0.0	0.0	0.0	0.3	6.0	16.4	55.90
Kooskia, ID Av. Total Precip. (in.)	2.15	1.50	2.40	2.67	2.84	2.46	1.04	1.37	1.84	2.13	2.43	2.13	24.84
Av. Total Snowfall (in.)	4.5	1.5	.0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	2.0	4.3	13.10
Nez Perce Camp, MT Av. Total Precip. (in.)	5.10	3.70	3.50	2.90	3.00	2.20	1.30	1.40	1.70	2.10	3.80	4.40	35.10
Mountain Meadows, ID Av. Total Precip (in.)	6.6	5.0	5.0	3.4	3.5	3.6	1.2	1.4	2.4	3.1	5.9	6.5	47.6
Lost Lakes, ID Av. Total Precip. (in.)	12.6	9.3	8.9	6.8	6.3	5.5	1.7	2.1	3.8	5.1	10.5	11.9	84.5

*Kooskia data from 1961 to 1987

Summertime precipitation accumulation can vary considerably between years, as a comparison of data from the Moose Creek Ranger Station for combined July to August totals demonstrates. The combined total for July to August 1969 was 0.28 inches, compared to 1975, which showed a total of 6.29 inches. The probability of various rainfall amounts is well correlated with the average rainfall. At Moose Creek Ranger Station, chances of 0.10 or more inches of rain falling in 24 hours decrease from 23 percent in much of June, to seven percent in July to mid-August, and back to 20 percent again in mid-September.

Lightning (or thunderstorm) activity occurs somewhere within the Selway and Middle Fork Clearwater subbasins on an average of about 19 days during July and August, the peak season. This average of storm days decreases to about four in September. Storms occur on about five days in May and seven days in June. Usually the months of May and June are too moist for a high frequency of fire occurrence. The months of July and August have the highest frequency of fire occurrence due to low moisture plus lightning and thunderstorm activity.

Floods

Floods often occur with winter rain-on-snow events or during high intensity, long duration rainstorms. Large floods have been recorded in the Clearwater and Selway subbasins in the years 1948, 1963, and 1974. Flooding from May 1 to June 1, 1948 was the most severe since 1894 in northern Idaho. The Selway River as measured at Lowell, Idaho showed discharges that were the largest in 60 years of record on May 9, 1948. According to the *Idaho, Floods and Droughts, National Water Summary* (1988-89), floods occurred February 1 to 3, 1963, January 13 to 17, 1974 and in November and December 1995 and 1996. Large precipitation events have occurred in the Selway and Middle Fork Clearwater subbasins, some occurring as rain-on-snow floods and some as high intensity, long duration rainstorms. Precipitation events were recorded in 1919, 1933, 1949, 1968, 1995, and 1996. At the Fenn Ranger Station 9.92 inches of rain fell in January 1995 (*National Water Summary*, 1988-89).

Rain-on-Snow Events: Due to the moist maritime climate affecting the Selway and Middle Fork Clearwater subbasins, rain-on-snow events occur. (Summary of the rain-on-snow process is taken from *Rain-On-Snow in the Columbia River Basin* by Ferguson and others, review draft, 1996). The areas in the Pacific Northwest that are susceptible to rain-on-snow events occur in the Cascade Mountains, and where the warm, moist air flows from the Pacific Ocean into the Columbia Plateau, and up the Snake River Valley to include northern Idaho and northwest Montana. Northern Idaho includes a large part of the Selway and Middle Fork Clearwater subbasins.

Rain-on-snow floods are more likely during cool, wet years. Warm, dry years are less likely to experience rain-on-snow floods. Rain-on-snow events are common where snow is transient in the low elevation zone (below 4,500 feet in the Selway and Middle Fork Clearwater subbasins), and where snow accumulates periodically and can totally melt and accumulate several times a year. Snow accumulation in this zone and rain at high elevations often occur, causing rain-on-snow floods. Most rain-on-snow events occur between late October and February.

Large floods within recorded history on the Selway River occurred in 1933, 1948, 1956, 1964, 1972, 1974, and 1997. The record flood recorded was a 50 to 100-year recurrence flood in 1948; it peaked May 29 at 48,900 cfs. Only one flood on record for the Selway subbasin was considered a rain-on-snow winter flood; it occurred in late fall, 1995. In comparison, winter flood events on the Lochsa River have occurred six times in recorded history. On the South Fork Clearwater River, winter floods have occurred 15 times in recorded history. (For more information on floods and droughts, refer to the hydrology section of this chapter).

Long Duration Rainstorms: Large precipitation events have occurred in the Selway and Middle Fork Clearwater subbasins, some occurring as rain-on-snow floods and some as high intensity, long duration rainstorms. Precipitation events were recorded in 1919, 1933, 1949, 1968, 1995 and 1996. At the Fenn Ranger Station 9.92 inches of rain fell in January 1995 (*National Water Summary*, 1988-89).

Floods often occur with winter rain-on-snow events or during high intensity, long duration rainstorms. Large floods have been recorded in the Clearwater and Selway subbasins in the years 1948, 1963, and 1974. Flooding from May 1 to June 1, 1948 was the most severe since 1894 in northern Idaho. On May 9, 1948 the Selway River as measured at Lowell, Idaho showed discharges that were the largest in 60 years of record. Floods occurred February 1 to 3, 1963, January 13 to 17, 1974 and in November and December 1995 and 1996 *(National Water Summary,* 1988-89).

Temperature

Both elevation and topographic setting influence air temperature. Air temperature is also moderated and affected by the coastal maritime climate that has the strongest effect on the northern and western half of the Selway subbasin and the entire Middle Fork Clearwater subbasin. Moving eastward toward the Montana Bitterroot Mountain Divide, the maritime influence affects temperature less. Along the Selway River near the Fenn Ranger Station, elevation 1,550 feet, the coldest minimum mean monthly temperature is in January at 23 degrees F, and the highest maximum mean monthly temperature is in August at 88.6 degrees F. This is displayed in Table 4.16 below. Large daily ranges occur in the summer between maximum and minimum temperatures in the canyons; the difference averages about 40 degrees F. Daily maximums range as high as 90 degrees F. The daily range decreases to 15 to 20 degrees F in the late autumn and winter months. Because of inversions, July and August minimum temperatures average lower in the canyon bottoms that at elevations 3,000 to 5,000 feet higher.

The mean monthly maximum and minimum temperature (in degrees Fahrenheit) for the Fenn Ranger Station is shown below for the period of record, 1948 to 1998. Total average maximum and minimum mean monthly temperatures are also displayed.

Table 4.16: Monthly Temperatures at Fenn Ranger Station

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Av. Max. Temp. (F)	35.6	42.9	51.0	61.3	70.6	78.2	88.5	88.6	76.5	60.8	44.7	36.8	61.4
Av. Min. Temp. (F)	23.0	26.7	30.3	35.4	41.7	47.6	51.4	50.2	44.3	36.8	30.7	25.7	37.0

Humidity averages 40 to 45 percent during most of May and June at the Moose Creek Ranger Station, dropping to 28 to 30 percent during most of July and through mid-August, and back up to 40 to 60 percent by September to mid-October. Winds blow most frequently from the southwest at the Moose Creek Ranger Station, but north or northwest upriver and to the south. At the higher elevations, away from the canyon influences, winds are tied into larger airflows and are predominately from the west or southwest.

Regional Overview of Climate Change in the Columbia River Basin

The Selway and Middle Fork Clearwater subbasins are located within the Columbia River Basin. Like most areas of the basin, both subbasins have transitional type climates. Moist, maritime air from the west moderates seasonal temperatures and has the largest influence in the winter; continental air from the east and south is dry and cold in winter and hot with convective precipitation and lightning in the summer and has a large effect during fire season; and dry arctic air from the north cools the basin in the winter (Ferguson, 1997).

A USDA/USDI publication, *A Climate-Change Scenario for the Columbia River Basin,* contains a discussion of the results of climatic modeling for the Columbia River Basin. The changes in climate were related to disturbance factors, such as floods, fire and drought.

The resulting climate change scenario shows temperatures at lower elevations may increase throughout the year with the greatest increases in the winter. Increases may be as high as 1 to 3 degrees C. If runoff from snowmelt is reduced, and summer temperatures increase, then the incidence of wildfire would go up.

The climate change scenario suggests that precipitation could increase 20 to 50 percent in the winter and 5 to 35 percent during spring and autumn. A decrease of 0 to 5 percent is expected in the summer. At high elevations, due to higher cloud cover, winter average temperatures could decrease, but lower elevation summer temperatures may increase.

AIR QUALITY

Air Resource Management

Air quality impacts associated with fire use activity is increasing in importance as air quality regulations become more stringent. Smoke, whether from wildland fire or prescribed fire, affects air quality and therefore peoples' health and quality of life. Air quality issues include the direct effects of smoke on visibility, and the potential effects of smoke on human health. It is increasingly apparent that there are tradeoffs between meeting air quality objectives and meeting goals for ecosystem health through prescribed burning (EPA, 1999). Non-industrial smoke is recognized as the primary pollutant of the air in the analysis area. This smoke can be produced locally or can be transported here with the prevailing winds.

Under current rules (state and federal) smoke from wildland fire is considered a natural event and is covered under EPA's Natural Events Policy. Smoke from prescribed fire must meet federal, state, and local air quality regulations. Within the Forest Service's Northern Region, the state smoke management programs, specifically the Montana/Idaho State Airshed Group, are critical in coordinating and minimizing smoke impacts from prescribed fire (Acheson et al., 2000).

Air Quality Regulatory Framework

The Clean Air Act: The framework for controlling air pollutants in the United States is mandated by the 1970 Clean Air Act (CAA), as amended in 1999 and 1990. The CAA was designed to "protect and enhance" air quality. The primary means by which this is to be accomplished is through implementation of National Ambient Air Quality Standards (NAAQS).

The CAA requires measures "to preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreation, scenic, or historic value." Stringent requirements are therefore established for areas designated as "Class I" attainment areas. Class I areas include Forest Service and Fish and Wildlife Service wilderness areas over 5,000 acres that were in existence before August 1977. Designation as a Class I area allows only very small increments of new pollution above already existing air pollution levels. All of the Selway-Bitterroot Wilderness, including that portion in the analysis area, is designated Class I. There are several other Class I airsheds downwind in Montana, such as the Bob Marshall Wilderness Area.

Another requirement of the CAA (as amended) is that new major stationary sources or major modifications of existing stationary sources must first receive a "Prevention of Significant Deterioration" (PSD) permit from the appropriate air regulatory agency before construction or modification of these sources can be accomplished. Montana and Idaho have had the PSD permit program delegated to them by the Environmental Protection Agency (EPA).

PSD permit applicants must demonstrate that the proposed facility will: (1) not violate national or state ambient air quality standards, (2) use Best Available Control Measures, (3) not violate either Class I or II increments for sulfur dioxide, nitrogen oxides, or particulates, and (4) not cause or contribute to an adverse impact on AQRVs in any Class I area (Acheson et al., 2000).

AMBIENT AIR QUALITY STANDARDS

The Environmental Protection Agency has established National Ambient Air Quality Standards (NAAQS) for specific pollutants emitted in significant quantities throughout the country that may be a danger to public health and welfare. These pollutants are called criteria pollutants. The criteria pollutants are carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), ozone, PM10 (particulate matter <10 microns), and PM 2.5.

If a community or area does not meet or "attain" the standards, it becomes a non-attainment area and must demonstrate to the public and the EPA how it will meet standards in the future. This demonstration is done through the State Implementation Plan. Non-attainment areas for Idaho and Montana are displayed in Figures 4.3 and 4.4.

Air quality in the Selway and Middle Fork Clearwater subbasins is generally considered good to excellent most of the year. Local adverse effects result from native-surfaced roads, sporadic debris, field burning by local landowners, heating homes, and occasional wildland and prescribed fires.

Figure 4.3: Idaho Air Quality Nonattainment and Class 1 Areas

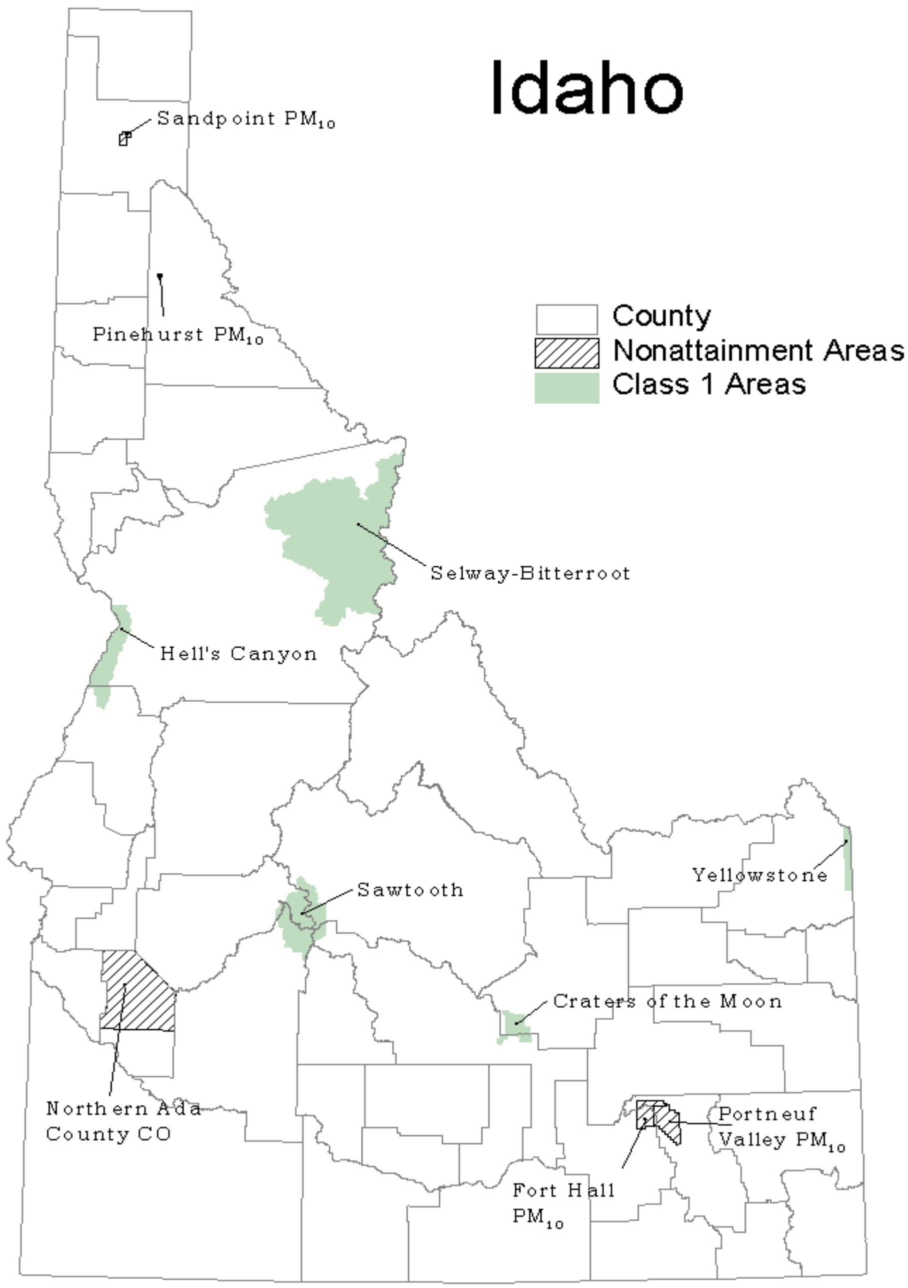
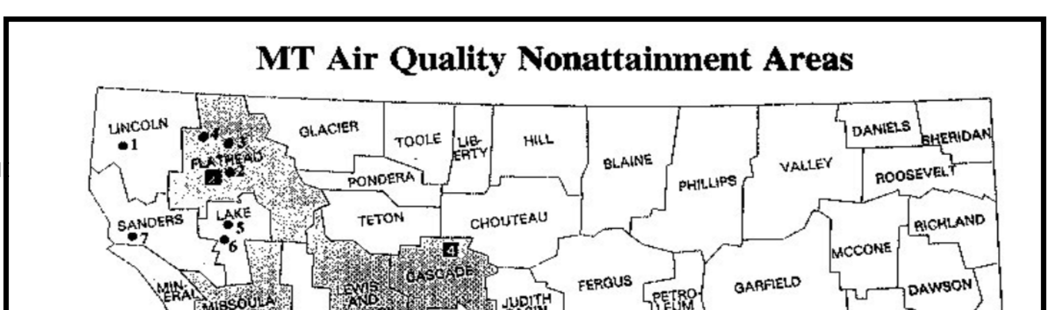


Figure 4.4: Montana Air Quality Nonattainment Areas



The prevailing wind direction in the assessment area is from the southwest, with west winds being the second most common (Finklin, 1983). Frontal storms that occur in the fall, winter, and spring are low intensity, long duration occurrences. Thunderstorms occurring between May and October are accompanied by locally strong winds, and are of high intensity and short duration.

Visibility impairment is a basic indicator of pollution concentrations in the air, and has been recognized as a major air quality concern for many years. Visibility variation occurs as a result of the scattering and absorption of light by particles and gases in the atmosphere. Without human-caused pollution effects, the natural visual range is approximately 150 miles in the West and 70 miles in the East (EPA, 1999).

Processes Affecting Air Quality

The geography and climate affecting air quality in the assessment area are described in several written works (Finklin, 1983; Ternes, 1994). The dominant climatic feature is a prevailing southwest wind. The prevailing gradient is known to carry pollutants from the Selway drainage across the Bitterroot Mountains and into the Bitterroot Valley and the Missoula vicinity. The delivery of smoke from wildfires or prescribed fires to this non-attainment area has become an increasingly important issue.

The Selway and Middle Fork Clearwater subbasins are very lightly populated and without any industrial sources of air pollution. The assessment area is not significantly affected by stationary sources, according to the data contained in *Air Quality Related Values: Management Plan for the Selway-Bitterroot Wilderness Area of Idaho and Montana*. The population is rural and widely dispersed. Dust from roads surfaced with native material and wood smoke from heating appliances are seasonal, and are the primary effects from the rural population. The largest inputs of pollutants to the air in the Selway and Middle Fork Clearwater subbassins come from the burning of native biomass. Smoke production is generally limited to May through October.

Fire history studies and analysis of current vegetation patterns indicate that these subbasins, as well as most others in the Western U.S., have been shaped by natural and anthropogenic fire. The habitats and vegetation patterns have been significantly affected by fire (Smith, 1997). It has also been determined that fire, as a process affecting ecosystem function, has been much reduced since the 1930s (Brown and Smith, 2000). It can be concluded that with less fire on the landscape currently, there is also less smoke being produced.

Several smoke and air pollution sources are recognized as part of the management of the Selway and Middle Fork Clearwater subbasins:

- Smoke produced locally with only local effects.
- Smoke produced locally with downwind effects.
- Smoke and/or air pollution produced upwind affecting the subbasins and other downwind locations.

The locally produced smoke with local effects may be the most common occurrence. Fires with a definite head or flaming front usually produce a definite smoke column, which when lifted aloft is dispersed by general or transport wind. This is a common daytime scenario. Smoke from less intense fire in the smoldering phase, especially that which is produced at night, never reaches the ridge tops and is not so easily dispersed. This smoke often “sinks” on down-slope winds, pooling in the valleys. Under late summer inversions this smoke accumulates, creating poorer air quality. Research indicates that valley smoke episodes were 1.3 times more likely to occur prior to 1935, in what researchers call the “presettlement period” (Brown, 1994). It has been concluded that smoke event duration and intensity has been less since 1935.

In more remote locations of the Selway and Middle Fork Clearwater subbasins, locally produced smoke from well-designed and well-implemented prescribed fires that follow the Airshed Group recommendations often go unnoticed by the public.

The second smoke scenario is similar to the first. In this case the volume of smoke produced may be very large, or atmospheric conditions may not favor good smoke dispersion, and the outcome is that smoke is delivered to sensitive areas downwind from the source within the Selway and Middle Fork Clearwater subbasins. This is a particularly common concern with natural fire events in the Selway-Bitterroot Wilderness. This type of event can last for 60 days or more. The longer such an event lasts, the more likely it is that the smoke will arrive at a non-attainment area, or in another Class I airshed in the western U.S.

The third scenario involves smoke and/or pollutants from downwind affecting air quality in the Selway and Middle Fork Clearwater subbasins and in non-attainment areas to the east. In 1998 a tremendous dust storm in China brought a dust cloud to the Pacific Northwest and Northern Rockies during the spring prescribed burning season. The dust cloud, large scale prescribed burning on all jurisdictions, and an unusual atmospheric event combined to create poor air quality over large portions of the Pacific Northwest and Rocky Mountains.

Air Quality Management

The planning and management of projects and their relationship to the air quality program requires land managers to determine significance, quantify smoke production, apply mitigation measures, and monitor project implementation.

One task facing specialists and decision makers is determining if air quality impacts from prescribed fire projects are likely to be significant. Following are some general guidelines for determining when an impact may be significant or need further analysis (CH2MHill, 1995):

- The project is highly controversial and therefore likely to receive intense public scrutiny.
- The project is located near a Class I area.
- The project is located near historical or cultural resources, parks or campgrounds, high-use recreational areas, etc.
- The project is located in or near (within 10 miles) a non-attainment area.

The Decision Analysis matrix (CH2MHill and USFS, 1998) is useful to stratify burns based on levels of potential emissions. It identifies which emissions and dispersion analysis models to use. *An Introduction to Smoke Emissions and Dispersion Modeling* (CH2MHill and USFS, 1998) provides a thorough explanation of smoke modeling concepts and available models. The Decision Analysis criteria used to determine the recommended level of modeling includes unit size, fuel loading, associated potential emissions, and distance to sensitive areas.

The FOFEM (First Order Fire Effects Model) is an emissions production model for piled debris or prescribed burns for $PM_{2.5}$, PM_{10}, and CO (Reinhardt et al., 1997). The FOFEM model inputs include fuel loading by size class, vegetation, density (herbaceous, shrub, and tree regeneration), anticipated fire intensity, fuel moisture, duff, depth, and season of burning.

Mitigation techniques include those used for reducing fuel loading, fuel consumption, smoke incursions, or smoke concentration in sensitive areas. Using such mitigation techniques helps in reducing emissions and impacts. Emission reductions should be quantified if possible.

The operations of the Montana/Idaho State Airshed Group should be emphasized as a method to reduce impacts of prescribed burning. Their full Operating Guide is at http://www.fs.fed.u/r1/fire/nrcc/smoke/html.

Monitoring is the post-decision action that is used to determine if the implemented alternative met the site-specific objectives, contributed toward the desired condition, and validated the assumptions used to develop the implemented alternative.

One method that is currently being used to measure the impacts of airborne pollutants is monitoring the acidity of high elevation wilderness lakes. Acid deposition to these lakes can be detected and used as a relative measure of atmospheric pollution.

To monitor NAAQS the Forest Service, the primary administrator of Selway and Middle Fork Clearwater subbasins, is a party to the North Idaho Smoke Management Memorandum of Agreement. There are now standards land managers must identify and comply with for both wildland fire and prescribed fire. The North Idaho Smoke Management objective is to minimize or prevent the accumulation of smoke in Idaho to such a degree as is necessary to protect State and Federal Ambient Air Quality Standards when either conducting a prescribed burn or determining if a wildland fire can burn naturally. The North Idaho Group currently uses the services and procedures of the Montana State Airshed Group. The procedures currently in place are considered to be the best available control technology (BACT) by the Montana Air Quality Bureau.

GEOLOGY

Upper and Middle Selway River Area

The upper portion of the Selway subbasin is mapped mostly as Idaho Batholith Formation (see Map 4). The Idaho Batholith Formation was formed by magmas generated from movement of the eastward moving plate. These granitic magmas were put in place during the Cretaceous period. The batholith intruded and assimilated some of the Belt strata in the upper Selway area. This portion of the Idaho Batholith is widespread in the Selway subbasin, but the Belt metamorphic rocks (gneiss, schist, quartzite) are often found intermingled throughout the upper and middle Selway subbasin.

High angle normal faults trending northeast to north to south are present throughout the middle and upper Selway subbasin. The Yakus, O'Hara Creek, and less extensive sub-parallel faults that cut through the southern valley wall of the lower subbasin control about three miles of O'Hara Creek, and the lower five miles or so of the Selway River. The Coolwater Ridge (tonalite) granitic is relatively free of faults.

The Precambrian Belt metamorphic rocks are some of the oldest rocks in the area. It is believed these rocks were originally deposited in a large, sedimentary basin in Precambrian time (700 million to 1,500 million years ago). The basin encompassed western Montana, northern and central Idaho, eastern Washington, and the southern portions of British Columbia and Alberta. The Belt strata are schists, gneisses and quartzites. Large portions of the middle and lower Selway subbasin and the upper Middle Fork Clearwater subbasin are mapped as Precambrian Belt Metamorphics.

Middle Fork Clearwater River Area

In the Middle Fork Clearwater River subbasin, Precambrian schists and quartzites are present on both sides of the northwest to northeast trending faults. South of the Middle Fork Clearwater River the Yakus fault trends northwest, crossing basalts, with the granites close to the river. From Suttler Creek west along the river, Tertiary basalts dominate the geology. These basalts came in several different flows. The basalts are also referred to as the Columbia River basalts.

Moose Creek Area

The area mapped as alluvium 1 is found mainly in Moose Creek, North Moose Creek and its upper elevation tributaries, and East Moose Creek and its upper elevation tributaries. It is also found in the Selway headwaters, and Deep Creek. This alluvium consists of high terraces such as on Moose Creek, East Moose Creek and North Moose Creek, near their confluence. These terraces are of glacial-fluvial origin, but have been moved several miles from their origin by water, so are considered alluvial terraces. The glacial deposits that occur in the higher elevations of these watersheds are smaller terraces along streams where they were deposited by glacial fluvial processes.

Selway and Middle Fork Clearwater Rivers Terraces

The area mapped as alluvium 2 is found as stream terraces along the Selway and Middle Fork Clearwater Rivers. These were stream deposits and were formed by alluvial processes. Examples of these are Johnson Bar on the Selway River, and the lower terraces between Suttler Creek and Clear Creek on both sides of the Middle Fork Clearwater River.

Mining

Mining in the Selway subbasin has focused on some early exploration in upper Meadow Creek, mining basalt rock for road aggregate, and mining the harder Belt metamorphic for barrier rock and road rock. Rock pits are found in the lower Middle Fork Clearwater subbasin, and Upper and Lower O'Hara Creeks. See Map 4, Geology and Mining of the Selway and Middle Fork Clearwater Subbasins.

SOILS

Soils are the biologically active zone at the interface of earth and atmosphere. Soils regulate movement and storage of energy, water, and nutrients. Soil physical properties such as bulk density and texture affect soil water holding capacity, hydrologic response, and surface stability.

Landslides and Mass Wasting

Some soil disturbances may require hundreds of years for recovery. Surface soil erosion reduces soil productivity. Eroded soil material may be delivered to streams as sediment, affecting water quality and fish habitat. Table 4.18, below, displays the acres of soil with high surface erosion hazard, acres of harvest on high surface erosion hazard, high subsurface erosion hazard, miles of road construction on soils with high subsurface erosion hazard, landslide prone acres, harvest acres on landslide prone areas, road density and miles of road construction on landslide prone areas.

Erosion Processes: The dominant erosion processes that shaped the assessment area have been influenced by geology, landform, and climate. The basalt parent materials in the lower

Middle Fork Clearwater ERU and part of the Clear Creek ERU typically weather into finer textured soils such as clays, or break into large gravel or cobble that do not erode readily. The metamorphosed Precambrian Belt rocks consist of gneiss, schist, and quartzite. These geology types weather into moderately coarse textured material and erode easily. The border zone granitic of the Idaho Batholith weathers to material ranging from coarse textured fine sand to coarse sand material also. The moist, humid climate of the Selway basin increases weathering rates and results in deeper soils than a dryer or colder climate. Volcanic ash occurs in the lower half of the Selway basin and the Middle Fork Clearwater basin on north and east slopes in moist vegetation types and has a large influence on site productivity. The ash soils have a large moisture holding capacity and have a high capacity to resist erosion. All of the above inherent properties have a large influence on how the landscape responds to indicators including high surface erosion hazard, high subsurface erosion hazard, and landslides, which are used as a measure of soil condition in the ERUs and the Selway and Middle Fork Clearwater subbasins.

The Selway basin is mostly wilderness and roadless area. The lower Selway subbasin from the wilderness boundary at Race Creek extending to the mouth of the Selway River encompasses most of the land within the assessment area that has been managed for timber harvest and road construction necessary for the timber transportation system. From the confluence of the Selway and Lochsa Rivers that drain into the Middle Fork Clearwater River downstream to the forest boundary at Clear Creek, timber harvest and roads occur on state, national forest, and private lands.

High Surface Erosion Hazard: There are 547,530 acres of area within the Selway and Middle Fork Clearwater subbasins that have soils with high surface erosion hazard. See Map 5, Selway and Middle Fork Clearwater Subbasin Areas of High Erosion Hazard for a display of the surface erosion areas. Surface erosion from timber harvest units typically is usually slight, except when skid trails are constructed on slopes that are exposed to wind and water erosion without adequate drainage or surface cover such as slash or vegetation. Erosion from harvest units typically declines rapidly with re-growth of vegetation.

A large portion of the analysis area has not been affected by harvest practices on soils with high surface erosion. ERUs that have had noticeable timber harvest on high surface erosion are Clear Creek ERU with 5,990 acres, and O’Hara and Goddard ERU with a total of 3,610 acres. The acres of high surface erosion harvest for each watershed within the O’Hara Creek ERU is shown in Table 4.18, below. The O’Hara and Goddard ERU on the south Selway face has the highest concentration of timber harvest in the lower Selway subbasin. The Middle Fork Clearwater face has 2,327 acres of harvest on high surface erosion soils. This occurs on watersheds on both the north and south faces. Timber harvest has occurred on only 2 percent of the total 547,530 acres of high surface erosion soil in the Selway and Middle Fork Clearwater subbasins.

High Subsurface Erosion Hazards: There are 405,648 acres of area within the Selway and Middle Fork Clearwater subbasins that have soils with high subsurface erosion hazards. See Map 5, Selway and Middle Fork Clearwater Subbasin Areas of High Erosion Hazard, for a display of high subsurface erosion areas. Subsurface erosion is a concern with activities such as road building that expose soil substrata. These areas erode readily and deliver eroded material to streams efficiently. Areas of high substratum erosion occur widely in the subbasins.

The ERUs that have the highest road miles in areas of high substrata erosion hazard are the Middle Fork Clearwater River with 122 miles of road, Lower Selway Canyon with 16.33 miles, Clear Creek with 158.03 miles, and O’Hara and Goddard with 145.59 miles. O’Hara and Goddard ERU includes most of the managed watersheds on the south Selway face such as Falls Creek, Elk City Creek, Goddard Creek, Swiftwater Creek, and O’Hara Creek. Other watersheds have minor amounts of road miles within soils with high hazard for substratum erosion with road building.

Landslides: Landslides, debris torrents, and debris avalanches can deliver large amounts of rock, soil and organic debris to a stream channel under both natural or managed disturbance regimes. Landslide prone areas are shown on Map 7, Selway and Middle Fork Clearwater Subbasin Landslide Prone Areas. Table 4.17 displays acres of landslide prone soils for ERUs and watersheds within ERUs.

Harvest and road building has occurred on landslide prone soils within the watersheds. This can lead to mass wasting such as debris torrents in timber cutting units or fillslope failures on roads, especially after intense summer rainstorms or rain-on-snow events. Recent design standards for timber cutting units and higher standards for road location allow for better detection of mass wasting potential.

About 2,472 acres have been harvested on landslide prone soils in the subbasin assessment area. This has been concentrated in a few ERUs such as Clear Creek with 158 acres of landslide prone harvest, O'Hara and Goddard ERU with 904 acres, and the Middle Fork Clearwater ERU with 352 acres of harvest on landslide prone soils.

Ninety-six miles of road have been constructed on landslide prone soils. Clear Creek ERU has 27 miles of road on landslide prone areas, O'Hara and Goddard ERU has 17.5 miles, and the Middle Fork Clearwater ERU has 32 road miles on landslide prone soils. Other ERUs have smaller amounts of road miles on landslide prone soils.

Clear Creek ERU has the highest landslide prone road density of 2.05 miles per square mile, which is rated high using the *Interior Columbia River Basin Science Assessment* rating. Roads in the lower one-third of the Clear Creek watershed were constructed at the base of landslide prone breaklands. The Middle Fork Clearwater River ERU has a landslide prone road density of 1.77 miles per square mile, which is also high. This includes small face watersheds such as Big and Little Smith Creeks, Swan Creek, Lodge Creek, Tahoe Creek and Big and Little Tinker Creeks. Big Smith and Swan Creeks have very high landslide prone road densities. This is shown on Map 8, Selway and Middle Fork Clearwater Subbasin Road Density on Landslide Prone Soils. Bridge Creek also has high landslide prone road densities. Road decommissioning is ongoing in Big and Little Smith watersheds, and in Bridge Creek on the Clearwater National Forest.

The O'Hara and Goddard ERU contains one watershed, Swiftwater Creek, with a high landslide prone road density of 1.90 miles per square mile, and three watersheds with moderate ratings. These are O'Hara Creek, Island Creek and Elk City Creek. Rackliff Creek in the North Selway Face ERU has a landslide prone road density of 1.12 miles per square mile, which is moderate. About 26 miles of road have been decommissioned in the lower Selway basin within the O'Hara and Goddard ERU, about 20 miles in O'Hara Creek, 5 miles in Goddard Creek, and 0.5 mile in Swiftwater Creek.

Erosion: Soil erosion has also increased in Middle Fork Clearwater River ERU, Clear Creek ERU, North Selway Face ERU, and Meadow Creek ERU from dispersed use of OHVs and motorcycles on the landscape. Most of the damage is on rolling upland landforms and the headwater meadows where OHV travel through wet areas and across the landscape creates new trails and exposes soil to erosion. The soil is also compacted by this use, destroying native vegetation and increasing weed encroachment on less productive soils.

Another source of increased erosion in the wilderness and roadless ERUs is erosion on abandoned, unauthorized or non-maintained trails, heavily impacted sites near alpine lakes, and sites where illegal salt placement has created large eroded areas.

Table 4.17: Activities on Soils with High Surface and Subsurface Erosion Hazard and Landslide Prone Areas

ERU	Cumulative Effects Watershed	Acres of High Surface Erosion Hazard	Acres of Harvest on High Surface Erosion Hazard	Acres of High Subsurface Erosion Hazard	Miles of Road on High Subsurface Erosion Soils	Landslide Prone Acres	Landslide Prone Harvest Acres	Landslide Prone Road Density	Miles of Road Construction Landslide Prone
North Selway Face	Boyd Creek	2,339	0	2,800	00	659	0	0	0
	Nineteen Mile Creek	1,247	82	1,385	.031	457	7	0	0
	Glover Ck	3,770	0	4,960	.034	1,761	0	0	0
	Twenty-Three Mile Creek	1,098	0	1,551	0	206	0	0	0
	Rackliff Ck	3,909	108	4,778	0.70	1,344	14	1.12	0.25
	Slide Creek	1,682	0	2,167	0.02	704	0	.08	0.08
Upper Selway Canyon	30102 Face Watershed	29,903	0	1,845	0	13,200	0	0	0
	Bad Luck Creek	20,133	0	0	0	6,497	0	0	0
	Crooked Ck	15,150	0	1,695	0	7,736	0	0	0
	Magruder Creek	2,099	0	670	2.74	1,742	0	0.19	0.56
	Upper Selway Basin	15,552	0	18,938	1.71	15,613	0	0	0.004
	Snake Creek	7,176	0	0	0	4,519	0	.076	0
Lower Selway Canyon	30201 Face Watershed	15,314	259	15,087	16.33	5,575	19	0.49	4.65
	Johnson Ck	1,448	0	1,566	0.29	365	0	0	0
Middle Selway Canyon	30203 Face Watershed	43,851	0	22,536	9.46	19,992	0	0.21	4.31
Gedney and Three Links	Three Links Creek	7,490	0	3,624	0	5,450	0	0	0
	Gedney Ck	15,250	0	18,287	5.25	9,340	0	0.12	1.82
Pettibone and Bear	Bear Creek	10,976	0	24,102	0	36,368	0	0	0
	Pettibone Creek	5,386	0	6,929	0	2,170	0	0	0
Clear Ck	Clear Creek	34,403	5,990	34,770	158.03	8,400	1,138	2.06	27.16
Deep Ck	Deep Creek	10,471	0	361	2.93	5,140	0	0.14	1.17
Ditch Ck	Ditch Creek	6,139	0	1,154	0	2,740	0	0	0
Running and Goat	Goat Creek	5,560	0	4,303	0	3,775	0	0	0
	Running Ck	22,030	0	9,501	2.07	10,186	0	0.06	0.85
O'Hara and Goddard	Elk City Ck	1,399	120	1,638	2.72	407	31	1.05	0.67
	Falls Creek	4,222	548	6,583	19.66	2,094	187	0.50	1.67
	Goddard Ck	6,075	737	8,162	23.15	2,009	141	0.47	1.44
	Swiftwater Creek	3,074	499	3,542	14.58	984	193	1.90	2.99
	O'Hara Ck	18,813	1,532	26,547	77.97	6,915	262	0.75	8.04

ERU	Cumulative Effects Watershed	Acres of High Surface Erosion Hazard	Acres of Harvest on High Surface Erosion Hazard	Acres of High Subsurface Erosion Hazard	Miles of Road on High Subsurface Erosion Soils	Landslide Prone Acres	Landslide Prone Harvest Acres	Landslide Prone Road Density	Miles of Road Construction Landslide Prone
	Island Creek	2,013	174	3,057	7.88	1,255	90	0.90	1.75
Indian Ck	Indian Ck	9,145	0	921	0	6,490	0	0	0
Selway Head-waters	Little Clearwater River	9,415	0	20,589	1.34	5,631	0	0.02	0.21
Martin Creek	Martin Creek	6,012	0	3,689	0	5,084	0	0	0
Meadow Creek	Meadow Creek	62,193	463	56,033	0.32	36,309	38	0.07	4.07
Middle Fork Clearwat-er River	Middle Fork Clearwater	49,648	4,893	26,254	122.03	11,717	1,597	1.77	32.29
Otter Mink	Mink Creek	3,495	0	941	0	2,646	0	0	0
	Otter Creek	5,235	0	6,172	0	3,021	0	0	0
Moose Ck	Moose Creek	67,625	0	49,510	0	45,416	0	0	0
White Cap Ck	White Cap Creek	11,444	0	9,001	0	29,125	0	.008	0
Upper Selway Canyon	Wynntest Creek	5,346	0	0	0	2,224	0	0.86	2.15
Total		547,530	15,405	405,648	469.24	325,266	3,717	NA	96.134

Acres of High Surface Erosion Hazard: Acres calculated from Landtype Limits Data Base and GIS.
Acres of Harvest on High Surface Erosion Hazard: Acres calculated from GIS and TSMRS Data Base.
Acres of High Subsurface Erosion Hazard: Acres calculated from Landtype Limits Data Base and GIS.
Miles of Road on High Subsurface Erosion Soils: GIS data layers for roads and Landtype Limits Data Base.
Landslide Prone Area Acres: Landtype Limits Data Base and GIS.
Landslide Prone Harvest Acres: GIS layer, Landtype Limits Data Base and TSMRS.
Landslide Prone Road Density (using Quigley, 1997 road density classes):

- Very High: greater than 4.7 miles per square mile.
- High: between 1.7 and 4.7 miles per square mile.
- Moderate: between 0.7 and 1.7 miles per square mile.
- Low: between 0.11 and 0.7 miles per square mile.
- Very Low: less than 0.1 miles per square mile.

Miles of Road Construction on Landslide Prone Soils: GIS and roads database.

Soil Productivity

Natural and human disturbances have an influence on soil productivity. Timber harvest, road construction, recreation sites such as campgrounds, and trails compact and disturb soils and can lower soil productivity. Reduction of soil productivity occurs through processes such as reduction of soils aeration due to loss of soil air space, decreasing natural water infiltration rate, and decreasing the ability of plants to produce healthy root systems due to increase in bulk density. Fire is a natural and human caused disturbance that is an important part of the forest ecosystem. Fires that are hot can volatilize some soil nutrients and increase water repellency in soils. Because water cannot infiltrate into the soil, overland flow may occur on water repellant soils, which results in an increase in erosion and sediment carried into stream systems. Woody debris is an important component in soil nutrient cycling. Prescribed fire, natural fire and clearcutting can remove large wood needed for soil nutrients.

Soil Compaction

Soil compaction is the packing together of soil particles by forces at the soil surface that increase the density of soil. The increased density of the compacted soil alters the infiltration of water into the soil, and this in turn alters the runoff patterns of water and soil water availability for plants. Soil displacement removes the nutrient-rich surface soil from a site, and the underlying mineral soil is often more erosive and lower in nutrients. Areas most prone to compaction and displacement have been timber harvest units logged with tractors and where logging slash has been piled with bulldozers. Table 4.18, below, shows the acres of tractor harvest and where logging slash was piled with bulldozers. Typically, on areas that have been tractor logged and not dozer piled, about 15 to 25 percent of the unit has detrimental compaction and displacement, according to analyses contained in the *Nez Perce National Forest Monitoring and Evaluation Reports* (USDA, 1990, 1991). On units both tractor logged and dozer piled, about 30 to 40 percent of the unit has suffered detrimental compaction or displacement. Current forest plan standards state that no more than 20 percent of an activity area may be detrimentally impacted.

Table 4.18: Acres of Tractor Logging and Dozer Piling

Cumulative Effects Watershed	Acres Tractor Logged Only	Acres Dozer Piled (usually tractor logged)
30201 Face Watershed	65	14
Clear Creek	2,645	1,890
Elk City Creek	31	0
Falls Creek	7	0
Goddard Creek	0	17
Island Creek	14	20
Meadow Creek	69	385
Middle Fork Clearwater (Nez Perce National Forest portion)	65	491
O'Hara Creek	160	512
Swiftwater Creek	0	103
Middle Fork Clearwater (Clear-water National Forest portion)	334	271
Total Acres	**3,390**	**3,703**

Logging started in the Selway River and Middle Fork Clearwater River basins in the 1950s and 1960s, with the most activity in the 1960 to 1970 decade, with a high level of activity still ongoing in the 1980s and tapering off in the 1990s. Many of the timber harvest units that were tractor logged, or both tractor logged and dozer piled, were entered twice and sometimes three or more times to harvest timber. The area of compaction and disturbance increased with each entry. Some harvest units may have from 30 to 80 percent of the unit in skid trails and temporary roads, in addition to topsoil disturbance and compaction by dozer piling. Prescribed fire, such as broadcast burning and dozer pile burning, has also affected soil productivity in these units.

Large Organic Debris

Large organic debris (down tree limbs, boles and roots) is a critical component of forested soil ecosystems, providing sites for nitrogen transformations, moisture retentions, root-microbial interactions (mychorrhizae), wildlife habitats, and sites for seedling establishment. Decaying logs have an extremely high water holding capacity, and in an advanced decay state may hold 350 percent moisture content in winter and 250 percent moisture content in summer. In western forests, where water is limited, decaying logs function as reservoirs for trees and soil organisms. Tree roots and mycorrhiza associated with roots are associated with decaying wood in dry habitats (Harvey et al, 1986) and the ability of seedlings to access water in soil wood can make the difference between survival and death in droughty south slopes or clearcut areas.

In most fire-prone lands of the Selway and Middle Fork Clearwater subbasins, wildfire is a principal agent in recycling large organic debris, because wood is relatively slow to decompose from microbial activity alone. With fire suppression, periods between fires have been extended, potentially increasing coarse woody debris accumulations and soil productivity. However, the risk of eventual severe fires has also increased, with the potential for loss of this organic material. Such losses could exceed those under the prior presettlement fire regime. Current harvest practices usually prescribe some level of large organic debris retention (10 to 15 tons), although this may be lost during piling of the slash or slash burns that consume the large woody debris left after harvest.

Soil Summary

Soil erosion processes in ERUs without a history of timber harvest and road building have soil erosion processes that are more similar to presettlement conditions than those ERUs where timber harvest and road building occurred. The main departure from historic conditions is the loss of the large pulse disturbances that drive erosion processes, such as wildfire. This is due to fire suppression. This includes ERUs in the Selway-Bitterroot Wilderness, Meadow Creek ERU, and most of the North Selway Face ERU. The erosion processes are driven by fire and flood. Erosion processes contribute sediment in the form of surface erosion and mass wasting. The decrease in fire occurrence in the past 60 years has increased the depth of the surface organic layers on the forest floor, which can lead to higher severity fires when they occur. This results in higher cambium scorch near the ground and burning tree roots close to the soil surface.

The main erosion process related to press disturbance such as timber harvest and roads on landslide prone soils, are mass wasting, surface sediment routed to streams, and surface erosion on harvest units. Long-term soil productivity has been affected the most in Clear Creek, O'Hara and Goddard, and the Middle Fork Clearwater River ERUs. Soil compaction and displacement are attributed to mostly ground-based timber harvest systems and jammer logging. Volcanic ash surface soils are the most susceptible to compaction.

Soil erosion, compaction, and displacement are increasing at a high rate from increasingly popular and uncontrolled dispersed OHV use on Coolwater Ridge, and in the Tahoe, Upper Meadow Creek, and Middle Fork Clearwater areas. Soil erosion and compaction is occurring in the wilderness ERUs from use of unauthorized trails, over used camp areas along the edges of alpine lakes and streams, and other areas of heavy human use.

HYDROLOGY AND WATERSHED

HYDROLOGIC PROCESSES

Hydrography

Hydrography is the scientific description and analysis of the physical conditions, boundaries, flow and related characteristics of the earth's surface waters or the mapping of bodies of water. The hydrography of the Selway and Middle Fork Clearwater subbasins is discussed in this section.

Streamflows: The hydrology of the Selway subbasin is affected by the pattern of precipitation and temperature that is related to the maritime climate, but the flow regime shown on the hydrograph is strongly influenced by the high elevation mountain snowpack that produces a high runoff peak in late May through early July.

Precipitation in the basin ranges from 40 to 70 inches. The Selway River originates in the Bitterroot Mountains at an elevation of 9,110 feet and drops 7,641 feet in 99 miles; the elevation is 1,469 feet at its mouth near Lowell, Idaho. Mean annual runoff in inches for the Selway subbasin averages 27.71 inches. The Middle Fork of the Clearwater River drops 150 feet over 23 miles from Lowell to Kooskia, Idaho. Precipitation on the Middle Fork Clearwater River ranges from 26 to 40 inches per year.

Mean annual discharge for the Selway River was estimated at 3,765 cubic feet per second (cfs) at the mouth of O'Hara Creek, a tributary to the Lower Selway where a USGS (U. S. Geological Survey) gauging station is located. Minimum average monthly flows were estimated at 766 cfs occurring in September and maximum average monthly flows were estimated at 13,540 cfs in May (USGS data, 1930 to 1988). Estimated mean annual discharge for the Middle Fork Clearwater River is 7,050 cfs at Kooskia (Middle Fork Chinook BA, 1995). Peak stream flow usually occurs in late May and is estimated to average approximately 24,900 cfs. Minimum monthly flows typically occur in September at about 1,460 cfs (USDA, 1995). The runoff regime for the Selway and Middle Fork Clearwater Rivers is dominated by spring snowmelt followed by gradual recession to base flows.

The Selway River typically experiences annual peak runoffs from mid May until mid June. Minimum mean monthly discharge for June is 2,950 cfs, and maximum mean discharge for June is 24,400 cfs. June is usually the peak runoff month. The largest flood of record for the Selway River occurred May 29, 1948 at 48,900 cfs. Floods on the Selway River are usually associated with spring snowmelt events in April to June, but in 1995 the Selway River experienced a rain-on-snow flood event on November 30, with a flood peak of 28,900 cfs.

Less than one percent of the flood peaks over base occur during the late fall and winter months with the rest occurring during the spring snowmelt period. In comparison to the Selway subbasin that has one recorded winter flood, the Lochsa subbasin has experienced six recorded winter floods during the period of record; four percent of the floods in the Lochsa subbasin occur in winter. The winter flood with the highest peak on the Lochsa River also occurred on November 30, 1995.

The Lochsa River subbasin is more affected by the maritime climate and a larger percent of the basin is located in the elevations where the rain-on-snow zone occurs, resulting in a higher occurrence of winter floods than in the Selway subbasin. The Selway subbasin in general has a higher elevation upper watershed basin than the Lochsa or the South Fork Clearwater River. The upper Selway subbasin climate is colder, with a stronger Rocky Mountain climatic influence and is less affected by the coastal maritime influence and the rain-on-snow zone. The South Fork Clearwater is a lower elevation watershed and is more strongly affected by rain-on-snow and winter rain storms, contributing to a higher incidence of winter storm peaks. Fifteen percent of the floods over base flows are winter floods.

Historic Floods of the Selway River and Lochsa Rivers: The flood of 1894 is believed to be the largest flood of history for the Lochsa River, as recorded by locals in oral history, but this is unknown as there were no gauging stations at this time (USDA, 1999). The Lochsa and Selway Rivers had large spring floods in common in 1948, 1956, 1964 and 1974. The Lochsa River flooded in 1933 and in November 1995; these two floods were among the six largest floods on the Lochsa. The same years, the Selway River had high water, but not record floods. In 1995, the winter peak on the Selway was a 2 to 5-year event compared to a 5 to 10-year event on the Lochsa. In 1997, the Selway had a peak flow on May 17, which was the fifth largest flood of record for the Selway River. In all of the 72 recorded years of gauging on the Lochsa River, the largest flood of record was a 40-year event (Hydrology Report, Lochsa Subbasin, 1999). In the period of record for the Selway River the largest flood of record was a 50 to 100-year event.

Table 4.19: Comparison of Historical Floods for the Selway and Lochsa Rivers in Chronological Order

River	Year	Date	Discharge - cfs	Recurrence Interval	Record Flood
Lochsa	1894				No record*
Lochsa	1933	June 10	34,800	25-50 years	2nd
Selway	1933	June 14	33,800	5-10 years	>15th
Lochsa	1948	May 29	34,600	25-50 years	3rd
Selway	1948	May 29	48,900	50-100 years	1st
Lochsa	1956	May 24	28,500	10-25 years	5th
Selway	1956	May 24	41,200	10-25 years	4th
Lochsa	1964	June 8	35,100	40 years	1st
Selway	1964	June 8	43,400	25-50 years	2nd
Selway	1972	June 2	43,400	25-50 years	2nd **
Lochsa	1974	June 16	32,000	10-25 years	4th
Selway	1974	June 16	43,100	25 years	3rd
Lochsa	1995	November 30	27,900	5-10 years	6th
Selway	1995	November 30	28,900	2-5 years	Not a flood
Selway	1997	May 17	40,300	10-25	5th

* Believed to be the largest event in recent history on Lochsa. ** Same as 1964.

The main tributaries in the upper Selway River --- Moose, Pettibone, Whitecap, Bear, Running, and Deep Creeks --- and other upper headwater tributaries have a runoff regime that is similar to the Selway River. They each drain areas with high elevation headwaters and high snowpacks resulting in late spring runoff. The runoff regimes of the middle and lower Selway subbasin watersheds are varied and complex depending on their elevation and location in the subbasin. Three Links and Gedney Creeks have similar runoff regimes as the upper Selway watersheds, due to their high elevation headwaters in the Selway Crags. They also have mid to low elevation breaklands on their lower reaches.

The runoff regime for Meadow Creek is almost a mirror image to the Selway River when comparing the hydrographs. The watersheds with headwaters at higher elevations offer cool water to the main river during summer low water periods. Watersheds such as O'Hara, Goddard and Swiftwater Creeks have headwaters located in upper elevation rolling uplands and have peak flows similar to the higher elevation watersheds, but may be more effected below 4,500 feet in the lower reaches with rain-on-snow events or winter rainstorms. Small watersheds on the lower Selway face and Middle Fork Clearwater River, such as Smith, Swan, Lodge, and Little Tinker Creeks and other smaller watersheds have earlier peak runoffs and are more prone to rain-on-snow events that cause winter flood peaks.

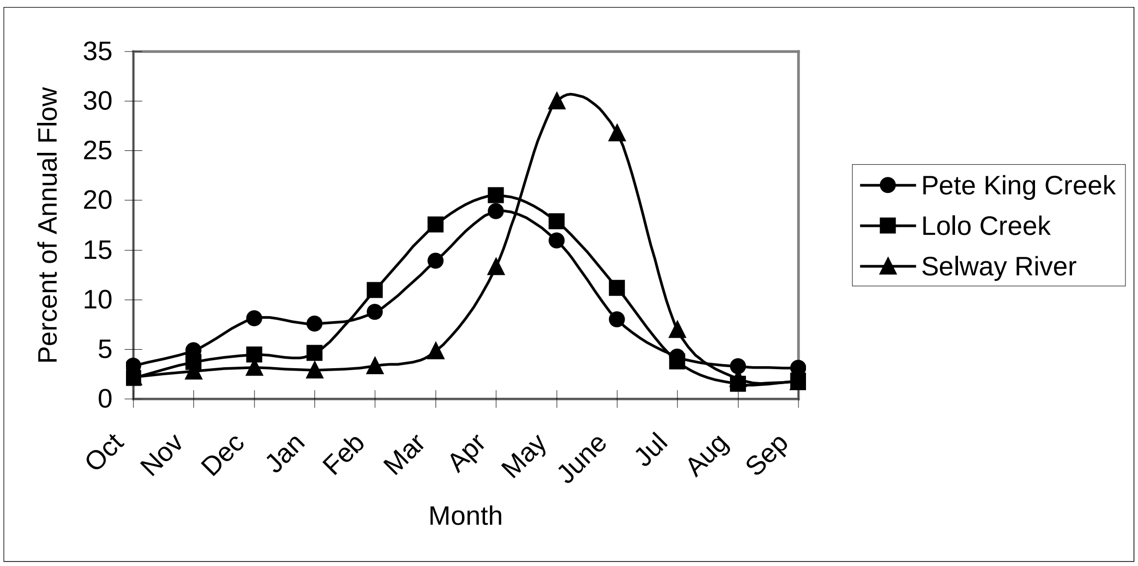
Analysis of Hydrographs: The runoff regime is affected by climatic and topographic variables. By comparing three hydrographs for the Selway River, Pete King Creek, and Lolo Creek various runoff regimes within the Selway and Middle Fork Clearwater subbasins are represented.

The Selway River stream gauge is located on the lower Selway River across from O'Hara Creek. The Selway River hydrograph in Figure 4.5 shows percent of annual flow on the Y axis and months of the year on the X axis. The period of stream gauging record used to create the hydrograph for the Selway River is 1930 to 1988. The hydrograph shows the peak for the Selway River in May, but June is also a high flow month. The Selway basin has large areas above 6,000 feet with high snowpacks, so peak runoff is in late spring. The average date of peak flow for the

Selway River is May 27. The runoff due to snowmelt has the most influence on the shape of the Selway hydrograph. Low flow months occur August to February. The rising limb of the hydrograph starts in March, peaks in June, and falls from late June until August. Winter peaks are uncommon on the Selway River and, as discussed above, only occurred once in November of 1995. This hydrograph also represents Meadow Creek.

The stream gauge for Pete King Creek is located on the mouth of Pete King Creek in the Lochsa River drainage. The Pete King Creek hydrograph is used to represent lower elevation watersheds on the Lower Selway and Middle Fork Clearwater Rivers. Most of these watersheds consist of a small percent of rolling uplands in the headwaters, but with the greatest part of the watershed located in lower elevation breaklands 4,500 feet or less in elevation. The Pete King hydrograph has a rising limb that starts in November and continues until April. Snowpack below 4,500 feet is low and sometimes intermittent. The upper elevations of the watersheds may have up to 2 feet of snow November to March. The runoff regime is complex with a mixture of snowmelt, rain-on-snow and rain resulting in peak runoff events, typically in early spring, but anytime in fall or winter also.

Figure 4.5: Monthly Percent of Annual Flow for Pete King Creek, Lolo Creek, and the Selway River



Lolo Creek steam gauge near Greer, Idaho in the main Clearwater drainage is used as an example to represent a hydrologic regime that is similar to Clear Creek, which drains into the Middle Fork Clearwater River. This hydrologic regime is representative of low to mid elevation watersheds. There is a characteristic February rise in the hydrograph and an April peak. Spring rains may result in a prolonged runoff. Runoff can occur over a longer period of time due to winter and spring rains, rain-on-snow events, and snowmelt. Runoff is not greater in volume, but runoff peaks occur more often with weather events over a longer period of the year. This differs from hydrologic regimes such as for the Selway River, which is mostly related to late spring peak flows due to high elevation snowpack.

Temperature

This section discusses what factors affect the stream temperatures within the Selway and Middle Fork Clearwater subbasins, and in general how physical processes, channel morphology and topography affect stream temperatures. Other influences that affect stream temperatures are:

aspect, elevation, riparian vegetation shading, the human development in stream zones, and natural disturbances such as wildfire.

Solar Energy: Solar radiation is the greatest source of energy for raising stream temperature. Natural topography and the physical characteristics of the stream have a large influence on the inherent temperature of the stream. Factors that affect the amount and impact of solar radiation reaching streams are: latitude; orientation of the stream or river; vegetation height and density next to the stream; gradient; channel morphology including substrate size; stream width; and topographic shading (Amaranthus, 1998).

Topographic Shading: The Selway River and its tributaries are affected greatly by topographic shading. The middle and lower sections of the Selway and Middle Fork Clearwater Rivers are not greatly influenced by vegetative shading, but the exception may be the headwater section of the Selway River above Paradise. The Selway River in that section is narrow enough that large trees in the stream zone probably have some effect on temperature. Also in that section the road next to the stream affects temperature.

Steep canyon sideslopes influence stream temperatures in most of the Selway and Middle Fork Clearwater subbasins. At certain times of the year, topographic influences can partially or totally shade the river due to steep ridges blocking the sun. On short days in the winter, the north aspects on the river may receive little or no sun. This topographic shading occurs mostly in early morning and late afternoon when the percentage of the daily solar radiation is minimal. This is only a general example because the rivers meander and change orientation over small distances, which effects shading and direct solar radiation.

Vegetative Shading: Smaller streams are affected both by topography, vegetation density and vegetation height. For example, on east to west running streams, vegetation on the south side of the stream is critical for providing shade, and the north side vegetation does not have much influence on shade. At midday more solar radiation reaches the stream. With a north to south oriented stream, the eastside vegetation provides morning shade and the westside vegetation provides afternoon shade. Vegetation that is sparse or poorly stocked provides less effective shade than thick dense stands. Taller vegetation provides shade a greater distance from the stream. Tall vegetation directly next to the stream can provide shading against high sun angles during the critical midday high solar radiation period.

Stream Width: Stream width affects how long the stream is exposed to solar radiation and the duration of exposure. A wider more exposed stream warms up faster than a narrow less exposed stream. If steams are equal width, shallow streams warm up faster than deeper streams.

Water Sources: Warm and cold water sources are another influence on stream temperature. Warm water sources may be natural thermal hot springs, several of which occur in the Selway subbasin. Cold water sources include cold water springs in the stream, lateral seeps, and pool bottom seeps. These may be important cold water refuge areas for salmonids.

Channel Morphology: Other aspects of channel morphology such as slope, channel bed characteristics, and substrates also affect stream temperature. Streams that have steep gradients have higher velocities and are not exposed to direct radiation as long; there is less time for the water to heat up. Streams with lower gradients act just the opposite. Streams that have large substrate and bedrock bottoms do not heat up or cool down as rapidly as streams with sand or gravel substrates (Amaranthus, 1998).

Daily Cycle: On a daily basis, stream temperatures cycle from a daily minimum just after dawn to a daily maximum in late afternoon and lag behind the minimum and maximum air temperatures (Stefan and Preud'homme, 1993). This is called diurnal temperature. The range between daily minimum and maximum temperatures is less in larger streams due to their higher heat capacity, but large streams are generally warmer than small streams. In small streams, the amount of shade provided by vegetation has the greatest influence on daily maximum temperatures due to the reduction in heating from direct solar radiation (Beschta, 1997).

Land Use Effects on Stream Temperature: Loss of streamside shade can be caused directly by human activity or by natural processes. Activities such as logging, fire, road construction, windstorms, grazing, mining, and flooding are all disturbances that can reduce shade and affect stream temperatures. Increasing solar radiation to the stream is the greatest single source of energy for raising stream temperatures (Amaranthus, 1998).

Removal of vegetation along the riparian zone by clearcutting increases direct solar radiation. Even though this was a common occurrence in the past, stream buffers that are retained during present day management reduce the occurrence of vegetation removal in riparian zones. Prescribed or natural fire within the riparian zone can also increase solar radiation. Changes in steam morphology can affect stream temperature. For example, aggradation of low gradient stream reaches often results in a wider and shallower stream. Breakdown of stream banks by grazing also results in a wider, shallower, dished-shaped stream. These physical changes produce a wider, shallower stream that results in increased stream temperatures. Lateral expansion of the channel, whether due to aggradation or erosion within the channel, subsequently increases stream temperatures (Brown 1969; Hawkins et al., 1997).

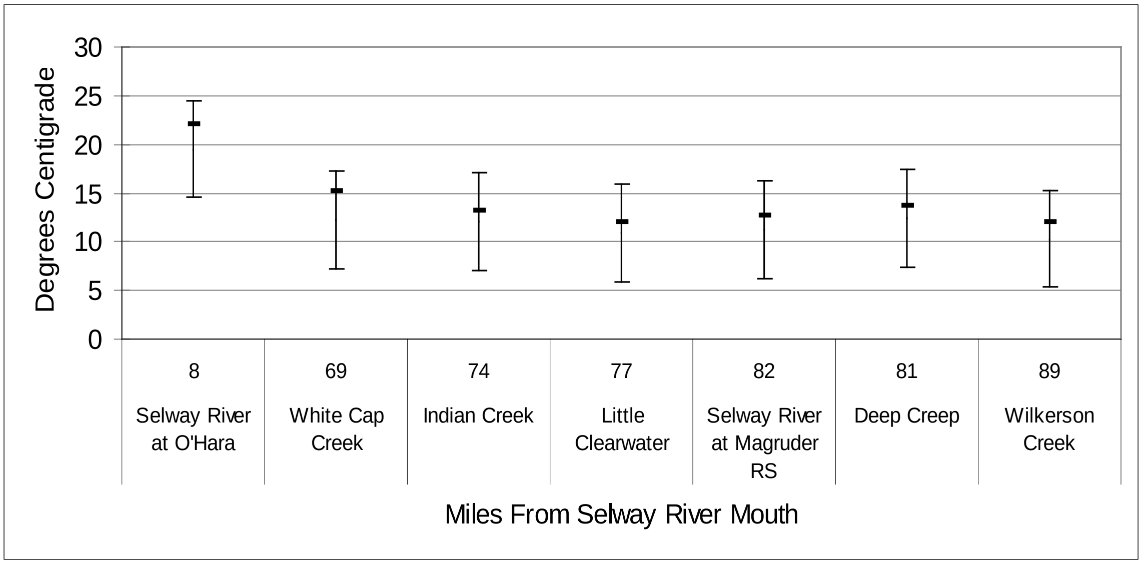
Analysis of Selway and Middle Fork Clearwater Subbasin Thermograph Data: Thermograph data for the Selway and Middle Fork Clearwater subbasins are fairly limited (thermographs are used to record stream temperature). This analysis looks at points in time, specifically, August 1997 and 1998 for the Selway subbasin and August 1998 for the Middle Fork Clearwater subbasin.

Very little historic data exists for stream temperature in the Selway and Middle Fork Clearwater subbasins. Most of the Selway subbasin is included in the Selway-Bitterroot Wilderness, with part of the upper subbasin administered by the Bitterroot National Forest. The lower part of the Selway subbasin below the Selway-Bitterroot Wilderness boundary and the Middle Fork Clearwater subbasin have been affected by human actions, such as road construction and timber harvest. Wildfire is the main disturbance that could affect tributaries of the Selway River in the wilderness sections at large scale.

This analysis simply represents a description, using the little data available, of the Selway and Middle Fork Clearwater Rivers and a few tributaries. The objective of Figures 4.6, 4.7, and 4.8 is to display stream temperature changes from a subbasin-wide view. The figures show a relationship in the subbasin; stream temperatures are cool at higher elevations, and they are cooler the farther the temperature monitoring point is from the mouth of the stream. The mean monthly temperatures are lower upstream and at higher elevations. Figures 4.6, 4.7, and 4.8 also compare differences in mean stream temperatures between monitoring sites in the Selway subbasin for the years 1997 and 1998, and in the Middle Fork Clearwater subbasin for 1998.

August 1997 Minimum, Maximum, and Mean Temperatures for the Selway River and Tributaries**:** As shown in the August 1997 thermograph data for the Selway subbasin displayed in Figure 4.6, the range of maximum, minimum, and mean temperatures in the mainstem Selway River at the O'Hara Creek gauge is greater than that of the mainstem at the Magruder monitoring station on the upper Selway River and stations near the mouths of the upper Selway tributaries.

Figure 4.6: August 1997 Minimum, Maximum, and Mean Temperatures for the Selway River and Tributaries



The mainstem Selway at O'Hara Creek Campground is wider, and has a slower velocity and much lower gradient than the mainstem Selway at Magruder, and is eight miles from the mouth of the Selway River. The water in the river at O'Hara Creek Campground has flowed through a long stretch above that is exposed to direct solar radiation, so it has had a much longer time to warm without a narrow canyon influence to shade it. This point on the river is prone to summer heating and more diurnal fluctuation than the Magruder site, which is 80 miles from the mouth of the Selway River, much higher in elevation, and located in a narrow canyon.

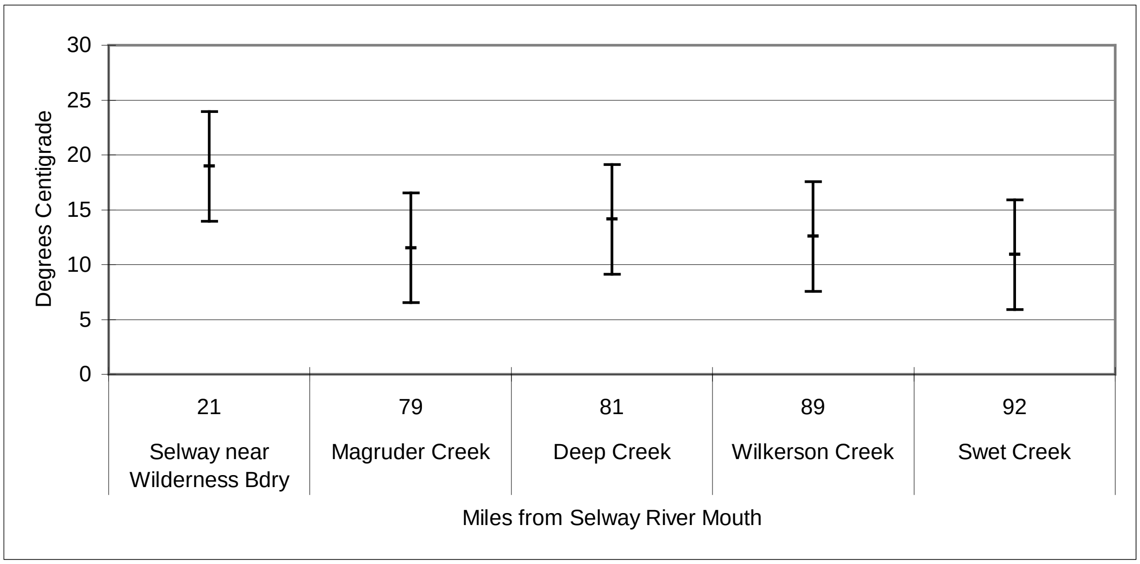
White Cap Creek is the largest of the tributary streams shown in Figure 4.6. The range between the maximum and minimum temperatures is the highest for the White Cap Creek monitoring site. The mean temperature is also higher than the other tributaries shown. White Cap Creek is large, and is wider, shallower, and longer than most of the other streams in the upper Selway area. This allows for more chance of increased solar radiation, resulting in warmer temperatures than in other streams. Much of White Cap Creek in general has a west and south aspect, which may also raise stream temperatures. The headwaters of White Cap Creek are in the rocky crags of the Bitterroots; this keeps temperatures low in general, compared to the lower sections of the mainstem Selway River.

Deep Creek has a higher mean temperature than some of the other headwater tributaries. A main road runs for several miles directly along Deep Creek. The shade-providing vegetation has been removed from one side of the stream in some stream reaches, so solar radiation is increased along the length of the stream where the road is located. This loss of shade-providing vegetation also leads to higher and lower diurnal temperatures. Deep Creek also has a west aspect that may have an influence on increased stream temperatures.

The Little Clearwater River monitoring site has the coolest mean temperature for the month of August. The Little Clearwater River is much smaller than White Cap Creek. The headwaters in Burnt Knob Creek start as high as 8,000 feet, and in general the Little Clearwater River has a steeper gradient and narrow valley bottom that helps keep stream temperatures lower. Other tributaries displayed have mean temperatures that are similar.

***August 1998 Minimum, Maximum, and Mean Temperatures for the Selway River and Tributaries*:** The August 1998 thermograph data for the Selway subbasin shown in Figure 4.7 displays stream temperatures for the Selway River mainstem at the wilderness boundary, and for tributaries in the upper Selway subbasin near their mouths. Magruder Creek, in the upper Selway subbasin, has a mean temperature of around 12 degrees C, compared to a mean of 18 degrees C at the wilderness boundary. Wilkerson Creek has a mean of 16.1 degrees C for 1997 and 19.3 degrees C for 1998.

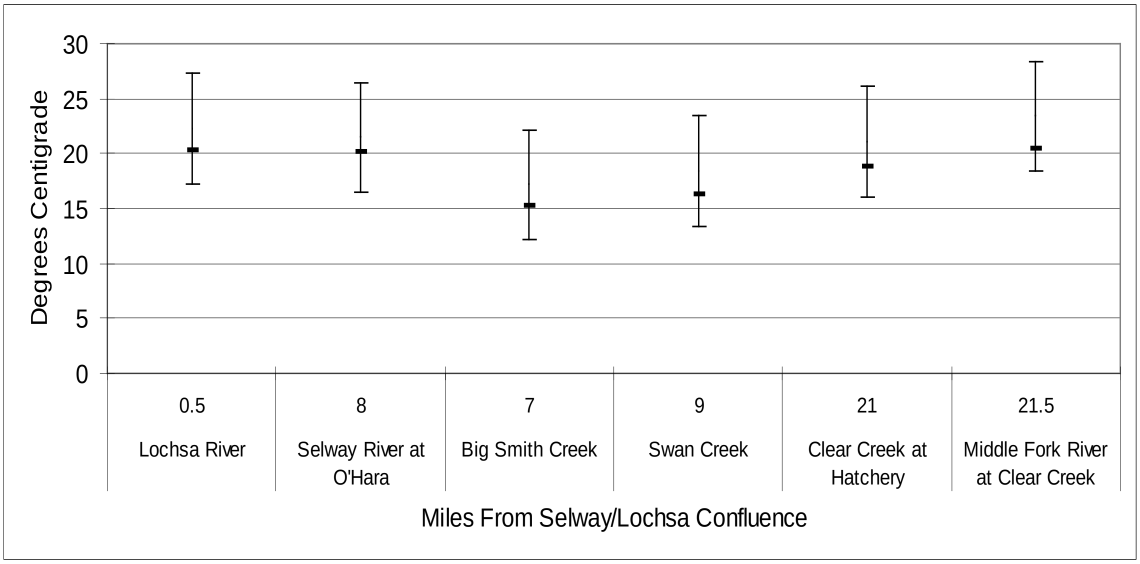
Figure 4.7: August 1998 Minimum, Maximum, and Mean Temperatures for the Selway River and Tributaries



***August 1998 Minimum, Maximum, and Mean Temperatures for the Middle Fork Clearwater River and Tributaries*:** Figure 4.8 displays the August 1998 temperatures for the Middle Fork Clearwater subbasin from Lowell to the Nez Perce National Forest boundary at Clear Creek. Mean temperatures of the Selway River at O'Hara Creek are similar to those on the Middle Fork Clearwater River. The monitoring site about one-half mile from the mouth of Clear Creek at the hatchery also has a similar mean. The Selway River and Middle Fork Clearwater River, and the lower portion of Clear Creek are reaches that all have long days of solar radiation during the month of August and show fairly high mean temperatures for the month. Big Smith and Swan Creeks are smaller sixth code watersheds that have steeper A and B channels that are narrow and heavily shaded by vegetation and steep canyons, so mean temperatures stay cooler throughout the summer.

The temperature for the Selway River at O'Hara was 19.5° C and in 1998 the mean was 20.3° C at the wilderness boundary. These two mainstem monitoring sites have had temperatures within 1 degree C of each other for several years of monitoring.

Figure 4.8: August 1998 Minimum, Maximum, and Mean Temperatures for the Middle Fork Clearwater River and Tributaries



Temperature Conclusions: Historic data for water temperature in the Selway and Lochsa Rivers with continually monitoring thermographs were not available before the 1980s. Some spot temperature information was collected earlier. The lower Selway and Middle Fork Clearwater Rivers have relatively warm temperatures when compared to the tributary streams. This is most likely a natural occurrence, due to high summer temperatures, reach characteristics, and distance from the mouth of the river. There may be a slight increase in stream temperatures in the lower Selway below the wilderness boundary, but this increase would be very slight, less than a mean temperature difference of 1 degree C.

Tributary streams that may be affected by road construction and timber harvest are lower O'Hara Creek and Clear Creek. Some other streams may have slight temperature changes, but monitoring data are not available.

Tributaries higher in the subbasin have cooler mean temperatures and provide cold water input for the mainstem Selway during the summer months.

Water Yield

Water yield refers to streamflow quantity and timing. It is important because streamflow is a key determinant of the energy available for erosion, transport, and deposition of sediment within channels. Streamflow is also a key component in determining the morphology of channels, with implications for the quality and quantity of fish habitat. Water yield is an important component in determining the availability and suitability of water for beneficial uses.

Water yield quantity and timing can be altered by vegetation growth or removal. Water yield generally increases after timber harvest or fire through a reduction in transpiration and a reduction of the interception of precipitation. Changes in the type or distribution of vegetation can affect snow accumulation and melt rates, as well as the amount of moisture returned to the atmosphere by evapotranspiration. Therefore, the vegetation on the landscape has an affect on the total amount of water that flows off the landscape (water yield), as well as how quickly it flows off the landscape (and therefore the magnitude of peak flows). Increased water yields may be associated with channel scour, bedload movement, or redistribution of sediment in depositional areas.

Equivalent Clearcut Area (ECA): Water yield increases can be directly modeled, but equivalent clearcut area (ECA) is often used as a surrogate. ECA is expressed as a percent of watershed area. ECA as an index represents the original percent of the watershed where vegetation was removed. Declines in the ECA percent over time are modeled as a function of vegetation recovery, and the rate depends on the potential rate of recovery on that forest site. Rate of recovery is related to precipitation, elevation, aspect and soil fertility. ECA is used as a procedure to index the effects of disturbance on streamflow (King, 1989).

Within the Selway-Bitterroot Wilderness and a large portion of the roadless area in the Selway subbasin, fire is the main historical disturbance in the watersheds. In the lower Selway subbasin below the wilderness boundary, and in the Middle Fork Clearwater subbasin, road construction and timber harvest are additional disturbances that are included in the ECA index.

Fire history for the Selway River and Middle Fork Clearwater River subbasins was mapped by fire year and severity class (low, moderate, high) by Green (1999), to provide a basis for inference of date and severity of fire impacts on the watershed. This historical fire mapping was used to estimate percent of canopy removed in the watershed as a result of wildfire.

Large fires occurred over much of the Selway River basin in 1889, 1910, 1919, and 1934; these fires were severe enough to reduce tree canopy up to 50 percent in some watersheds. These four major fire years historically were the largest recorded wildfire years in the Selway-Bitterroot Wilderness. Other large fires occurred in these watersheds more recently than 1934. The ECA in the wilderness watersheds began to decrease, in general, as recovery of vegetation in the watersheds occurred in the period after 1940 and up to the year 2000. This may be partially due to fire suppression and may also be related to natural fire cycles that occur through time. The ECA percent that existed in 1870 is unknown, so it is not considered in the displays of historical ECAs on the graphs. Because stand recovery has a large influence on ECA, the recovery is much slower than the recovery of sediment yield, and the existing ECA in 1870 may have ranged from 0 to 60 percent in any one watershed. Sediment yield often decreases within one or two years due to recovery of ground cover vegetation, such as grasses, forbs, and shrubs which protect the soil from erosion.

The following analysis shows the ECA in selected watersheds in the Selway and Middle Fork Clearwater subbasins. The graphs show the history of ECA from the period of 1870 through the year 2000, reflecting wildfire and management activities such as timber harvest and road construction. Wildfires had the main effect on ECA in the watersheds from 1870 to 1940, with ECA peaks from 10 to 60 percent in the watersheds. Timber harvest and roads, in combination with existing ECA from wildfire, had the most effect after 1940, with ranges in ECA from 10 to 60 percent in the watersheds.

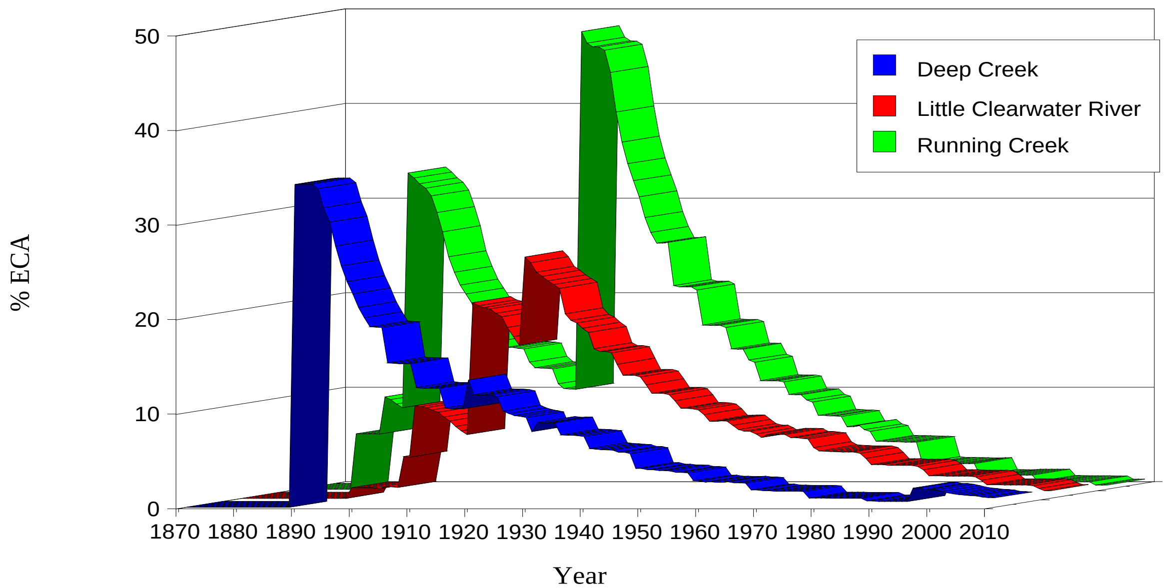
The records of ECA are based on mapped vegetation for the wildfire events since the 1870s. There is very little written record on wildfire before this period. It is unknown to what extent ECA varies within watersheds and subbasins over longer periods.

Selway Subbasin: This analysis for the Selway subbasin shows that streams within the Selway subbasin sustained increased water yields considerably above current levels from 1870 to 1930. It is difficult to assess what the effects were to stream channels as a result of increased ECA. Road encroachment and increased water yield are recent impacts on stream channels since 1960.

***Deep Creek, Little Clearwater River, and Running Creek Watersheds*:** Figure 4.9 shows the overall ECA in the upper Selway subbasin for the Deep Creek, Running Creek, and Little Clearwater River watersheds. The northern headwaters of Deep Creek watershed burned in a wildfire around 1889, which resulted in an ECA of around 30 percent. There was also a slight increase in 1920, but ECA for Deep Creek watershed drops gradually from around 10 percent in

1920 to <1 percent in 1970. There is a slight increase in ECA around 1930 when the road along Deep Creek was constructed, but the small clearing width for road construction has a very small effect on ECA.

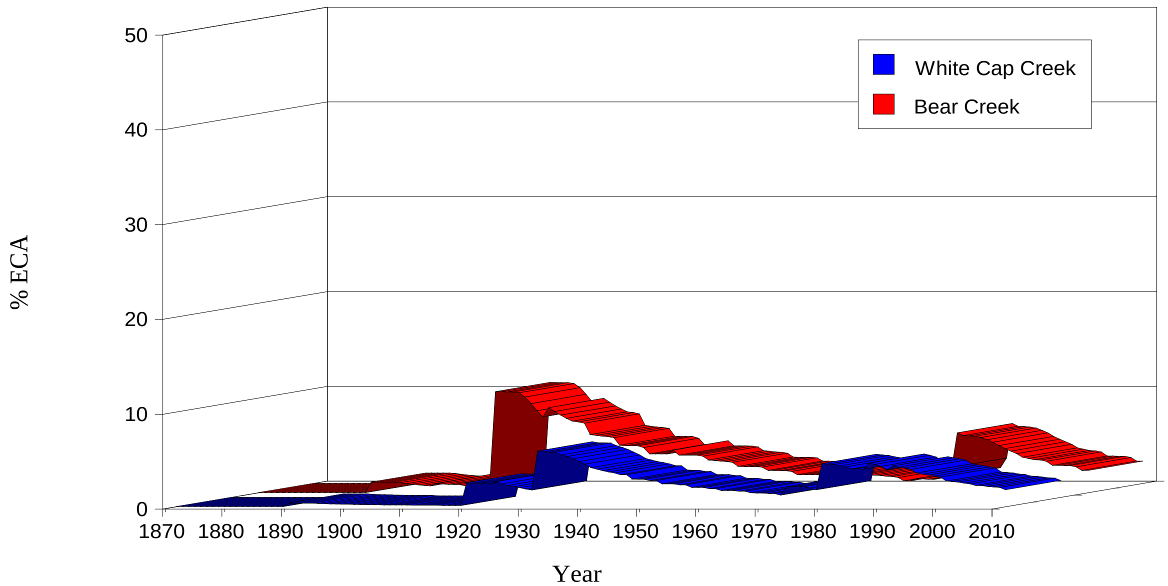
Figure 4.9: Percent Equivalent Clearcut Area: Deep Creek, Little Clearwater River, and Running Creek Watersheds



The ECA for the Little Clearwater River watershed peaked three times over a 30-year period: at 8 percent in 1910, 20 percent around 1919, and 23 percent around 1925. Two of these fire periods occurred in two of the large fire history years of 1889 and 1910. In 2000, a wildfire burned in the Little Clearwater River watershed; 38 percent of the watershed burned, 5 percent at high severity, 8 percent at moderate severity, with the rest at low severity. This fire peak is not shown on the graph above. The estimated first year fire peak flow increase for Flat Creek, a tributary of the Little Clearwater River, was around 30 percent. The Running Creek watershed peaked between 1880 and 1890 at around 33 percent ECA, and again in the 1919 at 48 percent. From the 1920s to the current time the ECA in Running Creek watershed has gradually decreased. Around 1 percent of Running Creek watershed burned in 2000. This is not reflected on graph 4.9. The pattern illustrated by these three watersheds is representative of other wilderness watersheds that were modeled for ECA. Between 1880 and 1940 several peaks occurred due to wildfire, followed by a quick recovery. The ECA has gradually declined to almost 0 percent in all watersheds. This is probably due to fire suppression in the past 60 years.

***White Cap Creek and Bear Creek Watersheds*:** Figure 4.10 displays the historic ECA for the White Cap Creek and Bear Creek watersheds. The main disturbance in the two watersheds is historic fire. The fires that have occurred since 1870 have not been large stand-replacing fires that have burned large portions of the watersheds. The upper halves of the watersheds are at higher elevations, with snowpacks for a large portion of the year. The pattern of ECA peaks on the graph shows lower intensity, lower severity, and smaller fires than watersheds lower in the Selway subbasin. The highest peak in ECA in Bear Creek watershed was in 1920 at 10 percent, and the ECA remained around that level until 1920. After 1920, the ECA decreased slowly until around 1988 when it peaked at 5 percent, and then decreased to the current ECA of 2 percent. White Cap Creek watershed has the highest peak in ECA around 1941 at 6 percent, and has decreased to the current level of 3 percent. ECA recovers fairly quickly after each small fire, with this pattern continuing with small fires in the recent past.

Figure 4.10: Percent Equivalent Clearcut Area: White Cap Creek and Bear Creek Watersheds



Three Links Creek and Gedney Creek Watersheds**:** Figure 4.11 shows the overall ECA for the Three Links Creek and Gedney Creek watersheds. Most of the Gedney Creek watershed was burned by fire in 1910, with more fire in the 1920s. The ECA for the first large wildfire in Gedney Creek watershed produced an ECA peak of 60 percent, burning about 80 percent of the watershed around 1910. An extremely large fire occurred again in the 1930s with an ECA of 60 percent, burning again a large portion of the watershed. Three Links Creek watershed has a similar fire history, but with smaller ECA peaks. These watersheds represent the ECA patterns on the north Selway face of the lower Selway River below the wilderness boundary. These watersheds have a good portion of lower elevation breaklands with a long snow-free season, and south and west aspects where soil and vegetation dry out faster, which results in a longer and drier fire season. Fires are larger, have a higher severity, and burn large portions of the watersheds. These fires have probably had long-term effects in shaping stream channels, especially in the steep headwaters and breaklands where debris torrents occur after large fires. After the large fires in the first half of the twentieth century, the ECA has gradually recovered and dropped to almost 0, except for recent fire in Three Links Creek watershed.

Meadow Creek and O'Hara Creek Watersheds**:** Figure 4.12 shows that the Meadow Creek watershed has a fire history similar to that of the wilderness watersheds in the upper Selway subbasin. Meadow Creek shows an ECA peak of 8 percent from about 1880 to 1890, a 12 percent peak in ECA around 1910, and the largest peak of 42 percent ECA between 1910 and 1920. Over half of the watershed burned in the period from 1910 to 1920. After 1930, the ECA gradually drops to <1 percent by the year 2000.

The O'Hara Creek watershed has two peaks caused by historical wildfire, one peak of 10 percent ECA around 1900 to 1910, and the largest peak around 1910 to 1920 of 35 percent ECA. This is similar to the wilderness watersheds, with the peak of 35 percent starting to decrease around 1935, and continuing to decrease gradually to 9 percent around 1960. Timber harvest and road building in the 1960s increased ECA to 12 percent, where it remained until it started to decrease again in the 1980s, gradually leveling out in 2000 at 9 percent.

Figure 4.11: Percent Equivalent Clearcut Area: Three Links Creek and Gedney Creek Watersheds

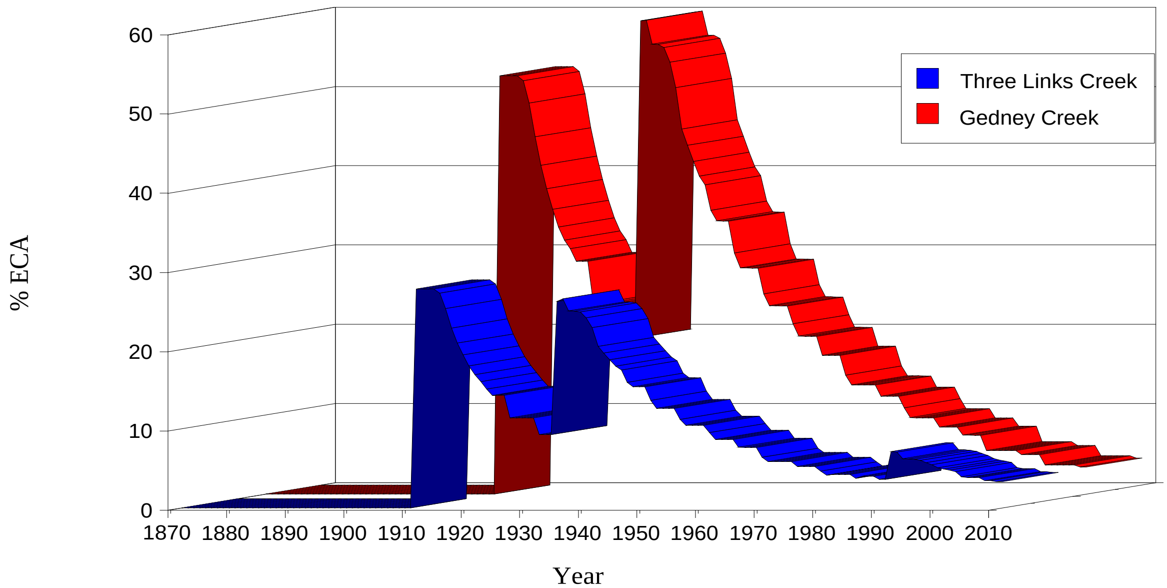


Figure 4.12: Percent Equivalent Clearcut Area: Meadow Creek and O'Hara Creek Watersheds

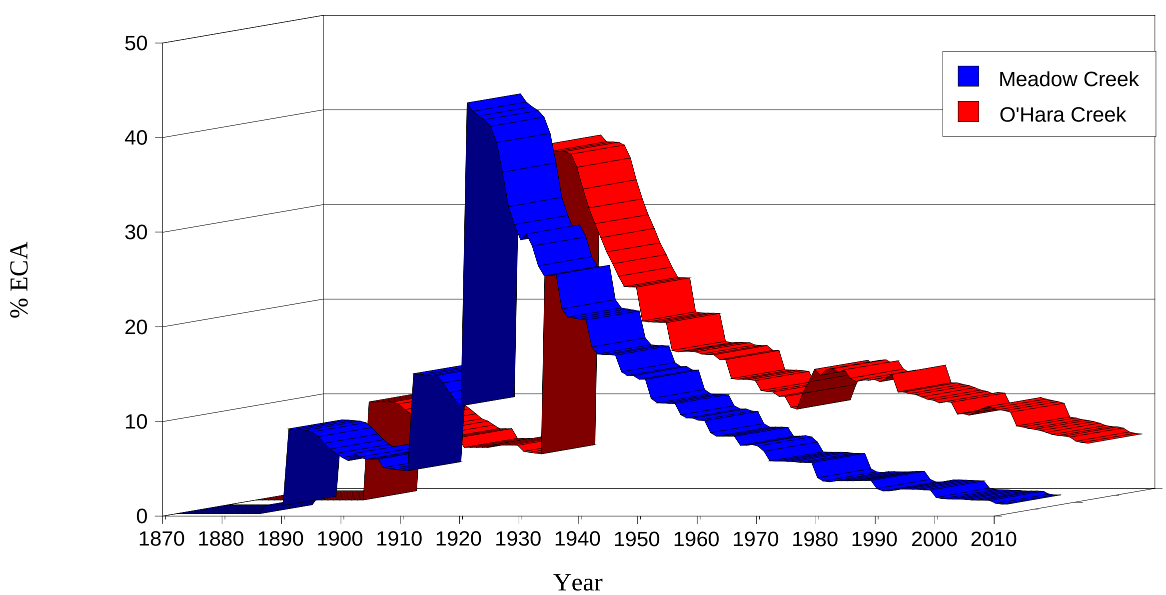


Figure 4.12 comparing Meadow Creek watershed ECA to O'Hara Creek watershed ECA illustrates that O'Hara Creek watershed, historically, had similar disturbance patterns from wildfire as Meadow Creek watershed and other watersheds in the wilderness. After around 1935, the watersheds start to recover and ECA decreases. The recovery continues in Meadow Creek watershed and the ECA decreases on through the current year to <1 percent. Around the late 1960s, the ECA in O'Hara Creek watershed increases slightly and maintains a level above 10 percent. It stays above 10 percent due to the presence of roads and continued timber harvest through the 1980s. With the decrease in road miles and reduction in timber harvest, ECA in O'Hara Creek watershed will continually decrease as stands recover. This pattern displayed by O'Hara Creek watershed is representative of roaded and harvested watersheds on the north Selway face. Trends for O'Hara Creek watershed show that there was a change from historical

pulse disturbances to press disturbances such road construction and timber harvest. Water yield and streamflow regimes in Meadow Creek watershed were dominated historically by pulse disturbances. Fire suppression has had the most effect on decrease in pulse disturbances in Meadow Creek watershed. The small amount of road building and timber harvest has not greatly increased the effect of press disturbances related to ECA, when comparing Meadow Creek watershed to O'Hara Creek watershed.

Water Yield Trends for the Selway Subbasin Watersheds: The Selway subbasin was historically dominated by pulse disturbances such as wildfire and floods. The cycle that is evaluated in this section looks at a small point in time of the fire history in the Selway tributary watersheds. There is an interconnection between the sediment and water yield regimes due to the changes in stream channels when water yield and sediment increase simultaneously after fire. The Selway subbasin has a history of several large fire occurrences between 1880 and 1935. The increase in water yield in the watersheds is related to the severity, intensity, and size of the fire in determining how much of the vegetative cover is removed in a watershed.

Watersheds in the high elevation headwaters of the Selway subbasin have long periods of snow cover. Fires are smaller and burn a smaller percent of the watershed area, when compared to watersheds such as Gedney Creek in the lower subbasin. The effect on water yield in these watersheds due to runoff after fire produces smaller peak flows, and probably has less effect on in-channel erosion and scour in stream channels. The largest influence on water yield and streamflow regime in these watersheds is still pulse disturbances such as fire and flood, and the decrease in pulse disturbances due to fire suppression.

Watersheds that were modeled in this analysis, such as Little Clearwater River and Running Creek, and other watersheds modeled but not displayed such as Moose Creek and its North and East Forks, Ditch Creek, and Otter Creek have similar patterns for ECA. Several ECA peaks from 15 to 40 percent occurred during the 1880 to 1935 fire period. Following this period, the peaks have recovered gradually. After 1935, all of the ECAs in the watersheds decrease gradually to almost 0 percent, and stay there until the year 2000. This is probably due to fire suppression and the loss of large-scale pulse disturbances in the watersheds.

The watersheds where management activities have occurred show similar ECA patterns to the wilderness and roadless watersheds until around 1960. After timber harvest and road construction start, ECA never decreases to 0 percent, but remains elevated at some point until timber harvest decreases. These watersheds have lost the influence on water yield and streamflow regimes related to large scale fire pulse disturbance and are influenced strongly by press disturbances such as timber harvest and road construction.

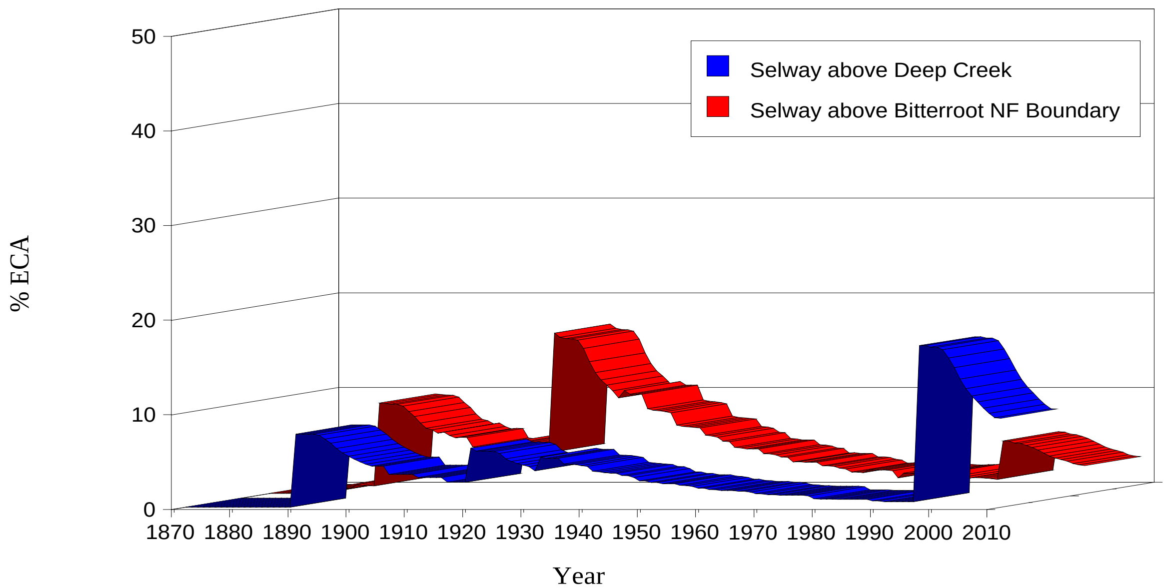
Stream channels evolved with sediment regimes and water yields tied to large pulse disturbances. The effects of long-term chronic sediment and increased water yield over prolonged periods, such as the past 40 years of management, are not fully known. The balance of water yield and sediment input into the system is definitely altered under the management regime.

Cumulative Effects of Water Yield on the Selway River: The graphs in Figures 4.13 and 4.14 represent cumulative effects of water yield on the Selway subbasin, as modeled for four areas between the headwaters and the mouth of the mainstem Selway River. These areas are:

- Selway subbasin above Deep Creek
- Selway subbasin above the Bitterroot National Forest boundary
- Selway subbasin above the mouth of Meadow Creek
- The total Selway subbasin

***Selway Above Deep Creek and Above the Bitterroot National Forest Boundary*:** Figure 4.13 represents the ECA for the upper Selway subbasin above Deep Creek, and above the Bitterroot National Forest boundary. Wildfire follows the patterns for ECA peaks for the historical fire years of 1889, 1910, 1919 and 1934. ECA peaks from wildfires were smaller in the upper Selway subbasin above Deep Creek than below Deep Creek. This is because the watersheds are located at higher elevations closer to the Bitterroot Divide where the snowpack lasts longer. This pattern is representative of the upper Selway watersheds that have large portions of the watersheds in high elevations, resulting in historical fires that are less severe and smaller.

Figure 4.13: Percent Equivalent Clearcut Area: Selway Above Deep Creek and Above the Bitterroot National Forest Boundary



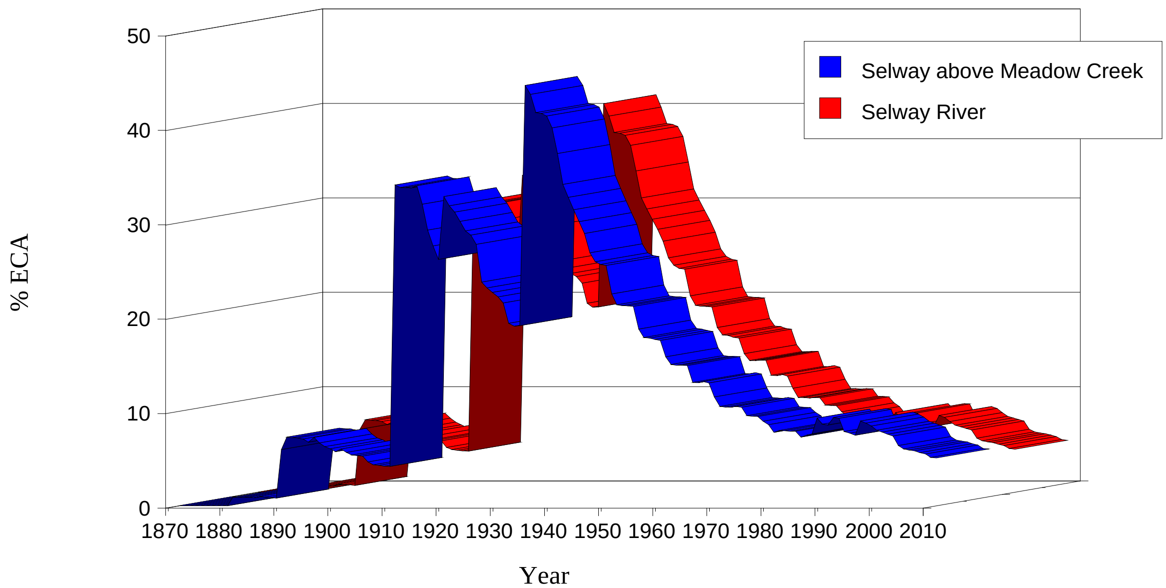
Peaks occurring in the Selway subbasin above Deep Creek were: 1889 at 7 percent, 1919 at 5 percent, and in the 1920s around 5 percent. The ECA dropped gradually until the early 1990s when the Swet Creek fire occurred. The ECA peaked at 15 percent at this point and is gradually decreasing. The fires that burned in the year 2000 are not shown on the graph above. A portion of Swet Creek burned again in 2000. Twenty-three percent of the Selway headwaters above Deep Creek burned with 5 percent high severity, 6 percent moderate severity, and 11 percent low severity.

The ECA of the Selway subbasin above the Bitterroot National Forest boundary displays ECA peaks that are higher than the basin above Deep Creek. This follows the trends of the tributary watersheds. In general, tributaries that are located lower in the basin (lower elevation) tend to have higher ECA peaks, but the peaks occur on similar years. The highest peak is in the 1920s at 15 percent. This contributes to cumulative increase in the ECA peak. A small increase in ECA is shown for late 1990s due to the Swet Creek Fire. The graph for the Selway subbasin above the Bitterroot National Forest boundary is a larger area, so the effect of the Swet Creek Fire on ECA is diluted more than it is for the Selway subbasin above Deep Creek.

***Selway Above Meadow Creek and Total Selway Subbasin*:** As can be seen in Figure 4.14, the ECA pattern for the Selway subbasin above Meadow Creek and the pattern for the total Selway subbasin are similar. The pattern shows that around 1910 the ECA above Meadow Creek, slightly over 30 percent, was due to wildfire. This was also true for the total subbasin acres. Around 1934, wildfire was responsible for an ECA of over 40 percent in the subbasin above Meadow Creek. This was also true for the total subbasin. This is an example of a large pulse disturbance in 1910 with gradual recovery between events, but with another large event occurring in 1934 on a subbasin-wide scale. The subbasin is adapted to the occurrence of and recovery from large pulse events. This is reflected in the vegetation in the Selway subbasin, which is dependent on and has adapted to regenerate after fire, and some of which can withstand low intensity fire. Ponderosa pine, for example, has bark that is adapted to withstand fire.

The ECA has gradually decreased, as vegetation recovered between 1940 and 1980, and no large widespread fire events occurred. There is a slight increase in ECA percent on both curves in the early 1990s, probably due to the Swet Creek Fire. The effects of fire in the subbasin and the large size of the subbasin seem to mute the effects of timber harvest in the lower Selway subbasin below Meadow Creek. The ECA is elevated slightly in the 1990s and drops in the early 2000s. Both graphs seem to be similar during this period.

Figure 4.14: Percent Equivalent Clearcut Area: Selway Above Meadow Creek and Total Selway Subbasin

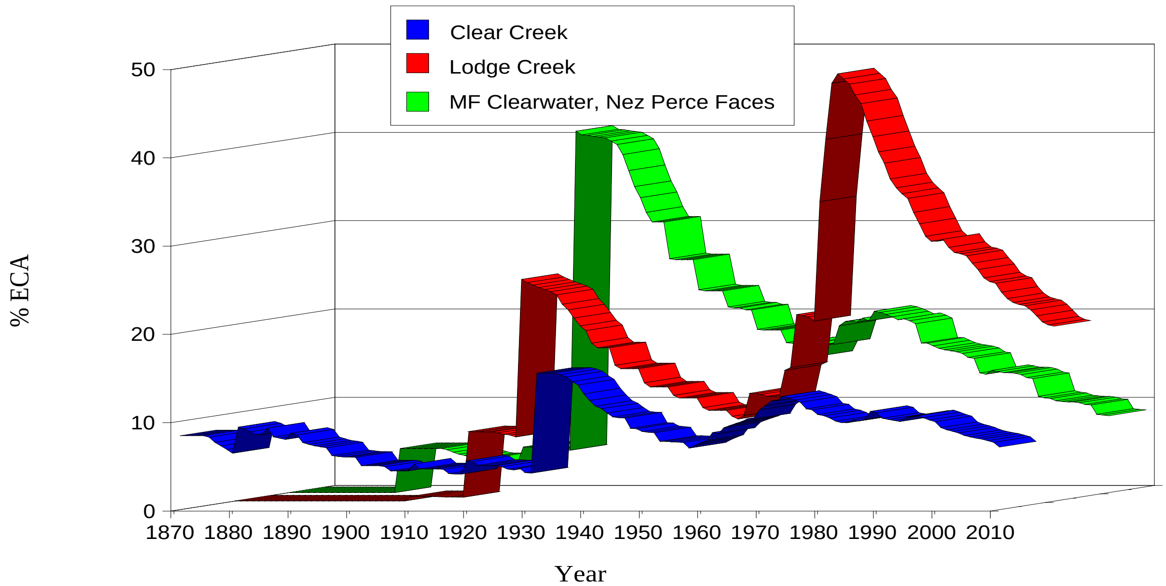


Lochsa Subbasin: The Lochsa River was not analyzed as part of the Selway and Middle Fork Clearwater subbasin assessment. Historical ECA from wildfire was not modeled for the Lochsa subbasin. But, because the Lochsa flows into the Middle Fork Clearwater River, it needs to be considered when considering water yield. The following discussion about some of the main tributaries of the Lochsa was written by Dick Jones, Forest Hydrologist for the Clearwater National Forest. The information is found in the draft *Hydrology and Water Quality Report for the Lochsa River Subbasin Analysis.*

Managed watersheds which are major tributaries of the Lochsa, such as Pete King Creek, Canyon Creek, Squaw Creek, and Papoose Creek, show a declining trend in streamflow and peak flow increases due to watershed recovery from past timber sales, and an increase in road obliteration. The watersheds were modeled in the WATBAL model, which estimates mean annual flow (Qa) and peak flow (Qp). Watersheds that historically had large wildfires, such as Wier, Old Man, Split and Fire Creeks show high water yield and peak flow increases after fire. From the WATBAL information for the Lochsa subbasin, Jones compiled a cumulative effects analysis for 68 percent of the Lochsa subbasin. From this information, he estimated that for the subbasin mean annual streamflow has increased 1.19 percent and peak flow has increased 1.24 percent. The increases were modeled in WATBAL using statistics from past road construction, timber harvest, and wildfire.

Middle Fork Clearwater Subbasin: Selected tributaries of the Middle Fork Clearwater subbasin are displayed on the following graphs that represent historic and current ECA trends, which represent water yield. Wildfire, road construction, and timber harvest effects are modeled. The graphs show two distinct patterns. The first shows historical wildfires from 1870 to 1940. The second pattern illustrates a combination of fire, timber harvest and roads.

Figure 4.15: Percent Equivalent Clearcut Area: Clear Creek, Lodge Creek, and Middle Fork Clearwater River-Nez Perce Face Watersheds

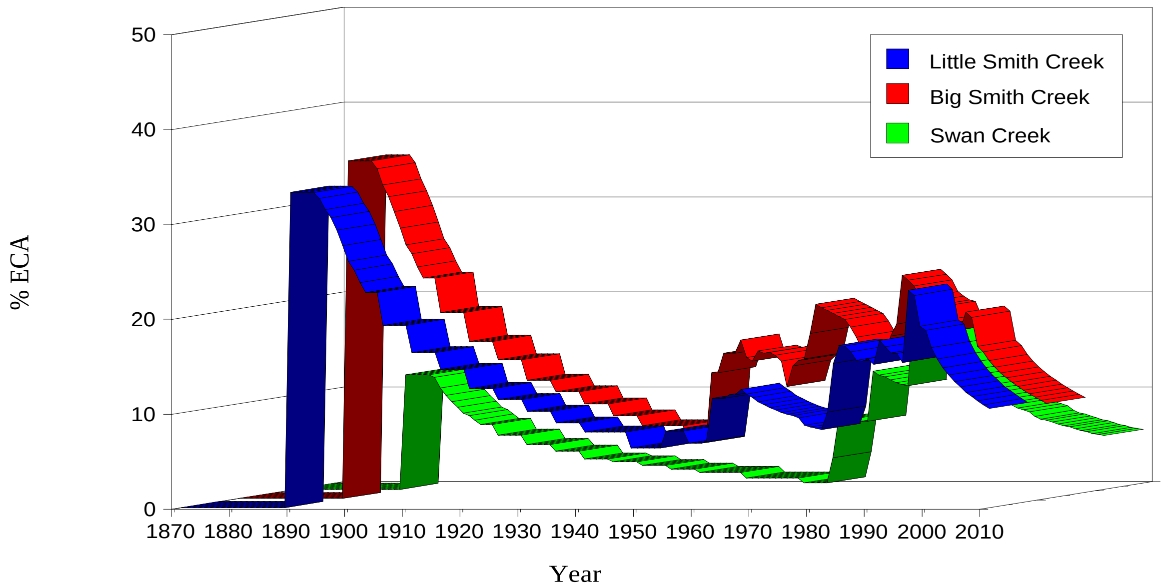


***Clear Creek, Lodge Creek, and Middle Fork Clearwater River-Nez Perce Face Watersheds*:** Figure 4.15 shows the ECA for the Middle Fork Clearwater River-Nez Perce face watersheds, Clear Creek watershed, and the watershed of a small sixth code HUC, Lodge Creek. All of these watersheds flow into the south side of the Middle Fork Clearwater River on the Nez Perce National Forest. ECA models the disturbance from wildfire in these watersheds starting at 1870. As in the roadless and wilderness watersheds, wildfire was the main disturbance in the 1940s. The Clear Creek watershed graph shows fire had a steady influence on ECA with an elevated level of ECA between 5 to 10 percent between 1870 and the 1930s. The highest peak in ECA for Clear Creek watershed is in the 10-year period between 1930 and 1940. The peak in ECA was 12 percent, with a gradual but steady decline until the 1950s, when the ECA dropped to 7 percent. At this point timber harvest and road construction started, and ECA peaked again at about 11 percent in the 1970s. ECA in Clear Creek watershed is dropping gradually, but never decreases below 6 percent. The graph does not break out the contribution from wildfire after 1950. The current ECA is mainly a result of timber harvest and road construction, but some percent may also be due to fire effects.

Lodge Creek is a small sixth code HUC watershed with steep headwater and mainstream channels. Lodge Creek watershed ECA peaked around 1910 to 1920 at about 7 percent, around 1920 to 1930 at about 23 percent, and in the 1970s at 46 percent. The first two peaks were due to wildfire, with a gradual drop in ECA after 1930 to 8 percent, but with a sharp increase in the 1970s due to intense logging activity in the headwaters. Between 1970 and the current time, the ECA has recovered to 18 percent. Most of this residual ECA is due to logging and road construction. The Middle Fork Clearwater River-Nez Perce face watersheds peaked at 40 percent due to wildfire around the 10 year period from 1930 to 1940, then dropped to 16 percent by 1960, and gradually increased with the onset of logging and road construction to 20 percent. The current ECA is 10 percent, and is mostly due to harvest and compacted skid trails and roads.

In the case of Lodge Creek watershed, the peak from timber harvest and roads exceeds the peaks from wildfire. In Clear Creek watershed and the Middle Fork Clearwater River-Nez Perce face watersheds, the 1934 wildfire peak exceeds the peak from management activities.

Figure 4.16: Percent Equivalent Clearcut Area: Little Smith Creek, Big Smith Creek, and Swan Creek Watersheds



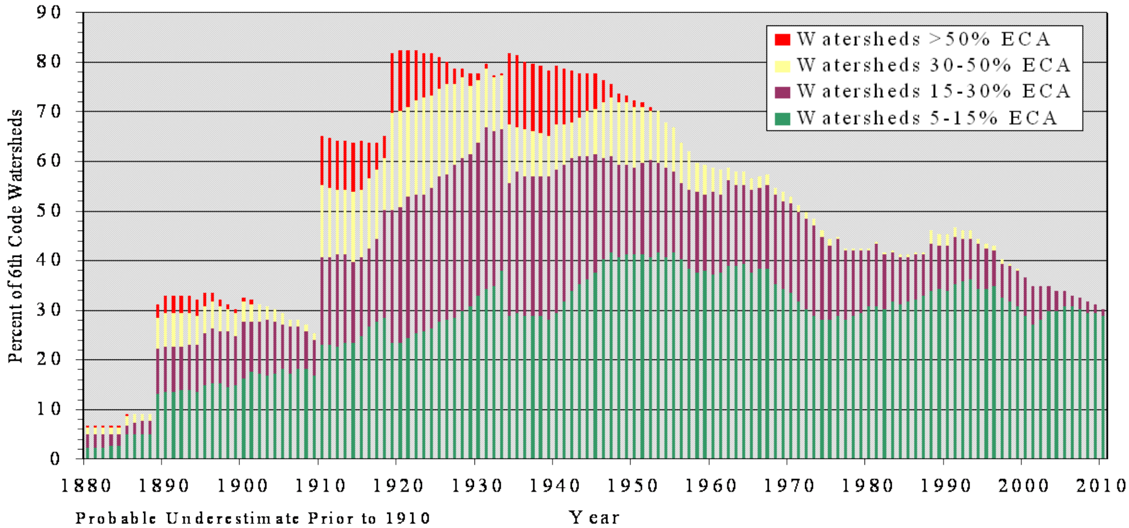
***Little Smith Creek, Big Smith Creek, and Swan Creek Watersheds*:** Figure 4.16 shows the overall ECA for three Middle Fork Clearwater subbasin watersheds in the Clearwater National Forest. The highest ECAs in Big Smith Creek and Little Smith Creek watersheds were 35 to 40 percent in the period from 1910 to 1920. Swan Creek watershed had a peak ECA of 12 percent around the same period. The ECA in all three watersheds decreased gradually to the mid-1940s to 1950s. The ECA peaks from historic fires were higher than the peaks due to management activities. The ECA peaks from fire recovered gradually, but recurrent harvest and road building in these three watersheds has not allowed recovery in the watersheds. After 1960, timber harvest and road construction contributed to an increase in ECA for Big Smith Creek watershed to a high of 22 percent, Little Smith Creek watershed peaked also around 22 percent, and Swan Creek watershed ECA increased with timber harvest and road construction up to around 15 to 20 percent. Currently all three watersheds are around 15 to 20 percent ECA.

Water Yield Trends for the Middle Fork Clearwater Subbasin Watersheds: Two patterns are displayed in the curves in Figures 4.15 and 4.16. The first is due to historic wildfire. The ECA peaks for wildfire increase very quickly and recover steadily over a period of years. This is a common pattern for pulse disturbances such as wildfire. Water yields increased and streamflow regimes changed after wildfire in conjunction with increase in sediment. This had a large effect on channel forming processes such as scour, aggradation, deposition and wood recruitment. The pattern due to management activities shows several ECA peaks occurring within a short time with very little recovery between timber harvest and road construction entries. This initiates press disturbances with large departures from the historic disturbance patterns.

Stream channels evolved with sediment regimes and water yields tied to large pulse disturbances. The effects of long-term chronic sediment and increased water yield over prolonged periods, such as the past 40 years of management, are not fully known. The balance of water yield and sediment input into the system is definitely altered under the management regime.

Historic fire peaks follow the same patterns from 1870 to 1935 as in the watersheds in the lower Selway subbasin. Fire was the dominant disturbance on the landscape historically. If management activities had not occurred after 1940, recovery patterns would mimic the lower Selway unmanaged watersheds, with recovery to almost 0 percent ECA for the year 2000, unless fire recurred.

Figure 4.17: Frequency Of Equivalent Clearcut Area (ECA) Condition In Sixth Code Watersheds in the Selway and Middle Fork Clearwater Subbasins



Frequency of ECA Condition in Sixth Code Watersheds in the Selway and Middle Fork Clearwater Subbasins**:** Figure 4.17 displays the percent of sixth code watersheds in each of four categories of ECA. It shows how the spatial extent and timing of ECA have varied with wildfires and timber harvest. The effects of the wildfires of 1889, 1910, 1919 and 1935 are clearly visible. Since then, the percent of watersheds in the higher ECA categories has decreased dramatically. Timber harvest beginning in the 1950s has tended to maintain the overall percentage of watersheds in the 5 to 15 percent ECA and to a lesser extent, in the 15 to 30 percent ECA categories. However, the percentage of watersheds in the 30 to 50 percent and the >50 percent ECA categories has decreased to zero. It should be noted that ECA prior to 1910 is probably underestimated, since no fire history data are available prior to 1870. Thus, the residual effects of fires prior to that date are not accounted for.

Sediment Yield

The erosion of the landscape yields sediment (solid fragments of organic or inorganic material) to streams. Sediment yield refers to the movement of sediment through the stream channel system. Sediment yield is typically expressed as tons per year or percent over base (synonymous with percent over natural). The morphology of stream channels (width, depth, slope, substrate, etc.) is the result of the balance between the timing and amount of water yield and the amount of sediment yield, deposition, and transport.

Sediment yield is an important indicator of watershed condition since it integrates the effects of upslope and in-channel conditions. It has a direct link to fish habitat quality as well as to other beneficial uses of water. Sediment yield is related to turbidity and often has a high correlation to fine sediment deposited in stream substrate. If changes occur in the amount of sediment or magnitude of peak flows, the shift in the balance between water yield and sediment yield can lead to changes in channel morphology. For instance, an increase in water yield without an increase in sediment yield may lead to scouring the stream bed and the channel down-cutting, and conversely, increases in sediment yield without an increase in water yield can lead to excessive deposition of sediment in the stream channel. The stream system is a connected network, and therefore changes in the physical processes upstream have effects in downstream reaches.

Sediment Analysis Methods: Sediment yield can be sampled in the field by a variety of methods. Most commonly, samples are taken for suspended sediment, bedload (sediment moving in or near a stream bed), and stream discharge. Another method uses sediment detention basins. Sediment yield can also be modeled using one of several approaches. For this analysis, sediment yield was modeled using NEZSED, a computer model tiered to a set of guidelines developed by hydrologists and soil scientists from the Intermountain Research Station and the Forest Service Northern and Intermountain Regions (USDA Forest Service, 1981).

From the guidelines that were developed and referred to above, specialists at the Nez Perce National Forest produced the NEZSED model. This model estimates the average annual natural or base rate of sediment yield and surface erosion sediment yield produced from roads, logging, and fire. The model is limited in that it does not consider the effects of activities on mass erosion greater than 10 cubic yards or the effects of grazing on stream bank erosion. Though the model shows annual variations in response to land use, it does not attempt to estimate annual variation due to climate or weather events.

Sediment yield for the Clearwater National Forest lands north of the Middle Fork Clearwater River were modeled using WATBAL. WATBAL models surface sediment yield using similar guidelines as NEZSED, based on the guidelines discussed above. WATBAL also models mass wasting erosional processes developed on the Clearwater National Forest using landslide data derived from the Clearwater National Forest and research watersheds in the Idaho Batholith. The upper Selway subbasin portion of this assessment located within the Bitterroot National Forest was modeled using hand calculations for percent sediment over base using the Forest Service Northern and Intermountain Region’s sediment methodology. Main sediment sources in these watersheds were Selway River access roads and historic wildfires.

Sediment Yield in the Selway and Middle Fork Clearwater Subbasins: Historically, in the Selway and Middle Fork Clearwater subbasins, the main disturbances were pulse disturbances such as fires and floods. In general the pulse of sediment from wildfire or flood events shows sediment increases, with recovery in a few years. In the wilderness and roadless watersheds, this process has been somewhat affected by fire suppression since 1930. In general, the fires that occurred between 1880 and 1934, mainly the four largest fire years of 1889, 1910, 1919 and 1934, show quick pulses of sediment ranging from 10 to 60 percent, and recovery in a few years. These sediment pulses from fire were interspersed with floods that occurred in 10 to 15 year intervals, often resulting in pulses of sediment from landslides and debris torrents. These events occurred if floods followed soon after wildfire.

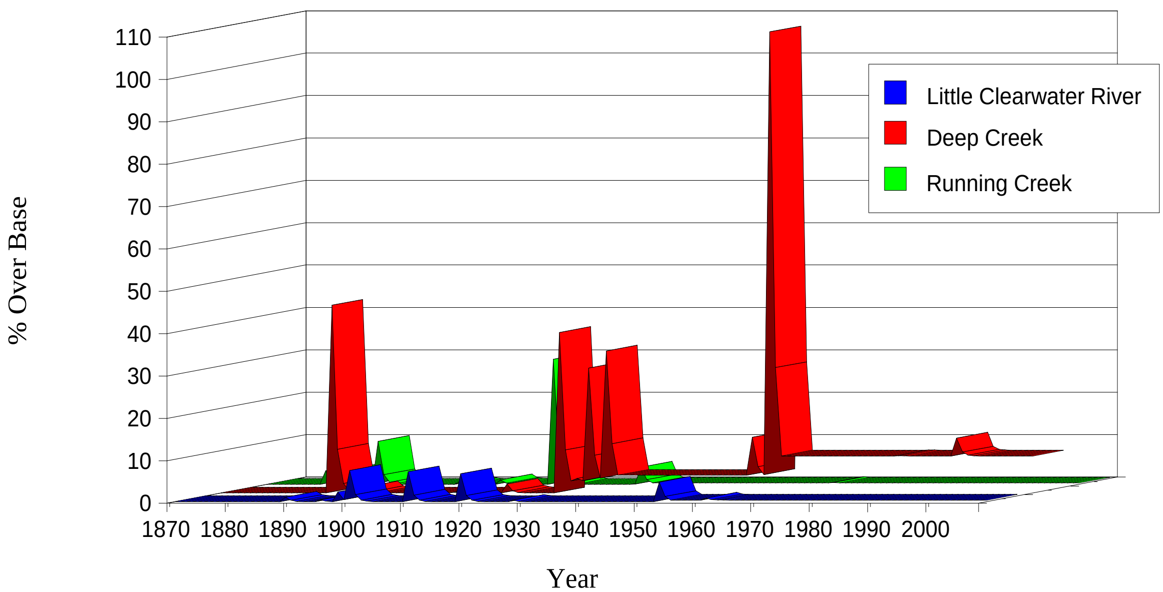
In the lower Selway subbasin below the wilderness boundary, the Middle Fork Clearwater subbasin, and a few watersheds with roads that access wilderness trailheads such as Deep Creek, roads and timber harvest have been a source of wide-scale press disturbance resulting in sediment regimes that have affected aquatic integrity, mostly in tributary streams. Sediment modeling based on road construction and reconstruction activities, beginning as early as 1930 in some tributary streams such as Deep Creek, shows that the effect of increasing sediment levels above the natural base levels was virtually continuous from 1930 until 2000.

For this analysis, sediment yield was modeled for the period 1870 through 2010. The disturbance history before 1870, mainly wildfire, was not modeled for sediment yield, so percent sediment over base before 1870 is unknown. Since sediment from fire recovers within 5 years when modeled in NEZSED, this is only a concern for the years 1865 to 1870. For the wilderness and roadless areas of the Selway subbasin, wildfire is the main disturbance that is modeled, except for some access roads, such as the road along Deep Creek. The sediment analysis for the wilderness includes natural baseline plus sediment from historic and current wildfires. From 1940 through 2010 in the lower Selway subbasin and the Middle Fork Clearwater subbasin, human activities such as timber harvest and road construction started to occur and are projected to continue. Timber harvest and road effects, combined with wildfire effects, are modeled for this period. Of these effects, the model suggests sediment recovery from wildfire after 5 years and recovery from timber harvest after 7 years. The model predicts a continuing sediment production from roads as long as they remain on the landscape.

The sediment modeling for the Selway and Middle Fork Clearwater subbasins does not include the effects of activity-induced mass erosion, except where WATBAL was used on the Clearwater National Forest portion of the Middle Fork Clearwater subbasin. Road effects are probably underestimated during the period from 1940 through about 1980 because sediment mitigation measures were not as refined during that period, but technical limitations of the model would have made it very difficult to account for this difference. Thus, roads built during this period were modeled with their current mitigation values, rather than those that would have been in place when initially constructed.

Selway Subbasin Tributary Watersheds: Following are graphs that show modeled sediment for tributary watersheds of the Selway River and sediment yield for modeled reaches of the mainstem.

Figure 4.18: Percent Over Base Sediment Yield: Little Clearwater River, Deep Creek, and Running Creek Watersheds



***Little Clearwater River, Deep Creek, and Running Creek Watersheds*:** Figure 4.18 shows percent over base sediment yield for the Little Clearwater River, Deep Creek, and Running Creek watersheds. About 30 percent of the headwaters of the Deep Creek watershed burned in a wildfire around 1880 to 1890, with a peak of 41 percent over base sediment yield. There were several sediment peaks from wildfire and construction of the road from Elk City to Darby between 1920 and 1935. The highest peak at 33 percent is from the construction of the road along Deep Creek between 1928 and 1933; the second peak is around 1933 when the road was reconstructed. The construction of Hells Half-Acre Road around 1933 to 1939 also contributed to sediment peaks in Deep Creek watershed. The peaks from wildfire drop to 5 percent within 5 years, tending to be a pulse disturbance with a quick recovery. The next large peak shown due to reconstruction and widening of the road along Deep Creek is 108 percent over base. This tends to be a press disturbance resulting in long-term chronic sediment levels.

Road 468 to Magruder follows Deep Creek for 14 miles, often encroaching upon or occupying part of the original stream course. Along much of the 14 miles there are no buffer strips of vegetation between the road and the stream, so sediment delivery is directly into the stream. Rehabilitation of the road sediment sources was planned along Deep Creek in 2001. Chronic sediment is shown for Deep Creek watershed at around 8 percent continuing on into 2000, due to continuing effect from the road along with a smaller residual effect from past wildfire. Sediment yields from fire tend to recover relatively quickly, but road systems, especially directly next to streams, continue to produce sediment for long periods. The Selway Road Sediment Stabilization Project of 2001 should help reduce chronic sediment.

Running Creek watershed has a similar fire history to other upper Selway subbasin watersheds. A sediment peak of 10 percent is shown in 1889, and a peak of 29 percent in 1919, followed by quick recovery. A peak of 4 percent over base in 1934 is shown on the graph when the road along Running Creek was constructed. Sediment dropped to <1 percent within a few years and remains there until the year 2000. One percent of Running Creek watershed burned in the year 2000.

The Little Clearwater River watershed shows small peaks in sediment yield of 4 to 7 percent in 1889, 1900, 1910 and 1919, which is similar to the fire history of the watersheds in the upper Selway subbasin. The sediment decreases within a couple of years to <1 percent for all four fire years. Around 1953, a road was constructed that follows the ridge at the headwaters of the watershed, creating a sediment peak of 4 percent over base, with a decrease to <1 percent in a few years. In the year 2000, 38 percent of the Little Clearwater River watershed burned. Sediment peaks for the 2000 fires are not shown on the sediment graphs. In the watershed of Flat Creek, a tributary of the Little Clearwater River, the modeled projected sediment peak for spring 2001 is as high as 30 percent. This does not represent the total watershed, but is an example of the projected spring 2001 sediment peak. The overall Little Clearwater watershed will have a lower peak. Flat Creek watershed had the most area burned with high and moderate severities, so it has the highest projected sediment peak.

White Cap and Bear Creek Watersheds**:** Figure 4.19 displays sediment yield in percent over base for White Cap Creek and Bear Creek watersheds. Patterns displayed on the graph show frequent small peaks from fire from 1870 to 1935. The sediment peaks show a distinct pattern that differs from watersheds located geographically lower in the Selway subbasin. Watersheds in the lower subbasin with longer snow-free seasons show similar, but higher sediment peaks from fire. White Cap Creek and Bear Creek watersheds show three sediment peaks from wildfires that occurred from 1880 to 1935. All of the sediment peaks are under 10 percent.

The fire occurrence from the period 1870 to 1935 is similar to other watersheds in the upper Selway subbasin. Fires are less severe, more frequent, and smaller in lower elevation, dryer parts of these watersheds. Similar patterns are displayed for more recent fires that have occurred from 1970 to the 1990s. Recovery from fire in White Cap Creek and Bear Creek watersheds has been fairly rapid, and the absence of human disturbance has allowed the watersheds to return rapidly to one percent over base.

Three Links Creek and Gedney Creek Watersheds: Figure 4.20 shows percent over base sediment yield for Gedney Creek and Three Links Creek watersheds. The sediment patterns show large pulse disturbances caused by wildfire with large sediment peaks. These watersheds are in the middle lower Selway subbasin. Although the headwaters of these watersheds are high elevation, large portions of the lower watersheds are snow-free longer and occur on lower elevation breaklands. Fires occur earlier, are higher in severity and intensity, and encompass more of the watershed, producing higher sediment peaks.

Figure 4.19: Percent over Base Sediment Yield: White Cap Creek and Bear Creek Watersheds

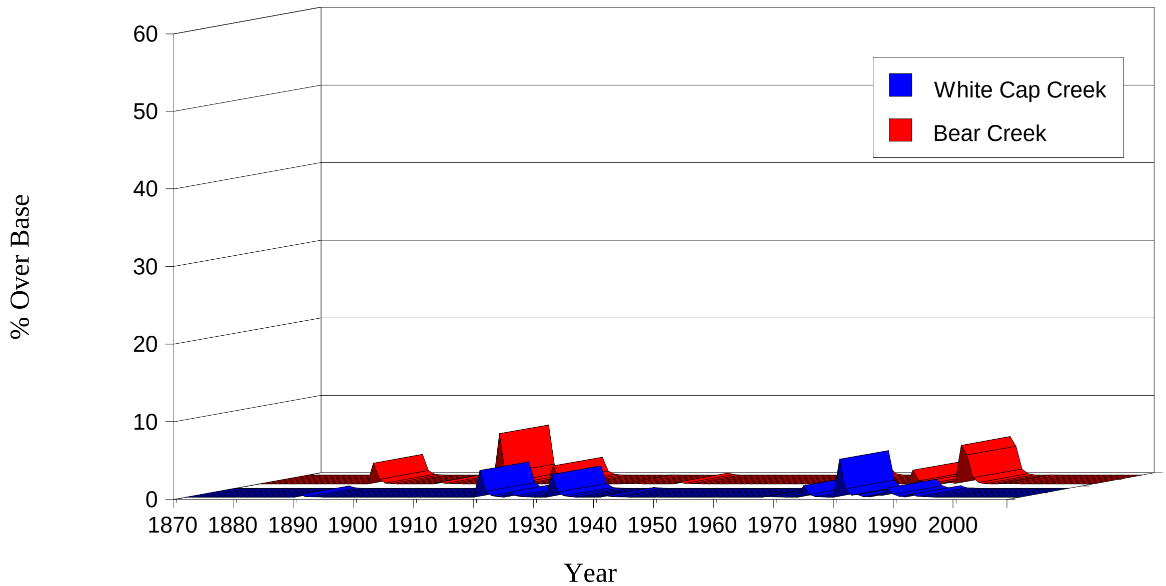
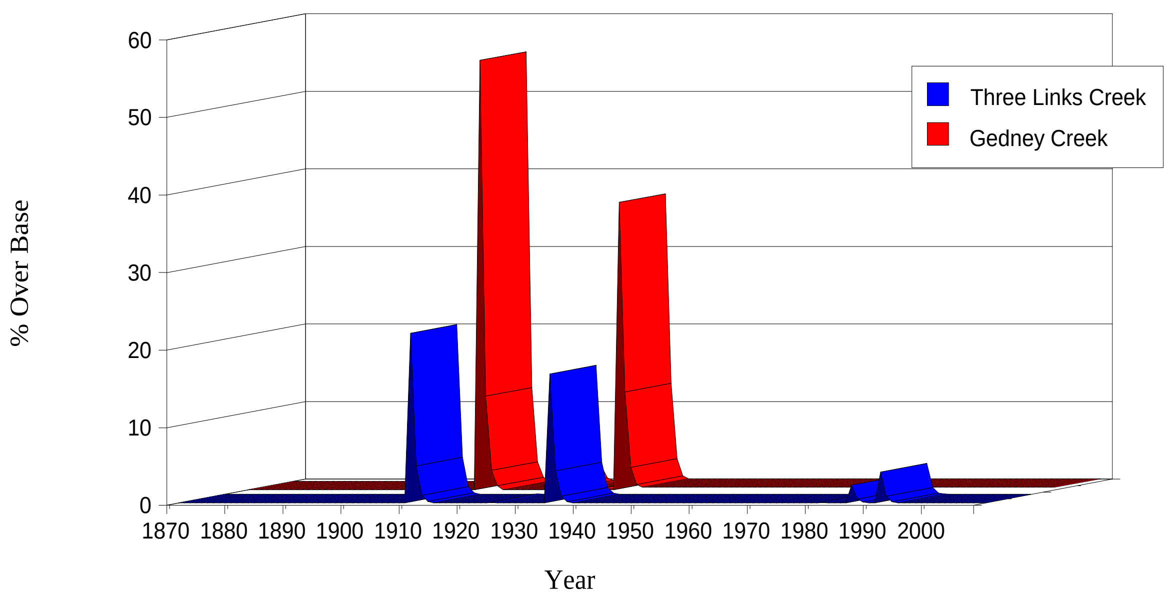


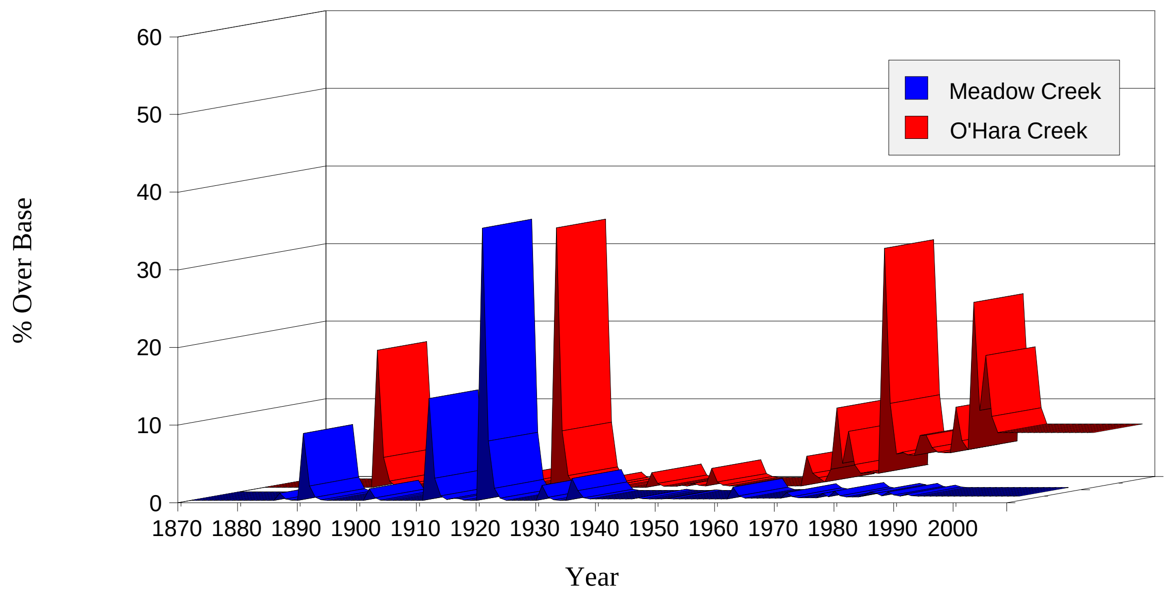
Figure 4.20: Percent Over Base Sediment Yield: Three Links Creek and Gedney Creek Watersheds



The two largest historical wildfire years for Three Links Creek and Gedney Creek watersheds are 1910 and 1934. The 1910 fire burned around 80 percent of the Gedney Creek watershed with a percent over base sediment peak of 55 percent. Around 50 percent of the Three Links Creek watershed burned with a percent over base sediment peak of 22 percent. The next large fire cycle for the Gedney Creek and Three Links Creek watersheds occurred in 1934. The 1934 fire burned over 50 percent of Gedney Creek watershed, with a peak of 37 percent over base sediment, and around one-third of the Three Links Creek watershed burned, with a peak of 16 percent over base sediment. After each wildfire, percent over base sediment decreased to <1 percent within four years.

Although sediment from mass wasting is not shown on the sediment graph or calculated in NEZSED, floods that occur as heavy rain, such as in 1964, resulted in large debris torrents coming down Gedney Creek and possibly Three Links Creek. The debris torrents supplied large amounts of wood and sediment to Gedney Creek and the main Selway River. From around 1940 to the present, the sediment peaks resulting from fire have decreased and large pulse events have not occurred. This is a common trend in the wilderness and roadless watersheds. This is mainly due to fire suppression.

Figure 4.21: Percent Over Base Sediment Yield: Meadow Creek and O'Hara Creek Watersheds



Meadow Creek and O'Hara Creek Watersheds**:** Meadow Creek and O'Hara Creek watersheds both show similar sediment peaks from wildfire in three of the four large historic fire years. O'Hara Creek watershed had a peak of 18 percent in 1889, and Meadow Creek watershed had a peak of 9 percent. Meadow Creek watershed has a sediment peak of 13 percent in 1910 from wildfire, and Meadow Creek and O'Hara Creek watersheds have large peaks of 35 and 33 percent from the 1919 wildfires. Both watersheds show a rapid recovery from wildfire, and peaks of <3 percent until development of roads and timber harvest began around 1960. The Horse Creek watershed experienced some timber harvest and road building in the late 1970s up until the early 1990s. The Meadow Creek watershed is so large that the activity peaks from the Horse Creek development do not have a large effect on the sediment peaks for Meadow Creek.

The development-related pattern for O'Hara Creek watershed shown in Figure 4.21 starts around 1960. The development of roads and timber harvest in O'Hara Creek watershed results in sediment peaks that are similar to the wildfire peaks, but recovery to sediment base levels does not occur, and chronic long-term sediment remains in O'Hara Creek watershed, mainly from roads, until the present time. When the curves for Meadow Creek watershed and O'Hara Creek watershed are compared from 1960 to 2000, the pattern of quick recovery of sediment to base level from wildfire in Meadow Creek watershed can be seen, and the chronic sediment interspersed with peaks from timber harvest and roads in O'Hara Creek watershed is apparent. This is a good comparison of pulse versus press disturbance between the two watersheds. The sediment level shown for O'Hara Creek watershed for the year 2000 is still 8 percent over base. Between 1996 and 2000, 20 miles of the 100 total miles of road in the O'Hara Creek watershed were obliterated. The effect of this road obliteration will be a small peak in sediment the first year, but over time road obliteration will result in a large decrease in chronic sediment source in the watershed.

Sediment Trends For The Selway Tributary Watersheds: The Selway subbasin historically was dominated by pulse disturbances such as wildfire and floods. The cycle that is evaluated in the sediment analysis only looks at a small point in geologic time from 1870 to 2010. During this time most of the basin had a history of several large fire years between 1880 and 1935. The severity and extent of the fires in the tributary watersheds varied due to elevation, landform, aspect, moisture regimes, and distance from the mouth of the Selway River, along with vegetation types. Press disturbances that produced long-term chronic sediment levels in some tributary streams started as early as 1930 with road construction in the Deep Creek watershed.

When comparing the watersheds in the upper Selway subbasin and the Little Clearwater River, Deep Creek, and Running Creek watersheds, two trends are apparent. First, the pattern of sediment peaks before 1930 is caused by wildfire, and quick recovery occurs in the Little Clearwater and Running Creek watersheds. Second, a pattern is shown for Deep Creek watershed, with chronic levels of sediment still remaining in 2000 due to the road along Deep Creek and dating from the time of its first construction in 1930.

Sediment patterns in watersheds with more high elevation area and snow retained late into the year show peaks that vary from those of the watersheds in the middle and lower Selway subbasin. The sediment peaks recur almost as often, but are smaller than the peaks in watersheds lower in the subbasin. Peaks are smaller because of higher soil moisture later in the year, which in turn is related to shorter fire seasons. Historically, fires in watersheds such as White Cap and Bear Creeks had less severity and intensity and were smaller in area on a watershed scale. Note: The sediment peaks in the smaller watersheds are somewhat amplified by the NEZSED model and may be somewhat higher than real peaks, where in larger watersheds such as White Cap and Bear Creeks, the peaks are not amplified.

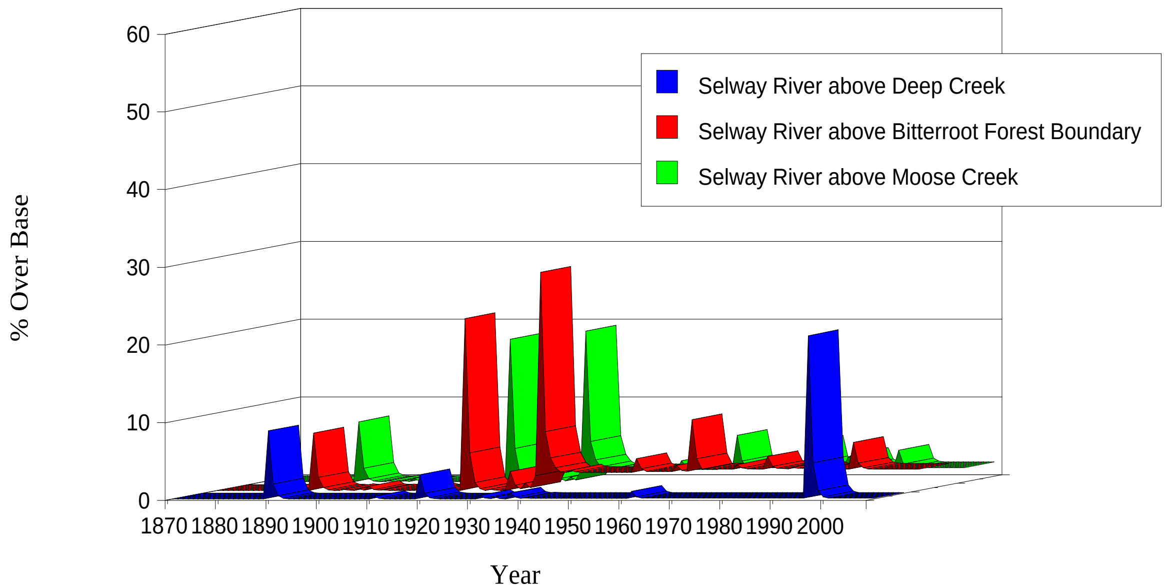
Sediment patterns in watersheds that are lower on the Selway River such as Gedney and Three Links Creeks have high sediment peaks. These watersheds have large areas that are snow-free early in the fire season, and are located on warm aspects. The fire season is longer and fires are more severe and intense, and encompass large numbers of acres in the watersheds. This type of fire season and fire is common in the lower Selway watersheds. This pattern represents the watersheds on the North Selway face that have some roads, but low road densities and minimal timber harvest.

The comparison of Meadow Creek and O'Hara Creek watersheds represents two patterns. Up to the early 1960s, similar peaks are shown for wildfire disturbance. Fires were large around 1920, with quick recoveries in the watersheds. The pattern changes around 1960, when timber harvest and road construction started in O'Hara Creek watershed. The pattern in O'Hara Creek watershed shows the change from pulse to press disturbances with the introduction of roads and timber harvest in the 1960s. The loss of pulse disturbance due to fire suppression is also apparent for both O'Hara Creek and Meadow Creek watersheds after the 1940s. The pattern in O'Hara Creek watershed represents the managed lower Selway watersheds on the south Selway face that have common histories of road construction and timber harvest.

Stream channels evolved with sediment regimes and water yields tied to large pulse disturbances. The effects of long-term chronic sediment and increased water yield over prolonged periods, such as the past 40 years of forest management, is not fully known. The balance of water yield and sediment input into the system is definitely altered under the management regime.

Cumulative Effects Of Sediment On The Selway Subbasin: The graphs in Figures 4.22 and 4.23 represent the cumulative effects of sediment on the Selway subbasin. The mainstem Selway was modeled at five points between the headwaters and the mouth. These points were the Selway subbasin above Deep Creek, the Selway subbasin above the Bitterroot National Forest boundary, the Selway subbasin above the mouth of Moose Creek, the Selway subbasin above the mouth of Meadow Creek, and the total Selway subbasin.

Figure 4.22: Percent Over Base Sediment Yield: Portions of the Upper Selway River Above Deep Creek, Above the Bitterroot National Forest Boundary, and Above Moose Creek



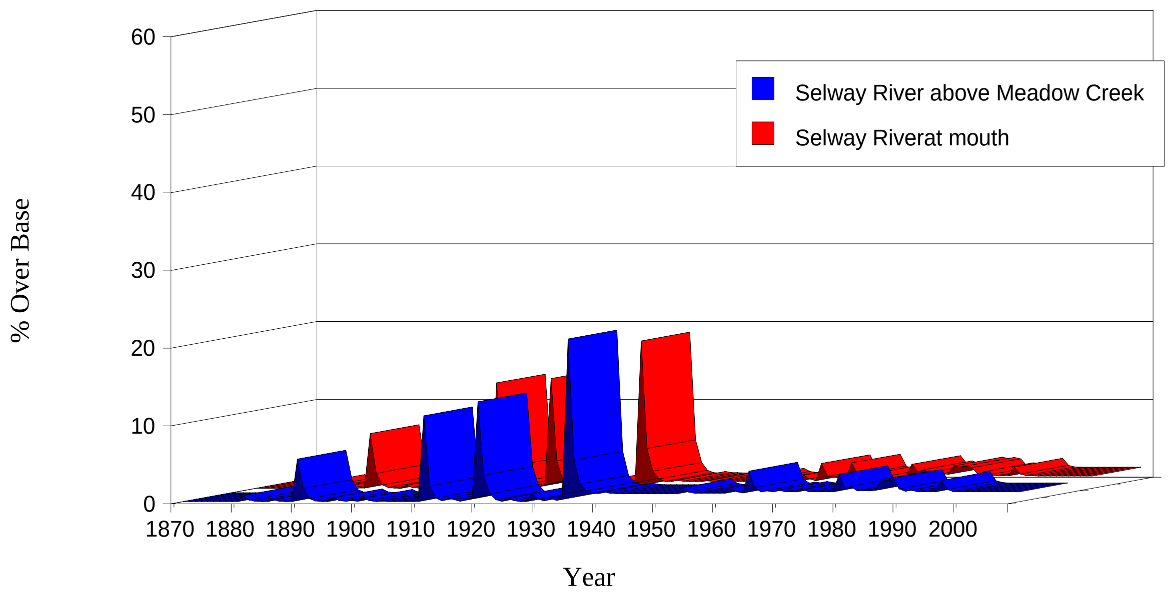
***Portions of the Upper Selway River Above Deep Creek, Above the Bitterroot National Forest Boundary, and Above Moose Creek*:** Figure 4.22 displays sediment yield for the mainstem Selway River with three reach breaks used for sediment modeling. The reach breaks for sediment modeling are the Selway subbasin above Deep Creek, the Selway subbasin above the Bitterroot National Forest boundary, and the Selway subbasin above the confluence with Moose Creek. Sediment peaks of 7 to 8 percent are displayed for all three reaches for the historic fire year of 1889, with a recovery close to 0 percent over base sediment yield within three years. The Selway River above Deep Creek shows several small peaks of less than 3 percent between 1920 and 1996. In 1996, the Swet Creek fire occurred, with a sediment peak of 21 percent over base sediment generated from the 40,000-acre fire. In 1997, after a heavy thunderstorm Swet Creek ran black with ash; this was observed during a monitoring trip. Discoloration in the upper Selway River in 1997 and 1998 was probably a result of mass wasting that was still occurring, or sediment and ash picked up in high spring runoff on Swet Creek. Discoloration in the river has been traced from the upper Selway to below Moose Creek. Portions of Swet Creek watershed burned again in 2000, and 23 percent of the area around the Selway headwaters above Deep Creek burned. Sediment peaks from the 2000 fires are not shown on the graph. The 5 percent high severity burn combined with the 6 percent moderate severity burn would probably produce a small sediment peak in the year 2001.

The Selway River above the Bitterroot National Forest boundary shows a sediment peak of 22 percent from historic wildfire, with a recovery to almost 0 percent over base sediment in a few years. In 1934, road construction resulted in a sediment peak of 28 percent. Over time, the sediment peak dropped to <5 percent, but remained at that level over a long period of time. There was another peak of sediment again in 1964 when the road was reconstructed, and some small peaks from wildfire. Currently, percent over base sediment is around 3 percent, most likely chronic sediment from the road, and possibly some residual sediment from wildfire.

Almost the same pattern in sediment peaks is observed for the reach above Moose Creek as for the reach above the Bitterroot National Forest Boundary. The fire history is similar, with sediment peaks showing rapid recovery. Sediment peaks from the construction and reconstruction of Road

468 along Deep Creek and Road 6223 along the Selway River to Paradise produce similar sediment peaks to those of the other reach, but the peaks are not as high. This is because sediment effect from the road is somewhat muted due to the larger subbasin size above Moose Creek. The sediment recovery is still somewhat elevated, around 2 percent currently.

Figure 4.23: Percent Over Base Sediment Yield: Selway River Above Meadow Creek, and Total Selway River

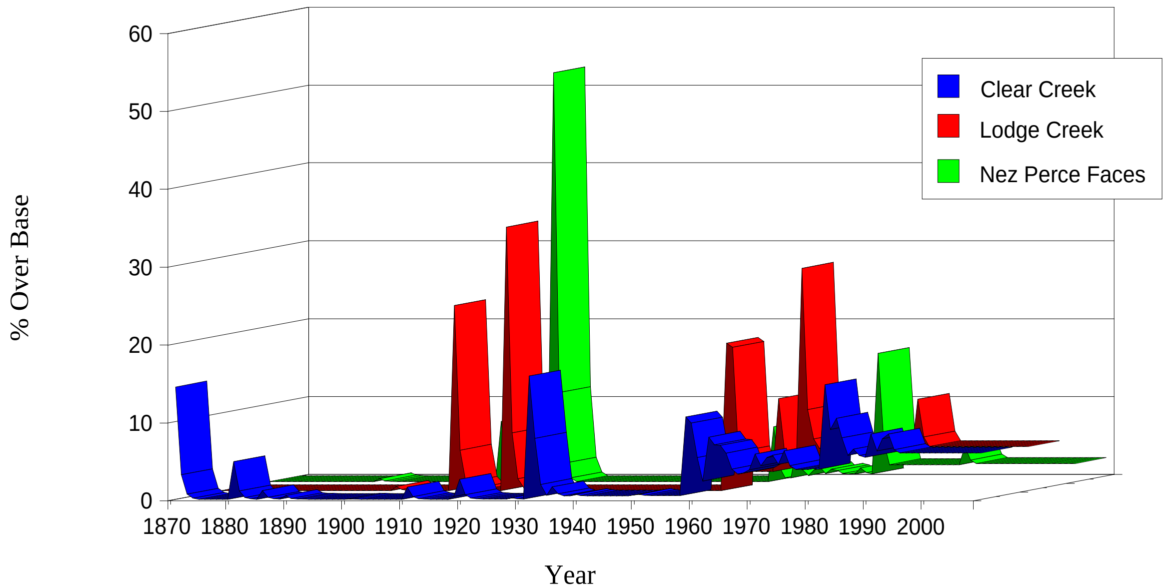


***Selway River Above Meadow Creek, and Total Selway River*:** Figure 4.23 displays the Selway subbasin above Meadow Creek, compared to the entire Selway subbasin. The history of fire displayed is similar when looking at the subbasin above Meadow Creek, and then including the rest of the subbasin below Meadow Creek. The four large historic fire years are all represented starting in 1889, with a peak of 5 percent for the Selway subbasin above Meadow Creek, and a peak of 6 percent when the total Selway subbasin is included. The pattern follows for 1910, with peaks of 11 percent and 13 percent; 1919 with peaks of 13 percent and 14 percent; and 1934 with peaks of 18 percent and 20 percent. Only 2 percent of the sediment peak was generated in the Selway subbasin below Meadow Creek.

Selway River Sediment Yield Summary: The four historic fire years stand out as showing the highest sediment peaks that represent the largest pulse disturbances during this time period. The pattern shows almost full recovery to 0 percent sediment yield over base between each sediment peak. After 1934, when roads were constructed along Deep Creek and along the Selway River to Paradise, 1 to 3 percent of sediment yield is always present until the year 2000. The roads and timber harvest below Meadow Creek probably contribute to this also, along with some wildfire. When comparing the sediment curves for the subbasin above Meadow Creek and the total subbasin between 1935 and 2000, little difference is observed. The effects of the timber harvest and road construction in the watersheds below Meadow Creek are probably muted by the size of the subbasin, so the peaks are similar.

Middle Fork Clearwater Subbasin Tributary Watersheds: Historic sediment trends for selected watersheds of the Middle Fork Clearwater subbasin are displayed in Figures 4.24 and 4.25. Wildfire, road construction, and timber harvest effect were modeled for surface sediment with the NEZSED model on the south side of the river in the Nez Perce National Forest. Watersheds on the north side of the river in the Clearwater National Forest were modeled for the same activities, but surface and mass wasting effects were both modeled using the WATBAL model.

Figure 4.24: Percent Over Base Sediment Yield: Clear Creek, Lodge Creek, and Middle Fork Clearwater River-Nez Perce Face Watersheds

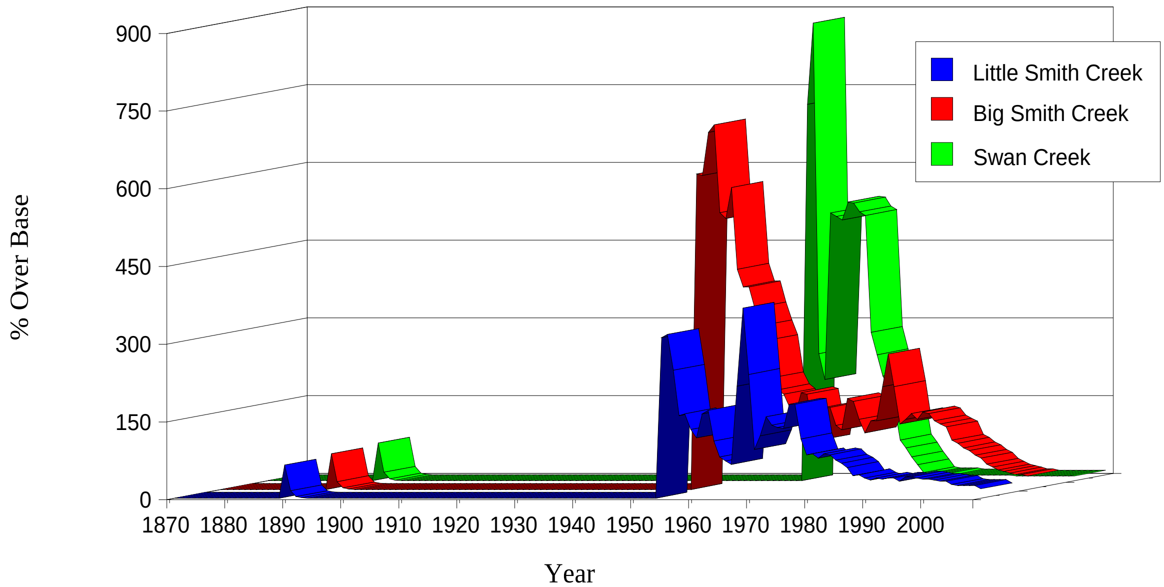


Clear Creek, Lodge Creek, and Middle Fork Clearwater-Nez Perce Face Watersheds**:** Figure 4.24 displays the sediment peaks for Clear Creek, Lodge Creek, and the Middle Fork Clearwater River-Nez Perce face watersheds from 1870 to 2000. These watersheds show relatively large sediment peaks in 1910, 1919, and in the early 1930s in response to wildfires. Recovery from these peaks was fairly rapid, as shown by the drop to almost 0 percent sediment yield by all three watersheds in 1940. The sediment yield patterns between 1962 and 1990 are similar for all three watersheds, although the magnitude of the peaks varies by watershed. This pattern is representative of press disturbances in all three of the watersheds. The peaks in Lodge Creek watershed may be somewhat amplified due to the small size of the watershed.

The increase in press disturbance in the watersheds due to managed activities is similar to watersheds south of the lower Selway River. Chronic sediment yield has been progressively increasing since road construction began in 1962, and continues at the present time. Sediment above base level is still around 6 percent as shown for all three watersheds.

The fire peaks (1910 to 1934) are slightly higher for all three watersheds than the peaks from human development (1962 to 1990). The important trend to note is that the sediment after fire recovers quickly to natural base levels and chronic sediment remains as long as roads are contributing sediment in the watershed.

Figure 4.25: Percent Over Base Sediment Yield: Surface and Mass Erosion; Little Smith Creek, Big Smith Creek, and Swan Creek Watersheds



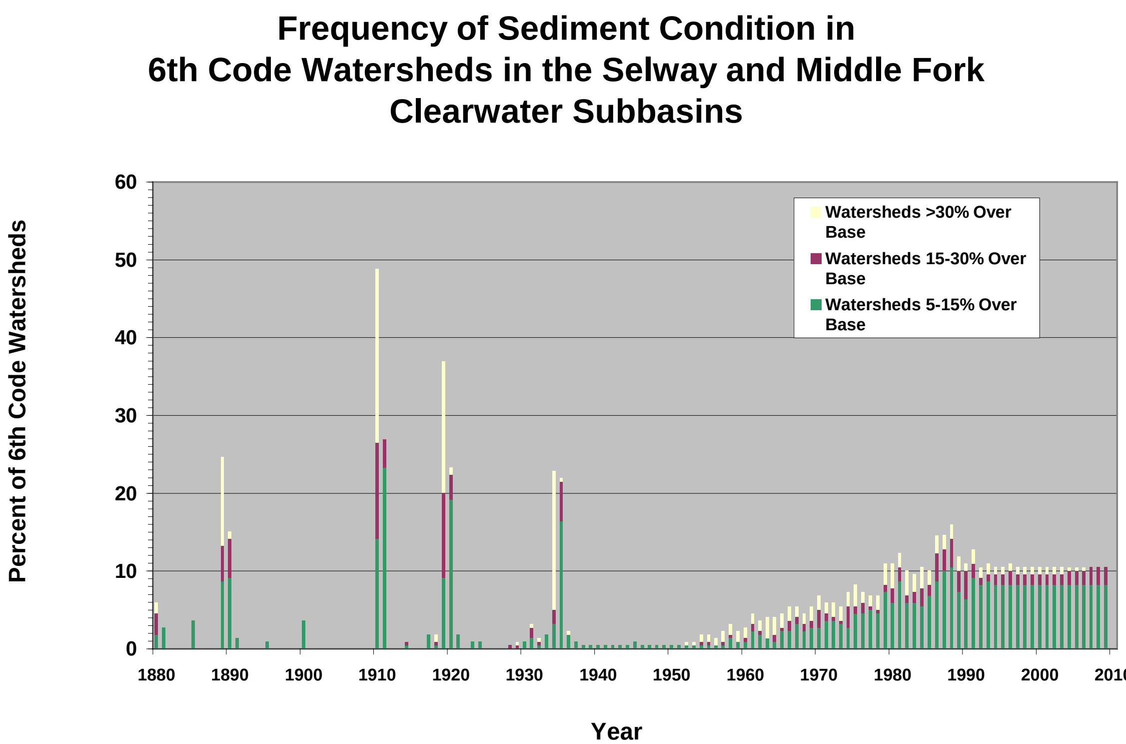
Little Smith Creek, Big Smith Creek, and Swan Creek Watersheds**:** Sediment yield and percent over base sediment shown in Figure 4.25 for Big Smith Creek, Little Smith Creek, and Swan Creek watersheds were modeled in the WATBAL model, which is used in the Clearwater National Forest. The base sediment is much higher than watersheds modeled in the NEZSED model. The WATBAL model includes mass wasting sediment plus surface sediment; the NEZSED model includes only surface sediment, and this difference results in a much higher percent over base sediment modeled by WATBAL. WATBAL models mass wasting erosional processes; it was developed by specialists at the Clearwater National Forest using landslide data derived from the Clearwater National Forest and research watersheds in the Idaho Batholith. Small sediment peaks from wildfire around 1910 in Big Smith Creek watershed quickly returned to base sediment levels. A second pattern is shown around the mid 1950s, when road building and timber harvest started in Big Smith Creek watershed, with the peak activity in 1955. The sediment peak for surface plus mass erosion was around 703 percent. There were several smaller sediment peaks from 1960 to 2000, with a gradual downward trend. In 1995 and 1996, a winter rain-on-snow storm caused several failures on roads and in clearcuts in Big Smith Creek watershed. This short-term, intense event was not modeled with the sediment model. Currently, percent sediment over base is 66 percent and is probably due to long-term chronic sediment from roads.

Road construction and logging activity started in Little Smith Creek watershed around 1954, with a peak for surface plus mass erosion of 256 percent over base sediment. Timber harvest and intermittent road construction continued from 1954 to 1970, with a peak of 366 percent over base sediment. Little Smith Creek watershed shows small sediment peaks of around 50 percent or less through the 1980s, and is currently around 30 percent. This is probably due to chronic sediment from roads. The wildfire sediment pattern and the sediment pattern from management mirror the patterns in Big Smith Creek watershed.

Swan Creek watershed shows the highest activity peak for timber harvest and road building in 1964, a surface plus mass wasting peak of 882 percent over base sediment. There was another peak of around 552 percent over base sediment in 1970, and then continued activity in the watershed; a lower rate and decrease in peak sediment is shown, with the current sediment level at 8 percent over base sediment. The effect of the mass wasting event in 1995-1996 on Big Smith Creek cannot be modeled. Chronic sediment from roads is present in all three watersheds.

Sediment Trends for the Middle Fork Clearwater Subbasin Tributary Watersheds: The sediment patterns shown for the Nez Perce face watersheds in the Middle Fork Clearwater subbasin display two distinct patterns. The first pattern is the sediment peaks from wildfire, which occurred before 1940. This represents the natural pattern of pulse disturbances that historically occur in these watersheds and have the most influence on the sediment processes and streamflow regimes. The second pattern is the sediment peaks generated from several repetitions of road building and timber harvest between 1960 and 2000. This pattern represents the change to press disturbances. The wildfire peaks were higher for all three of the watersheds in Figure 4.25, but the recovery of sediment generated after wildfire returns to natural base levels rapidly. The sediment peaks from the roads and timber harvest in the watersheds were not as high as the peaks from fire. In all the managed watersheds, chronic sediment is always present, although at low levels. Sediment never recovers to base level for the 40 year management period.

Figure 4.26: Frequency of Sediment Condition in Sixth Code Watersheds in the Selway and Middle Fork Clearwater Subbasins



The sediment patterns that are displayed for the Clearwater National Forest watersheds show small peaks for wildfire with quick recovery, and large peaks for timber harvest and roads, with chronic sediment remaining throughout the 40-year managed period with some decrease near 2000.

Stream channels evolved with sediment regimes and water yields tied to large pulse disturbances. The effects of long-term chronic sediment and increased water yield over prolonged periods, such as the past 40 years of management, are not fully known. The balance of water yield and sediment input into the system is definitely altered under the management regime.

***Frequency of Sediment Condition in Sixth Code Watersheds in the Selway and Middle Fork Clearwater Subbasins (Figure 4.26)*:** Figure 4.26 displays the percent of sixth code watersheds in each of three categories of percent over base sediment yield. It shows how the spatial extent and timing of sediment yield modeled from the large wildfires of 1889, 1910, 1919 and 1935 is clearly different from that modeled due to road construction and timber harvest that begins about 1955. Although the wildfires resulted in more watersheds being impacted immediately after the fires, recovery occurred within a few years. On the other hand, the chronic sediment yield associated with roads is shown as a continuing effect.

Field Testing and Calibration of the NEZSED Model: NEZSED has been tested against field sampled data in several studies at three scales of watersheds across the Nez Perce National Forest. Nick Gerhardt, Nez Perce National Forest Hydrologist, summarized the following sediment studies in the *South Fork of the Clearwater River Subbasin Steelhead and Bull Trout Biological Assessment,* 1999. The first study compared the measured and modeled natural sediment yields of 15 small watersheds tributary to Horse Creek, which is a tributary of the Meadow Creek watershed draining into the lower Selway subbasin (Gerhardt and King, 1987). These watersheds ranged in size from 0.08 to 0.57 square miles. Annual sediment yield was sampled with sediment detention basins, suspended sediment samples, and streamflow gauging. Of the 15 tributaries sampled, the model over-predicted sediment yield on nine sites and under-predicted on six sites. The mean result was that the model over-predicted by a modest amount.

The second study evaluated data from eight stream gauging stations on the Nez Perce National Forest. The watersheds measured ranged in size from 5.7 to 113 square miles. Three of these were located within the South Fork Clearwater subbasin (Gloss, 1995). At six stations, the field data consisted of suspended and bedload sediment samples, along with streamflow gauging. At two stations, sediment yield was estimated through the use of sediment detention basins and streamflow gauging. This study found that NEZSED under-predicted sediment yields at six stations and over-predicted at two stations, when compared to observed data from field sampling during water years 1986 through 1993. For the three stations within the South Fork Clearwater subbasin, field-sampled sediment yields averaged about 30 tons/mi²/year and modeled sediment yields averaged about 12 tons/mi²/year. In general, the model predicted better in average to below average water years, and more significantly under-predicted in above average water years.

The third sediment study to test the NEZSED model compared field sampled and modeled sediment yield at the subbasin scale using data for the Selway River and the South Fork Clearwater River (USDA Forest Service, 1995; Gerhardt, 1992). The South Fork Clearwater data was collected at the Mt. Idaho Bridge, near the forest boundary where the watershed area is about 830 square miles. Sampling occurred between 1988 and 1992 and consisted of a relatively small set of unsuspended sediment samples (n=52). When calculated as annual sediment yield, these data suggest an annual sediment yield at this site of 17,880 tons/year, or about 22 tons/mi²/year. Sediment yield predictions at this site, based on NEZSED, were estimated to be 15,080 tons per year, or about 18 tons/mi²/year. Thus, the model compared favorably with annual sediment yield estimates using field-sampled data. The Selway River data was field sampled at the O’Hara gauge on the lower Selway River where the watershed area is about 1,910 square miles. Sampling occurred between 1988 and 1992 and consisted of a relatively small set of suspended sediment samples (n=52). When calculated as annual sediment yield, these data suggest a sediment yield at this site of 54,900 tons/year, or if adjusted to the mouth, 55,700 tons/year. The watershed area at the mouth is 1,974 square miles, so the sediment production is 28 tons/mi²/ year. Sediment predictions based on modeled sediment at the mouth of the Selway River were 54,400 tons/year or about 27.5 tons/mi²/year. Thus, the model compared favorably with annual sediment yield estimates using field-sampled data (USDA Forest Service, 1995).

Watershed Processes And Conditions

Current Watershed Condition: In 1992, a coarse filter watershed condition analysis was completed for the Nez Perce National Forest (Gloss and Gerhardt, 1992). This assessment considered watershed sensitivity (erosion potential and channel type), disturbance indicators (road density, timber harvest, fire, grazing, and mining), and the condition of streams relative to the forest plan objective to derive a low, moderate or high rating for each watershed. Watershed sensitivity as defined in that analysis is shown on Map 15. Watershed sensitivity was derived from a forest-wide soil erosion hazard map and from generalized channel type groups within each watershed. Some small watersheds, such as the face drainages along the Selway and Middle Fork Clearwater Rivers were excluded from the analysis. Private lands were considered only if they were internal to predominately national forest lands.

The results for the 1992 watershed condition analysis are shown on Map 16, expressed as high, moderate, and low integrity. The analysis found across the Nez Perce National Forest, 52 percent of the area analyzed rated high integrity, 25 percent rated moderate, and 22 percent rated low. Within the Selway basin, the current thinking during the 1992 analysis of wilderness watersheds considered the wilderness watersheds as managed primarily for natural condition as opposed to some particular level of natural potential. Therefore, the wilderness watersheds were rated high integrity unless significantly disturbed by human activity. The affects of fire were not considered in the analysis of wilderness watersheds, but are analyzed later in this document. Watersheds on the lower Selway and Middle Fork Clearwater Rivers where some management activities occurred were rated moderate integrity, and O'Hara Creek watershed was rated low integrity due to mass wasting and erosion, mainly related to roads. This may have changed, due to the high concentration of restoration work in the O'Hara watershed to reduce road densities and restore fish habitat features in the channel.

In the 1992 report, the watershed condition results were expressed as high, moderate and low integrity. The terms concern and integrity are essentially opposites as used in this context. The results are the same, but the scales have been reversed.

Disturbance indicators are used to index watershed condition based on their effects on runoff or erosion processes. Disturbance indicators are related to natural disturbances such as wildfire and human activities such as road building and timber harvest. Wildfire is the main disturbance in wilderness watersheds resulting at times in a high percent of tree stand removal in wilderness watersheds. This can result in increased sediment, mass wasting and peak flows. In managed watersheds roads affect runoff processes through creation of impervious surfaces and disruption of subsurface flow patterns. Roads also expose soil and change slope conditions, which nearly always results in increased surface erosion and can result in accelerated rates of mass erosion, relative to natural conditions. Timber harvest effects are generally not as severe on a per unit area basis as roads, but generally result in increased erosion. The magnitude of timber harvest effects (aside from roads) is similar to fire, although substantial differences exist between timber harvest and fire effects.

Other significant human impacts in the lower Selway and Middle Fork Clearwater subbasins such as grazing, mining, subdivisions on river corridors, and agricultural practices are discussed in narrative form. Quantitative disturbance indicators are not readily available or commonly used for these activities. The *Nez Perce National Forest Plan* displays fish and water quality objectives for watersheds, and these are displayed on Map 18 in this assessment.

Table 4.20 summarizes road miles, road density, timber harvest acres, equivalent clearcut area, percent over base sediment yield, fire acres 1936 to present, and percent harvest for each watershed within ERUs.

Table 4.20: Watershed Condition Indicators

ERU	Cumulative Effects Watershed	Acres (Area)	Road (Miles)	Road Density (Miles per Mile^2)	Timber Harvest (Acres)	ECA (Percent)	Sediment Yield (Percent)	Fire Acres (1936 to Present)	Harvest (Percent)
North Selway Face	Boyd Creek	3,664	2.8	0.48	-0-	0.10		32	-0-
	Nineteen Mile Creek	1,988	0.6	0.31	82	0.08		-0-	0.04
	Glover Creek	5,695	-0-	.008	-0-	0.05	-0-	-0-	-0-
	Twenty Three Mile Creek	1,599	2.5	0.06	-0-	0.11	-0-	-0-	-0-
	Rackliff Creek	5,390	3.6	0.46	135	0.07	-0-	-0-	0.03
	Slide Creek	2,379	1.3	0.34	-0-	0.11	-0-	203	-0-
Upper Selway Canyon	30102 Face Watershed	38,286	-0-	*1	-0-	*1	*1	14,518	-0-
	Bad Luck Creek	21,370	-0-	-0-	-0-	0.01	-0-	1,278	-0-
	Crooked Creek	25,038	-0-	-0-	-0-	0.01	-0-	3,248	-0-
	Magruder Creek	9,381	9.40	0.66	-0-	0.00		-0-	-0-
	Upper Selway Basin	98,078	4.21	0.023	-0-	0.17	-0-	36,749	-0-
	Snake Creek	10,997	5.31	0.31	-0-	0.01	-0-	691	-0-
	Wynntest Creek	5,883	8.82	0.96	-0-	0.03	0	527	-0-
Lower Selway Canyon	30201 Face Watershed	19,427	27.5	*1	334	*1	*1	397	0.02
	Johnson Creek	1,788	0.9	0.37	-0-	0.03		0-	-0-
Middle Selway Canyon	30203 Face Watershed	61,342	9.4	*1	-0-	*	*1	8,295	-0-
Gedney & Three Links	Three Links Creek	27,560	-0-	-0-	-0-	0.05	0	3,624	-0-
	Gedney Creek	31,439	7.4	0.17	-0-	0.05	0	-0-	-0-
Pettibone	Bear Creek	114,307	-0-	-0-	-0-	0.04	0	27,406	-0-

ERU	Cumulative Effects Watershed	Acres (Area)	Road (Miles)	Road Density (Miles per Mile^2)	Timber Harvest (Acres)	ECA (Percent)	Sediment Yield (Percent)	Fire Acres (1936 to Present)	Harvest (Percent)
and Bear	Pettibone Creek	21,486	-0-	-0-	-0-	0.18	0	16,031	-0-
Clear Creek	Clear Creek	65,081	211.9	2.94	9,507	0.10	6	157	0.15
Deep Creek	Deep Creek	36,260	-0-	0.40	-0-	0.02	9	2,031	-0-
Ditch Creek	Ditch Creek	11,510	-0-	-0-	-0-	0.03	0	1,625	-0-
Running and Goat	Goat Creek	18,867	-0-	0.00	-0-	0.02	0	928	-0-
	Running Creek	57,633	10.6	0.11	-0-	0.01	0	137	-0-
O'Hara and Goddard	Goddard Creek	9,251	22.6	1.80	1,056	0.10	6.4	-0-	0.11
	Elk City Creek	1,800	2.0	0.99	213	0.06		-0-	12
	Falls Creek	7,582	21.0	2.12	827	0.11		266	0.11
	Swiftwater Creek	3,925	17.3	2.7	617	0.12	15	-0-	16
	O'Hara Creek	37,898	100.2	1.79	4,273	0.08	7	871	0.11
	Island Creek	3,866	6.8	1.45	291	0.07	6	59	0.08
Indian Creek	Indian Creek	31,991	.32	0.006	-0-	-0-	0	191	-0-
Selway Headwaters	Little Clearwater River	45,478	8.90	0.13	-0-	0.01	0	363	-0-
Martin Creek	Martin Creek	20,973	-0-	0.00	-0-	0.03	0	969	-0-
Meadow Creek	Meadow Creek	155,309	67.1	0.27	1,085	0.02	1	1,876	0.01
Middle Fork Clearwater Face	Middle Fork Clearwater	74,720	282.90	2.70	2,062	0.05		55	0.03
Otter and Mink	Mink Creek	10,229	-0-	0.00	-0-	0.03	0	1,091	-0-
	Otter Creek	10,534	-0-	.002	-0-	0.03	0	-0-	-0-
Moose Creek	Moose Creek	233,208	-0-	-0-	-0-	0.04	0	32,058	-0-
White Cap Creek	White Cap Creek	84,785	1.65	0.012	-0-	0.03	0	17,043	-0-
Total		1,427,977	837.00		20,482			172,719	

*[1] The face watersheds are a composite of watersheds. Indicators such as road density, ECA, and percent over natural sediment are indicators used for true watersheds, not composites of

watersheds.
Watershed Area, Timber Harvest, Road Miles, and Timber Harvest Percent: from watershed database as of 12-12-98.
Road Density: from GIS overlay of roads using INFRA database, 3-15-99.
ECA: from the watershed database and fire history GIS layer, 3-2-99
Sediment Yield: from NEZSED runs as of 1998, projected sediment yield over base.
Fire Acres: from the fire history layer, 1936 to present.

Road densities relative to watershed condition have been rated on various scales, depending on the study and its assumptions. In the 1992 Nez Perce National Forest coarse filter analysis, road density less than 1 mile per square mile was rated "low", 1 to 3 miles per square mile was rated "moderate", and greater than 3 miles per square mile was rated "high”. In the *Interior Columbia River Basin Science Document* less than 0.7 was "low", 0.7 to 1.7 was "moderate", 1.7 to 4.7 was "high", and greater than 4.7 was "very high".

The estimated clearcut acre (ECA) thresholds of concern have varied considerably, but typically range between 15 percent and 30 percent of 3rd to 5th order streams. Many of the watersheds in the Selway basin designated as roadless or wilderness have ECA percents between 0 to 5 percent. Most of the areas in the watersheds where vegetation is found as shrub fields or young conifer stands are due to wildfire. Other watersheds that have been managed for timber harvest or roads have ECA percents as high as 16 percent.

Table 4.20 indicates how impacts, primarily from roads, timber harvest, and fire, are distributed throughout the Selway and Middle Fork Clearwater subbasins. This is also illustrated on Maps 6 (Current Sediment Yield Over Natural Base), 17 (Road Densities by Watershed), 33 (Fire History, 1935 to Present), and 56 (Harvest History by Decade). Map 19 (Watersheds With Low Levels of Development) illustrates the high percentage of roadless and wilderness watersheds in the subbasins.

In general, the highest occurrence of fire acres occur in ERUs in wilderness and roadless areas where fires tend to be the largest natural disturbance, and where fire suppression has not been as aggressively applied. Fire acres that burned from 1936 to current times are greatly decreased from the fire acres that burned between 1870 and 1936. There have been 172,719 acres of fire mapped that have burned in the Selway and Middle Fork Clearwater subbasins since 1936 (see Map 33). In the ERUs that have been managed the most for timber harvest and road building (Middle Fork Clearwater River, Clear Creek, and O’Hara and Goddard), only 1,805 acres of fire have been mapped that have burned from 1936 to the current time. This gives a rough idea of the impact of fire suppression on natural fire disturbance cycles.

Relatively, impacts from roads and timber harvest are heaviest in the Clear Creek ERU, watersheds such as Island, Falls, O’Hara, Swiftwater, and Goddard, all within the O’Hara and Goddard ERU, and watersheds such as Big and Little Smith Creek, Lodge Creek, Tahoe Creek and Little Tinker Creek in the Middle Fork Clearwater ERU. Low to intermediate levels of impacts from roads and timber harvest are found in Rackliff Creek and Nineteen Mile Creek in the North Selway Face ERU. Some mostly unmanaged ERUs such as the Lower Selway Canyon, Running Goat, Middle Selway Canyon, and Deep Creek have some impacts from roads that access wilderness trailheads.

Increase in roads, landing and skid trail compaction from historical levels changes the way water is intercepted on the slope and the efficiency in which it is infiltrated into the forest soil. Removal of vegetation has changed the historical water yield regime, increasing peak flows and timing of peak flows.

Channel, Floodplain and Riparian Processes

Riparian areas and floodplains play an important role in how material (for example, sediment and wood) and energy (for example, flowing water and solar radiation) are processed within the aquatic system. Riparian areas support vegetation that either seasonally or continuously requires standing or flowing water. Riparian areas include streamside areas, lakeside areas, wetlands, and areas of high groundwater tables.

The term streamside area is calculated similarly to the riparian habitat conservation area (RHCA) that was introduced through PACFISH (Pacific Anadromous Fish Strategy). Streamside areas are used to describe the area along a stream or wetland. Riparian vegetation provides bank stability and shading along most streams. The degree to which this is important depends on stream size, channel type, and valley form.

Floodplains are low areas adjacent to streams that are periodically inundated when flows exceed bank-full stage. This is typically expected to occur about every 1 to 2 years. Floodplains provide important functions of energy dissipation, effect channel morphology, and also support riparian vegetation. Riparian areas and floodplains are disproportionately important to aquatic and terrestrial species.

Channel types (also known as stream types) are a system of classifying streams based on observable features that have process and functional implications. Basin characteristics that distinguish channel types include thread, entrenchment (access to floodplains), sinuosity, width to depth ratio, gradient, and substrate size (Rosgen, 1994). Channel types are significant in that various stream types process energy (water) and sediment in different ways. Channel types are further described and diagrammed in Appendix D, Aquatic Landtype Associations.

A given set of disturbances, such as flood, drought or fire, or changes in sediment yield can have varying effects depending on the channel type and magnitude of disturbance. Channels that have fine substrates in bed and banks are more sensitive to disturbance than channels that have cobble or bedrock substrates and stream banks. The concept of stream valley confinement is important. This term refers to the width of the valley floor relative to the stream width. Natural streams flowing in unconfined valleys are generally meandering, relatively low gradient, have substantial floodplains, and are free to migrate across the valley floor. Streams flowing in confined valleys are usually more linear, have a steeper gradient, have discontinuous floodplains, and tend to remain in place over time.

Aquatic Landtype Associations: Aquatic landtype associations (ALTAs) are ecological land units used to delineate areas with characteristic and distinguishable stream pattern, families of stream order and gradient, and broadly similar climatic, terrestrial and aquatic disturbance regimes and geologic groups. The Selway and Middle Fork Clearwater subbasins were mapped to show ALTAs. Map 10 displays the ALTAs referred to in the following discussions of channel types within the ALTAs.

ALTAs 1 and 2, which are glaciated ridges and slopes on granitic soils, dominate the Selway headwaters in the high elevations. These landforms are found above 5,500 feet and form the headwaters of streams such as White Cap, Moose, Pettibone, Bear, Deep, Marten, Ditch, and Otter Creeks and other streams. Streams flow through valleys that alternate between steep cirque or trough walls and low gradient valley bottoms.

The 1st and 2nd order streams are usually high gradient A or B channel types. They can be prone to channel scour during rapid snowmelt. The runoff regime is dominated by snowmelt. In the 3rd to 5th order streams, there are usually low to moderate gradients with some higher gradient reaches. Channel types are often E or C in low gradient glacial valleys and high elevation meadows. B channels are common in steeper glaciated valleys and some A reaches occur, especially where the gradient is controlled by large boulders or bedrock cascades. The steep tributary streams deliver material to larger order streams of lower gradients. This happens in pulses and is related to events such as fires, intense thunderstorms or rapid snowmelt. Lower reaches of the upper Selway streams change to steep A channel types as streams drop over breaklands to the Selway River Canyon. (See Appendix C for more information on channel types).

ALTA 5 includes low gradient glacial valley bottoms found along Moose Creek, East Moose Creek, Bear Creek and White Cap Creek. Channel types in this ALTA are B2 and B3 in forest and shrub-land, and C3 and C4 in meadow complexes. The streams are poorly to moderately confined and the hydrologic regime is dependent on snowmelt. Stream order in ALTA 5 is 5^{th} to 6^{th} order. Pulse events such as fire and floods, thunderstorms, debris torrents and spring runoff can affect 1^{st} to 3^{rd} order streams flowing into ALTA 5. This results in deposition such as alluvial fans and woody debris that contributes to bar formations and pool formations at tributary mouths.

The confined canyons of ALTA 7 are found in the lower Middle Fork Clearwater River subbasin. This ALTA is located in the lower half of the Middle Fork Clearwater ERU. Streams include lower Clear Creek, Maggie Creek, Sutter Creek, Big Horse Canyon and other small face watersheds. The landform is steep breakland on basalt bedrock below 5,000 feet elevation. The channels are confined in V-shaped valleys with steep slopes and moderate to steep stream gradients. The streams are linear, have almost no floodplain, and are typically 1^{st} to 3^{rd} order drainages. Channel types are mostly A, with smaller reaches of B. Snow pack is low, and rain-on-snow events can occur. Snowmelt is rapid and smaller face drainages are often intermittent. Mass wasting and debris torrents are part of the channel formation process. Watersheds in ALTA 7 in the lower Middle Fork Clearwater subbasin have been affected by road construction, timber harvest, grazing, and farm practices. Watersheds such as Maggie Creek, Big Horse Canyon, Lytch Creek, and Clear Creek show formation of alluvial fans at the mouth due to aggradation of alluvium. During the 1995 and 1996 winter storms, many small steep face drainages in the Middle Fork Clearwater subbasin experienced debris torrents that scoured the channels.

ALTA 15 consists of plateau landforms on the lower Middle Fork Clearwater River that are formed on basalt. These landforms are found in Clear Creek, Leitch Creek, Maggie Creek, Big Horse Canyon and other Middle Fork face watersheds. Most of the streams are 1^{st} and 2^{nd} order headwater streams with A or B channel types. The headwaters of the streams originate on the basalt plateaus and drop steeply from the plateau over the breaklands to the Middle Fork Clearwater River.

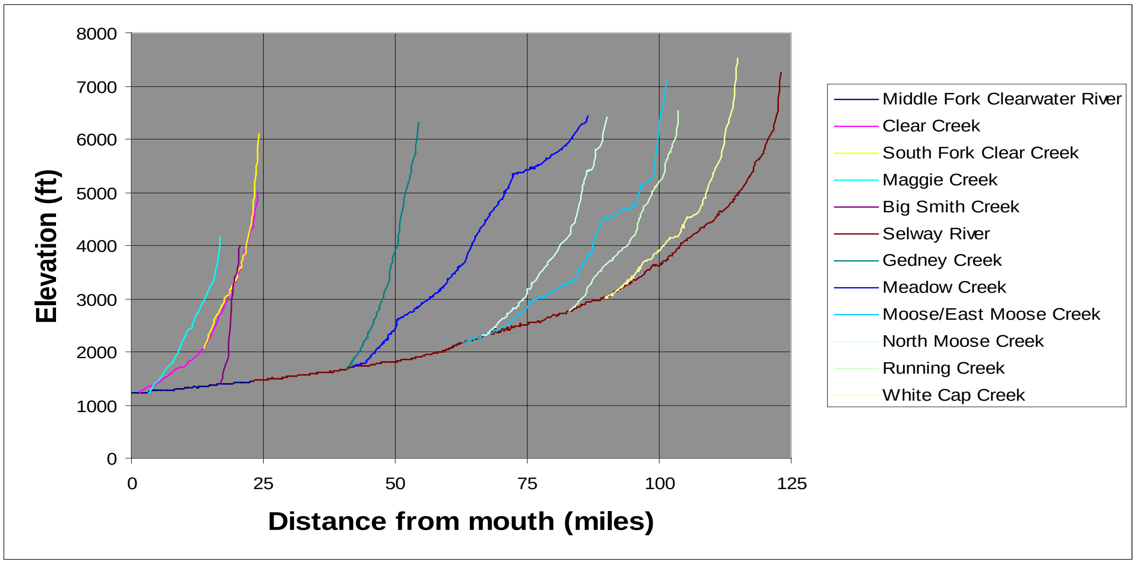
In the Middle Fork Clearwater River ERU the geology type changes from basalt to the Precambrian Belt rock metamorphics around Sutter Creek. ALTA 8 extends up the Middle Fork canyon and the Selway canyon on low elevation breaklands below 5,000 feet to Moose Creek. ALTA 3 occurs on low elevation breaklands on granitics below 5,000 feet and extends from Moose Creek to the Selway headwaters. The channels are steep to moderately steep and confined to V-shaped channels. The channel types are predominately A, with a smaller amount of B in short reaches. The steep reaches of these streams have large cobble and boulder substrate and transport water and sediment quickly to the mainstem Middle Fork Clearwater and Selway Rivers. Examples of these streams include Island, Falls, Elk City, Big Smith, Swan, Nineteenmile, and Johnson Creeks and the lower reaches of larger watersheds. Rain-on-snow and debris torrents are common processes and have been recorded as occurring during floods every 10 to 15 years on south aspects. ALTAs 3, 7 and 8 also include larger more complex streams as they drop steeply into the main rivers.

Channel Gradients: Figure 4.27 shows longitudinal profiles of the Selway and Middle Fork Clearwater Rivers and major tributaries. These profiles show the channel gradients at distances from the mouth. Some key features can be noted along individual streams. For example, the Middle Fork Clearwater River has a relatively consistent, low gradient. The Selway River has a consistent, moderate gradient until around 5 miles below Moose Creek. The gradient of the

Selway River profiles becomes gradually steeper until it becomes markedly steeper at the confluence of White Cap Creek and continues until the headwaters.

Relatively steep reaches occur in general in Maggie Creek, Clear Creek, Big Smith Creek, Gedney Creek, and reaches of Meadow, Moose, North Moose, Running and White Cap Creeks. Moderate reaches occur in lower portions of valleys such as Clear Creek, Moose Creek, Running Creek, White Cap Creek, and North Moose Creek. The lowest gradient reaches occur in meadows, such as upper Meadow Creek, East Moose Creek, and short reaches in upper White Cap Creek and Running Creek.

Figure 4.27: Longitudinal Profiles of the Middle Fork Clearwater River, Selway River, and Selected Tributaries



Within the Selway and Middle Fork Clearwater subbasins, most channel types are currently similar to those of presettlement times. Natural disturbances may have occasionally altered channel types from one state to another through erosional and depositional processes. There has been some change in the channel building and forming processes due to loss of natural disturbances such as wildfire. For example, a large wildfire followed by debris torrents would result in large inputs of wood, organic matter and sediment into the channel, reshaping it.

Human disturbances have resulted in some channel type changes within the subbasins. This has mainly occurred in a few watersheds and is discussed in the following section.

Stream Channel Conditions: Streams in the upper part of the Selway subbasin are located in the Selway-Bitterroot Wilderness and Frank Church River of No Return Wilderness. The streams are considered to be in near natural condition, except for road construction along the streams in Deep Creek, Running Creek, upper Selway River and Magruder Creek. Recent large fires have been the other main disturbance in the upper Selway subbasin watersheds. Refer to Maps 32 and 33 for the fire history. Streams in the Middle Selway basin are also assumed to be functioning close to their natural potential because they are located in wilderness or roadless areas where very little management has occurred. One exception to this is the Horse Creek watershed that flows into the Meadow Creek watershed. Horse Creek is included in a paired watershed study that compares the effect on sediment in a managed watershed with timber harvest, road construction, and prescribed fire treatments, to East Fork Horse Creek, which is an unmanaged control watershed.

Watersheds in the lower Selway subbasin below the wilderness have a wide range of conditions. The main human activities that have affected the stream channel conditions are road building and timber harvest. There has been very little mining activity. Cattle grazing effects are minimal and occur only in the headwaters of Meadow Creek and some of the Middle Fork face watersheds. Watersheds on the south side of the Selway River that have been effected by timber sale and road construction activities are Island Creek, Falls Creek, O'Hara Creek, Goddard Creek, Swiftwater Creek, and Elk City Creek. Road building and timber harvest have had more effect on O'Hara Creek than the other watersheds. Restoration in the past 4 years has decommissioned 20 miles of road. Fish habitat in-channel restoration work is planned for 2000.

Watersheds on the north Selway face of the Selway River canyon below the wilderness boundary have had some road building and timber sale activity, but not to the extent that stream channel conditions were altered to a large extent. The lower reaches of some of the watersheds, such as Boyd, Gedney, Glover, and Nineteenmile may have some in-channel effects from the debris removal efforts after the 1964 floods. The lower 500 feet of Nineteenmile Creek was channelized using gabions after a large debris torrent in 1965. Most of the middle to upper reaches of these streams still function close to natural potential.

Streams on the Middle Fork face located in the Clearwater National Forest have also had a history of timber harvest and road building. Of the smaller face watersheds, Lodge Creek has been effected the most, showing an increase in channel erosion from debris torrents that may be related to peak flows and increased water yield related to clearcutting over 50 percent of the headwaters in the 1960s and 1970s. Other small face watersheds on the Nez Perce National Forest have steep channels that are in good to excellent condition, as shown in the 1996 stream surveys.

Some of the smaller face watersheds on the Middle Fork Clearwater River show aggradations in the form of gravel alluvial fans at the mouth. Some examples are Maggie Creek and Big Horse Canyon. The deposition of alluvial fans is probably related to erosion from roads, agricultural practices in the headwaters, and timber harvest, which increase water yield and sediment in the stream and increase in-channel erosion.

Clear Creek watershed has a high streamside road density, and the channel has been altered by road construction and timber harvest in both the upper tributaries and main Clear Creek. Within the agricultural reaches, the channels have been heavily modified by vegetation removal, bank breakdown from grazing, road and residential encroachment, and sediment and bedload deposition related to these activities. The gradients in lower Clear Creek drop considerably and substantial bedload has been deposited at the mouth due to past flood events and in-channel erosion.

Streamside and Riparian Conditions: Streamside areas are the areas adjacent to streams that have the greatest effect on the aquatic environment. As discussed above, changes in riparian functions have occurred due to human activity. Map 11 shows the streamside activities that have had the most effect on influencing streamside and riparian processes. The major influences have been from road building, campgrounds, and subdivisions. Change in riparian function, as it relates to aquatic function, was assessed using: (1) timber harvest acres in the stream zone, (2) stream-side road miles, (3) streamside road density, and (4) indicators of stream crossings in the streamside area such as stream crossings per mile and streamside road density. These listed indicators were rated to assess effects on riparian function, as shown in the last column in Table 4.21. The streamside road density was rated using the road density classes as described in the *ICRB Science Assessment*.

Table 4.21: Change in Streamside Conditions

ERU	Watershed	Streamside Acres	Percent of CEW	Streamside Harvest Acres	Streamside Harvest Density Rating	Streamside Road Miles	Streamside Road Density	Streamside Road Density Rating	Stream Crossings/Mile	Stream Crossing Rating	Effect on Riparian Function
North Selway Face	Boyd Creek	718	20			.13	.12	Low	.15	Mod	Low
	Nineteen Mile Creek	363	18			.05	.09	VL	.17	Mod	Low
	Glover Creek	1,134	20			.06	.024	VL	.05	Low	Low
	Twenty Three Mile Creek	288	18			.03	.07	VL	.16	Mod	Low
	Rackliff Creek	934	17	0		.13	.11	Low	.05	Low	Low
	Slide Creek	357	15			.02	.03	VL	.14	Mod	Low
Upper Selway Canyon	30102 Face Watersheds	8774	23								
	Bad Luck Creek	5,521	25								
	Crooked Creek	4,809	06								
	Magruder Creek	1,902	20			3.52	1.12	Mod	.25	Mod	Mod
	Upper Selway Basin	19,551	20			.79	.03	VL	.01	Low	Low
	Snake Creek	2,264	21			5.31	1.50	Mod	.13	Mod	Mod
	Wynntest Creek	1,287	22			8.43	4.19	Mod	.27	Mod	High
L. Selway Canyon	30201 Face Watersheds	4,205	22	21	VL	19.78	3.01	High	.30	Mod	Mod
	Johnson Creek	305	17			.20	.41	Low	.35	Mod	Low
Middle Selway Canyon	30203 Face Watersheds	13,337	22			3.43	.28	Low	.08	Low	Low
Gedney and Three Links	Three Links Creek	4,937	18								
	Gedney Creek	5,444	17			.20	.024	Low	.03	Low	Low
Pettibone and Bear	Bear Creek	19,670	14								
	Pettibone Creek	4,061	19								

ERU	Watershed	Streamside Acres	Percent of CEW	Streamside Harvest Acres	Streamside Harvest Density Rating	Streamside Road Miles	Streamside Road Density	Streamside Road Density Rating	Stream Crossings/Mile	Stream Crossing Rating	Effect on Riparian Function
Clear Creek	Clear Creek	10,636	16	1,359	High	43.43	2.66	High	.74	High	High
Deep Creek	Deep Creek	7,130	20			14.43	1.30	Mod	.24	Mod	Mod
Ditch Creek	Ditch Creek	2145	17								Low
Running and Goat	Goat Creek	4,456	24								Low
	Running Creek	13,711	24			2.89	.13	Low	.04	Low	Low
O'Hara and Goddard	Elk City Creek	258	14	5		.27	.67	Low	.65	High	Low
	Falls Creek	1,149	15	80	High	.88	.50	Low	.47	Mod	Mod
	Goddard Creek	1,523	16	88	High	1.03	.44	Low	.29	Mod	Mod
	Swiftwater Creek	537	14	61	High	.62	.73	Mod	.37	Mod	Mod
	O'Hara Creek	7,259	19	346	Mod	16.91	1.49	Mod	.56	High	Mod
	Island Creek	474	12	17		.16	.20	Low	.17	Mod	Low
Indian Creek	Indian Creek	5,678	18			.32	.036	VL	.01	Low	Low
Selway Headwaters	Little Clearwater River	10,751	24			.50			.01	Low	Low
Martin Creek	Martin Creek	4,154	20			0.0					
Meadow Creek	Meadow Creek	29,258	19	180	Low	4.90	.11	Low	.04	Low	Low
Middle Fork Clearwater Face	Middle Fork Clearwater	11,917	16	572		59.9	3.24	High	.77	High	High
Otter and Mink	Mink Creek	2,056	20			0.0					
	Otter Creek	1,992	19			.04					Low
Moose Creek	Moose Creek	40,629	17			.05					Low

ERU	Watershed	Streamside Acres	Percent of CEW	Streamside Harvest Acres	Streamside Harvest Density Rating	Streamside Road Miles	Streamside Road Density	Streamside Road Density Rating	Stream Crossings/Mile	Stream Crossing Rating	Effect on Riparian Function
White Cap Creek	White Cap Creek	15,239	18			1.54	.06	VL	.009		Low
Total		403,678				146.87					

Ratings in Table 4.21 were defined using the following measures:
Streamside Area (calculated using the GIS layer):

- 300 feet for perennial streams with fish
- 200 feet for other streams.

Streamside Harvest Density:

- Very High: greater than 15 acres of harvest per 100 acres of streamside area
- High: between 5 to 15 acres of harvest per 100 acres of streamside area
- Moderate: between 2 to 5 acres of harvest per 100 acres of streamside area
- Low: between 0.5 acres of harvest per 100 acres of streamside area
- Very Low: less than 0.5 acres of harvest per 100 acres of streamside area

Streamside Road Density (using Quigley, 1997 road density classes):

- Very High: greater than 4.7 miles per square mile
- High: between 1.7 to 4.7 miles per square mile
- Moderate: between 0.7 to 1.7 miles per square mile
- Low: between 0.11 to 0.7 miles per square mile
- Very Low: less than 0.1 miles per square mile

Stream Road Crossings Per Mile:

- Very High: greater than one crossing per mile
- High: between 0.5 to 1 crossing per mile
- Moderate: between 0.1 to 0.5 crossing per mile
- Low: between 0 to 0.1 crossing per mile

Stream Road Crossings Per Mile Square

- Very High: greater than one crossing per square mile
- High: between 0.5 to 1 crossing per square mile
- Moderate: between 0.1 to 0.5 crossing per square mile
- Low: between 0 to 0.1 crossing per square mile

See Map 12 for streamside road densities, Map 13 for streamside areas, and Map 14 for road crossings per mile.

Summary Of Hydrologic Analysis

Physical aquatic conditions in the upper Selway subbasin have not changed substantially since the initiation of human disturbances in the early 1900s, except in a few watersheds.

Upper Selway Canyon ERU: The greatest change in the Upper Selway Canyon ERU is related to the road along Deep Creek and the upper Selway River. This road encroaches on the stream, decreasing the width of riparian function, increasing sediment from road sources, and increasing in-channel erosion. These changes also affect the condition of fish habitat. This road also has had a strong effect on the sediment regime of the Selway River as shown in the sediment modeling. Using the stream condition indicators to rate roads effects, the Upper Selway Canyon ERU is rated moderate for effect on riparian function.

North Selway Face ERU and Gedney and Three Links ERU: Riparian function in the Selway subbasin below Paradise to the wilderness boundary has not been significantly affected by human activities. There may be a slight effect on availability of wood in streams due to fire suppression. The North Selway Face ERU and the Three Links and Gedney ERU have been somewhat affected by human disturbances. All watersheds in the North Selway Face ERU have some effects from human activities such as a very small amount of road mileage (< 0.2 miles of road in the riparian zone) and low to very low streamside road densities. Removal of logjams and some logging of cedar in the riparian zones have affected the lower reaches in some watersheds. There has not been a significant change from the historical condition in the riparian function resulting from roads or timber harvest. The effect of historic logjam removal needs to be further investigated.

O'Hara and Goddard ERU: In the O'Hara and Goddard ERU significant change has occurred in streamside condition since the initiation of human activities in the mid 1900s. The rating shown in Table 4.21 for the effect of streamside timber harvest on riparian areas is rated high for three watersheds in this ERU. O'Hara Creek is rated high for effect on riparian function, because it has the combined effects of streamside harvest and road encroachment on the lower 3 miles of the watershed. Other watersheds that have experienced significant effects to streamside condition due to riparian harvest and roads are Fall Creek, Swiftwater Creek, and Goddard Creek.

Middle Fork Clearwater River ERU: The Middle Fork Clearwater River ERU has changed significantly due to human activities since the early 1900s. This ERU, which has managed watersheds such as Lodge Creek, Little Tinker Creek, Tahoe Creek, Big and Little Smith Creeks, and Swan Creek, has an overall rating of high streamside road densities, moderate streamside harvest effects, and high number of stream crossings per mile. Suttler Creek and Maggie Creek also have had intensive timber harvest and road building activities, but are not shown on the table. The condition of this ERU varies by the watershed. This is a general overall rating.

Clear Creek ERU: Clear Creek ERU had changes similar to those of the Middle Fork Clearwater River ERU. Clear Creek ERU has a high rating for the effects of harvest and roads on streamside areas. This watershed has changed substantially since the early 1900s, not only from roads and timber harvest, but also from stream channelization, agricultural practices, grazing, and aggradation on lower reaches from floods.

AQUATIC HABITATS

This section discusses aquatic habitats in the Selway and Middle Fork Clearwater subbasins. The time period referred to in the subsections covering historic conditions is presettlement, as in the rest of this assessment.

MOUNTAIN LAKES

Historic Conditions Of Lakes In The Selway Subbasin

Physical Characteristics: More than 350 mountain lakes were scattered across the headwaters areas of many tributaries of the Selway River. Most lakes occurred at elevations greater than 5,500 feet and were included in one of the following geomorphic types: (1) cirque lakes - formed by rotational pluck and scour action of mountain glaciers and located in a bowl under a peak, flanked on three sides by steep walls; (2) cirque-scour lakes - located down-valley of a headwall and usually occupying basins scoured of less-resistant bedrock; (3) paternoster lakes - consisting of chains of at least three cirque-scour lakes; (4) upland lakes - lake basins scoured by an ice cap on gently rolling surfaces; and (5) lakes of other varieties, including those formed by beaver dams and landslides.

All lakes in the Selway subbasin were located in Aquatic Landtype Association (ALTA) 2. In general, lake productivity varied by elevation, depth, amount of littoral zone, exposure, and shoreline development. Most lakes were oligotrophic and were characterized by cold, clear water with low dissolved solids and low conductivity. Lakes were generally free of ice five to six months out of the year. Lake size varied considerably, and ranged from less than one acre to greater than 150 acres. Lake depth was also highly variable, with many lakes less than one meter in depth, and some with depths greater than 30 meters. Deeper lakes experienced both spring and fall turnover, while shallow lakes simply warmed and cooled depending on ambient temperature. Shallow lakes were generally frozen solid during the winter except where groundwater upwelling occurred, while deeper lakes rarely, if ever, froze from surface to substrate. Inlet streams of varying number and size fed most lakes, but snowmelt and/or groundwater upwelling maintained a few.

Biological Characteristics: Mountain lakes in the Selway subbasin generally supported unique ecosystems distinct and different from streams. Despite a lack of productivity, many mountain lakes supported a rich array of aquatic vertebrate and invertebrate species, in addition to vascular and non-vascular aquatic plants. Mountain lakes were also important areas for terrestrial animals, providing summer and fall feeding areas for animals such as moose, elk, and insectivorous birds.

Mountain lakes supported diverse assemblages of zooplankton, with the following families, orders, and genera represented: Bosmina, Chydoridae, Daphnia, Diaphanosoma, Holopediem, Polyphemus, Sida, Scapholeberis, Calanoida, Diaptomus, Clycloploida suborder, Chaoborus, Harpacricoida suborder, Macrothricidae, and Alona. The following aquatic plant taxa were present: Callitriche, Carex, Eleocharis, Equisetum, Fontinalis, Juncus, Isoetes, Nuphar, Potamogeton, and Sparganium. At least 150 macroinvertebrate taxa were present.

Mountain lakes also provided important habitat for aquatic vertebrates. Amphibians found in some or all mountain lakes included western long-toed salamanders, tailed frogs, western spotted frogs, and Pacific giant salamanders. Most lakes in the subbasin were fishless. Six lakes in the subbasin, however, probably supported indigenous westslope cutthroat trout. Cutthroat trout in these lakes probably migrated freely between the lakes and the streams, with spawning occurring in the streams. Cutthroat trout in lakes may have grown faster and matured earlier than those in streams, resulting in high numbers of small fish in the lake population.

Departure From Historic Conditions of Mountain Lakes in the Selway Subbasin

Physical Characteristics: Approximately 347 mountain lakes currently exist in the Selway subbasin. Physical characteristics of lakes are probably similar to historic conditions. The natural succession of lakes, which often involves an increase in deposition, encroachment by vegetation, and eventual transformation of the lake to a wetland or wet meadow, may have resulted in fewer lakes currently than existed since the last ice age. This process may also have resulted in some lakes becoming shallower, and increases in littoral zone areas and adjacent wetlands. Many other lakes are probably unchanged.

The riparian areas and adjoining lands around some lakes have been altered by human use. Some mountain lakes attract a higher density of visitors than others due to their aesthetic appeal, and the introduction of trout to the lakes. High visitor use has resulted in establishment of campsites, trails, and impacts from packstock. Specific changes at these sites include trampling and compaction of soil and vegetation, removal of down dead wood, establishment of fire rings, mortality of trees from stock tying, impacts on streambanks and lakeside areas from packstock, and introduction of noxious weeds. The degree of human impact appears positively correlated with presence of fish in the lake, size of the lake, ease of access by foot or stock, and the presence of nearby lakes (Bahls, 1987). All lakes rated with high or very high human impacts currently support fish.

Biological Characteristics: The biological characteristics of many mountain lakes in the Selway subbasin differ significantly from historic conditions. The primary causative factor of this difference is the introduction of hatchery trout to historically fishless lakes. Survey data suggest the introduction of trout to mountain lakes has resulted in a significant change in the biological communities of zooplankton, aquatic macroinvertebrates, and amphibians indigenous to naturally fishless lakes (Bahls, 1987). Specifically, changes in aquatic communities include significant reduction or elimination of large, open-water zooplankters, reduction of total taxa of zooplankton and macroinvertebrates relative to fishless lakes, and elimination of western long-toed salamanders, whose current distribution in mountain lakes is mostly restricted to those lakes that do not contain fish. In addition, some members of Coleoptera, Notonectidae, Corixidae, and Gerridae, taxa that are large and commonly found on the water surface and in open water, are primarily restricted to fishless lakes (Bahls, 1987).

Of the 347 mountain lakes in the subbasin, 239 (69 percent) have been surveyed. Of these 239 lakes, 136 (57 percent) have been stocked in the past 50 years. Currently, 98 historically fishless lakes (40 percent) now support fish; 142 (60 percent) are currently fishless. Presumably, the biological characteristics of existing fishless lakes are similar to the historic characteristics.

STREAMS

General Physical and Biological Conditions

Streams in the Selway and Middle Fork Clearwater subbasins are highly variable, depending on factors such as gradient, aspect, size, geology, substrate, and upland disturbance regimes. The physical components of streams may be grouped generally by the ALTA in which the stream is found. These components are inextricably linked to upland disturbance regimes and processes. Therefore, streams are highly dynamic, and conditions in a stream at any point in time are a function of change. While rates of change differ among streams, the concept of change applies across the landscape.

The specific biological components of streams are best addressed in the Aquatic Species section. In summary, the most significant change from historic conditions in the biological component is the introduction of non-native trout, which may have resulted in local extirpation and widespread hybridization of westslope cutthroat trout.

The following discussion of habitat components has been roughly divided into four categories, representing landscapes with the following characteristics: (1) breaklands; (2) high elevation glaciated lands; (3) moderate to low relief uplands; and (4) alluvial valleys.

Breaklands

ALTAs 3, 7, and 8 are included in this category (see Map 10).

Historic Stream Process and Function: The process and function of streams in the breaklands differed depending on stream order. Low order streams were subject to extreme events in response to fire and other disturbances. Channels were prone to scour and debris torrents, particularly in drainage headwalls with shallow soils, and channels were subject to major impacts as a result of severe events. Debris torrents were a natural process. Climatic and fire events provided a relatively frequent supply of sediment from surface erosion, mass wasting, and channel scour, which was delivered efficiently downstream to higher order streams. The supply of large wood was often limited by fire frequency on south exposure streams. On north exposure streams, large wood was delivered to streams frequently and stored until the next large flow event or debris torrent. Large wood in the channel provided a measure of channel stability and contributed to the streams' ability to resist change. Low order stream resistance to change was generally high, especially in ALTA 7, but resilience was low, with many years required to reestablish channel structure and stable vegetated banks following severe events.

Higher order streams, which included third through sixth orders, were generally lower in gradient, with boulders and large cobbles as the dominant substrate. Stream banks were well armored, usually with boulders or bedrock, resulting in high resistance to change and resilience. Sediment transport capacity was high, which resulted in low levels of deposited sediment despite frequent pulses from low order streams. Larger streams were high energy (containing large amounts of fast-moving water) and did not retain large woody debris efficiently. They were highly dependent on upland disturbances to produce large pulses of debris delivered to the streams over a short period of time.

Large woody debris was an important element of breakland streams, integral to channel structure and function, and providing habitat for salmonids. Since larger streams in the breaklands were generally high energy with moderate gradients, they did not retain large woody debris efficiently. These streams, especially the higher order main stem tributaries, were highly dependent on upland disturbances to produce large pulses of debris delivered to the streams over a short period of time. Occasional trees delivered to larger streams were not likely to become stable, long-term fixtures due to the sustained high spring runoff flows in highly confined channels. Large pulses of debris, conversely, often resulted in the formation of large, complex debris jams that were stable and historically functioned as important determinants of pool frequency, habitat complexity, and spawning gravel recruitment in larger breakland streams.

Pulses of debris generally occurred in response to wildfire events and debris torrents in low order tributaries, both of which were frequent and significant natural agents of change. Moderate or high severity wildfires, especially those which resulted in significant mortality of streamside trees adjacent to higher order streams, increased the probability of many trees recruited over a short period of time. Low order tributaries, which more efficiently stored debris even in the absence of disturbance, were also important factors in providing large amounts of debris to high order streams. Floods and debris torrents delivered large amounts of wood over a short period of time, thereby ensuring a pulse of material that was likely to form stable debris jams in fish-bearing streams. Debris torrents occurred more commonly following wildfire events, especially those of high severity, although rain-on-snow events sometimes produced similar results.

Due to formation of complex debris jams, existence of boulders, and moderate stream gradients, pool frequency and pool quality were probably high in some reaches. High sediment transport capability of larger streams resulted in streambeds with low levels of deposited sediment and high water clarity during all but the most extreme flow events. Level of suspended sediment generally increased only in response to debris torrents or other pulse sediment events. High levels were rarely sustained over long periods of time and occurred only in response to widespread lethal fire events.

Where basalt parent materials existed, the level of deposited fine sediment was probably higher. The base level of suspended sediment was also higher, even at low flows.

Spawning habitat for anadromous fish was mostly located in high (third to sixth) order streams along stream margins, at pool tailouts, and in low gradient riffles and runs. Spawning habitat for resident and fluvial fish, including bull trout, was located throughout the fish-bearing portions of all watersheds and concentrated along stream margins and in low gradient reaches. Stable stream temperatures, groundwater upwelling, and high levels of large wood in the stream may have been important determinants of bull trout spawning.

Departure From Historic Conditions in Stream Process and Function: Current stream process and function remain similar to historic stream process and function, with several notable exceptions. The influence of anthropogenic press disturbances both within the breaklands landscape and lands upstream of the breaklands has resulted in several changes. These changes include an increase in deposited sediment, increased and sustained high suspended sediment levels following moderate and high flow events, decreases in large wood, a reduction in pool frequency, and an overall simplification of habitat. Areas where this has occurred are generally located in the lower reaches of the Selway River and throughout the Middle Fork Clearwater subbasin. Other activities that have contributed to this condition include debris-clearing efforts, which occurred in the 1960s. Removal of debris jams in these streams has resulted in locally significant departures from historic conditions. Removal of woody debris from streams results in a reduced number of pools, reduction in pool quality in remaining pools, reduction in habitat complexity, and reduced resistance to change.

The introduction of noxious weeds, most notably spotted knapweed, has been implicated as possibly increasing surface sediment yield. Lacey and Olson (1991) reported that as knapweed replaces native bunch grasses, forbs, and gramminoids, soil erosivity increases. Although the extent of such an impact on process and function of watersheds in the Selway subbasin is unknown, given the extent of the spotted knapweed infestation across the breaklands landscape, it is possible that changes in surface sediment yield, and potentially mass erosion processes, have occurred.

Suppression of wildfire may have significantly affected natural streamflow and sediment regimes in this landscape.

High Elevation Glaciated Lands

ALTAs 2 and 5 are included in this category (see Map 10).

Historic Stream Process and Function: The process and function of streams in glaciated lands varied greatly. Steep, ice-scoured cirques and glacial troughs with inclusions of gently sloping ice-scoured ridges and morainal deposits characterized lands in these ALTAs. Streams generally flowed through valleys composed of steep cirque or trough walls, which were prone to channel scour and debris torrents during periods of rapid snowmelt. Rapid snowmelt was not a common occurrence, however, and streams were therefore more stable than those in the breaklands. Streams were subject to debris torrents after intense wildfire followed by high-intensity thunderstorms, which were fairly common occurrences in the summer and fall. Streams in ALTA 2 were low order and important in determining the process and function of higher order streams. Boulders, bedrock, and large wood were stabilizing factors in ALTA 2 streams. In ALTA 5, streams flowed through low gradient valley bottoms with occasional moderate or high gradient reaches. Low order streams delivered sediment rapidly. Materials such as large substrates or large woody debris commonly accumulated in ALTA 5 streams, and then slowly moved downstream.

Streams in ALTA 5 were higher order and flowed through low or moderate gradient valley bottoms. Occasional high gradient reaches occurred in most ALTA 5 streams. Valley confinement, elevation, soil depth, and aspect were also variable within this ALTA, and streams varied accordingly. For example, valley confinement ranged from low in meadow reaches, where there was a high frequency of large woody debris and high cobble embeddedness, to moderate in forested reaches, with less woody debris and very low cobble embeddedness. Resistance to change varied as well, depending on the composition of bed and bank materials and riparian vegetation. Recovery from disturbance was usually slow. Fire, particularly stand-replacing fire, occurred at long intervals, ranging from 100 to 300 years, with mixed and lethal severity.

Most fish habitat was found in the higher order mainstem tributaries and lower reaches of low-order tributaries in ALTA 5. Large wood was an important determinant of habitat quality and complexity. Although recruitment rates were moderate or low, large wood was usually retained even when recruited discretely. In addition to creating high quality pools, large wood also provided bank stability in moderate and low gradient reaches, provided higher channel stability, and was an important contributor of nutrients. In general, reaches with high levels of large wood were more productive than those with moderate or low levels. Substrate composition was highly variable, ranging from coarse sand as the dominant substrate in low gradient reaches to large cobble, boulder, and bedrock in moderate and high gradient reaches. High levels of fine sediment deposition were generally not a prevalent feature of stream substrates in the glaciated ALTAs. Water clarity was very high, except during the most extreme precipitation events. Primary production was probably limited by lack of nutrients, cold water temperature, and short summer seasons.

Streams in ALTA 5 provided spawning habitat for resident fish, including both westslope cutthroat trout and bull trout, but lower elevation reaches also provided habitat for anadromous fish where accessible. Spawning habitat for all species was located along stream margins, at pool tailouts, and in lower gradient riffles and runs. Although spawning habitat was abundant and widespread for small resident fish and fluvial cutthroat trout, quality of habitat was increased if gravel was proximate to large wood, which was used for cover by staging and spawning adults and newly emerged fry. Appropriate-size gravels associated with large wood and groundwater upwelling were particularly important for spawning by fluvial bull trout. Such areas were uncommon, but where they occurred, they exhibited a disproportionate level of fluvial bull trout production.

Departure From Historic Conditions in Stream Process and Function: Currently, streams in the glaciated ALTAs function similarly to the historic condition. These ALTAs are located exclusively in designated wilderness and roadless areas and have not sustained anthropogenic disturbance on a large scale. Fine-scale disturbances are present, however, and are associated with trail erosion, fords, human-caused salt licks (resulting in artificially high densities of big game animals and impacts to stream banks), packstock use, and high levels of recreational use. Lands in the glaciated ALTAs are highly sensitive to impact and exhibit both very low resistance to change and resilience, requiring decades for recovery following impact.

The suppression of wildfires starting in the 1930s may have disrupted the normal fire regime in this landscape. Such disruption probably has minimally affected the function and process of streams. Disruption of fire frequency, however, may have resulted in accumulations of fuel, which will ultimately increase fire intensity when fire occurs. Increased intensity, especially if widespread, may result in more severe changes in highly sensitive glaciated streams.

Moderate to Low Relief Uplands

ALTAs 1, 6, 15, 17, and 21 are included in this category (see Map 10).

Historic Stream Process and Function: Although a variety of landscapes are included in the moderate to low relief uplands category, process and function of streams among the ALTAs that make up the area shared some common characteristics. Watersheds were generally moderately or highly dendritic, with streams moderately or highly confined in v-shaped or trough-shaped valley bottoms with variable gradients. Except for ALTA 15, most valley bottoms were forested, but sedge meadows and forest meadow complexes occurred frequently. Mass wasting and severe channel erosion were not common. In ALTA 15, valley bottoms were primarily shrub-dominated.

Channels were not usually subject to extreme events due to lower stream energy, moderate snowpack, slow and sustained runoff, and low incidence of rain-on-snow events. Low order streams transported sediment (sands and larger particle sizes) efficiently through their steeper reaches, which were then stored for extended periods in lower gradient reaches. Surface erosion occurred most significantly in response to wildfires.

Streams in these landscapes were relatively stable and did not change with the frequency seen in other landscapes. Given inherent channel stability, resistance to change, and resilience following change, habitat remained unchanged over long periods of time. The primary influence was wildfire, which generally occurred at moderate or long intervals and was of mixed severity.

Large wood in streams was an important component of fish habitat, and it contributed significantly to the moderate and high resistance to change. Amount of woody debris in the channel was a function of debris available in the riparian area; debris was not commonly delivered from areas upstream. Recruited debris was retained efficiently on-site, whether delivered discretely or in large numbers. Woody debris was important in creating high-quality pools, especially when associated with channel meanders. In low gradient areas, particularly in meadow reaches, undercut streambanks provided important refuge and cover for fish. Dominant substrates were variable, but low order streams were generally dominated by large and small cobbles while higher order streams had smaller substrates, such as small cobbles and coarse sands.

Of the above ALTAs, ALTA 1 was most significant in terms of habitat potential for fish. A rough correlation between the presence of resident bull trout subpopulations and occurrence of ALTA 1 existed. Spawning habitat for resident fish, particularly bull trout, was generally widespread and located within glides, low gradient riffles, and in pockets along stream margins. Cover for staging adults and newly emerged fry was provided by large woody debris and undercut banks. Streams in the other ALTAs in this category were most important as critical contributors to conditions downstream.

Departure From Historic Conditions in Stream Process and Function: Current stream process and function is similar to historic stream process and function in some areas, and significantly different in others. As a general rule, reaches in ALTA 1 function similarly to the way they did in their historic condition, except for the upper reaches of Meadow Creek. The stream channel in these reaches has been altered by decades of domestic livestock grazing (cattle), which occurred until 1993. The channel exhibits various lengths of bank instability and over-widening over significant lengths as the stream flows through stringer meadows. Although these changes are prevalent, the channel has probably improved since the area was last grazed. Improvement may be hindered, however, by high off-road vehicle use in the meadows and grazing of packstock.

Similarly, reaches in ALTA 21 function as they did historically, with several exceptions. Roads have been constructed across this landscape in the O'Hara, Clear, Running, and Deep Creek watersheds. Road construction has resulted in a press sediment source in these areas, and this may have resulted in increased sediment deposition in streams that do not transport sediment efficiently.

Reaches in ALTA 15 (basalt plateaus) mostly occur off National Forest lands, and existing vegetation is now primarily cropland, hay, and pasture, with some remaining forest land that has been heavily affected by livestock grazing, residential development, timber harvest, and road construction. These activities have resulted in high levels of both deposited and suspended sediment in sensitive basalt watersheds. Streams flowing from these lands are commonly visibly turbid following even minor precipitation events. These streams also exhibit high levels of bedload aggradation at their mouths, indicating that watershed function has been disrupted.

Reaches in ALTA 17 have been affected by road construction and logging. Increases in surface sediment yield have undoubtedly occurred, resulting in higher levels of deposited sediment than occurred historically.

Alluvial Valleys

ALTA 18 is the only ALTA present in this category (see Map 10).

Historic Stream Process and Function: Historic process and function of streams in ALTA 18, comprised of mid- to upper elevation alluvial valleys, varied little among stream types. Although

ALTA 18 comprises a very small portion of the Selway subbasin, its significance is high, and it is considered a rare element. Lands within this ALTA were above 3,000 feet, with low gradient channels that were poorly confined in trough-shaped valley bottoms or flat valleys in canyons. Low gradient channels were usually not resistant or resilient. These areas provided important spawning and rearing habitat for anadromous fish. Streams were generally moderate to high gradient and well to moderately confined in flat valley bottoms with glacial troughs or stream breaklands forming valley walls.

Departure From Historic Conditions in Stream Process and Function: Current stream process and function is similar to historic process and function. Compared to surrounding areas, streams continue to support spawning and rearing habitat of disproportionately high value for anadromous salmonids. Local impacts may have occurred from high recreational use.

AQUATIC SPECIES

The Selway and Middle Fork Clearwater subbasins contain a significant amount of habitat with high to very high potential to support a native aquatic assemblage. The Selway subbasin is extremely important to aquatic resources when considered in the context of the Columbia River basin. Although the bulk of the aquatic species discussion below is devoted to at-risk native salmonids, a significant component of the native assemblage is composed of non-salmonid species. The lack of discussion related to non-salmonids reflects a lack of information on these species, rather than a lack of their importance to the overall aquatic ecosystem. This lack of information is considered a significant data gap, and represents missing information necessary to completely understand the aquatic ecosystem of the Selway and Middle Fork Clearwater subbasins.

The Selway subbasin is considered a critical component for recovery of at-risk native salmonid fishes, given its existing habitat quality, connectivity, and species status.

In addition to at-risk salmonid species, non-salmonid aquatic species within the Selway and Middle Fork Clearwater subbasins may be at-risk as well. Neither historic nor current distribution and abundance of some non-salmonids have been described, and in some cases species have not been identified. It is possible that endemic aquatic organisms currently exist, or existed historically, in mountain lakes in the Selway subbasin.

To summarize the current status of the habitat and populations of westslope cutthroat trout, a classification system that considers habitat potential, habitat condition, and species status has been developed for this assessment.

Areas with high to very high habitat potential are described as: (1) strongholds, where habitat is good and population is strong; (2) population strongholds, where the population is strong but the habitat condition has been degraded; (3) habitat strongholds, where the habitat condition is good but the population is depressed; and (4) historic strongholds, where the habitat condition has been degraded and the population is depressed.

Areas with moderate to low habitat potential are described as: (1) adjunct-secure, where habitat condition is good and the population is strong; (2) adjunct population, where the population is strong but the habitat is degraded; (3) adjunct habitat, where the habitat condition is good but the population is depressed; and (4) adjunct, where the habitat condition is degraded and the population is depressed. This series of classifications uses the term “adjunct” differently than it is typically used, which is to describe areas adjacent to focal or refuge habitats (Frissell, 1993). In this context, “adjunct” is used to describe areas of lesser habitat potential that support populations of the species less continuously than areas of higher potential.

Areas providing subadult/adult rearing, overwintering, and migratory habitat are classified as: (1) nodal - high quality, where habitat condition is high; and (2) nodal - degraded, where the habitat condition has been degraded.

Areas that provide water quality to downstream habitat are called critical contributing areas and are classified as: (1) critical contributing - high quality, where these water quality contributing areas contain high quality aquatic conditions; and (2) critical contributing - degraded, where the aquatic condition is in these areas is degraded.

WESTSLOPE CUTTHROAT TROUT *(Oncorhynchus clarki lewisi)*

The U. S. Forest Service Northern Region considers westslope cutthroat trout to be a sensitive species in the Clearwater River basin. The state of Idaho categorizes westslope cutthroat trout as a species of special concern.

Westslope cutthroat trout were once abundant through much of the north and central portions of the upper Columbia River basin. Although this subspecies is still widely distributed, remaining populations may be seriously compromised by habitat loss and hybridization with non-native rainbow and Yellowstone cutthroat trout. Some extension of the natural distribution has occurred through hatchery introductions. Despite wide distribution, there appear to be few remaining healthy populations outside of the central Idaho mountains.

Basin Context

Westslope cutthroat trout in the Selway and Middle Fork Clearwater subbasins represent an important metapopulation in the Clearwater River basin. Other important metapopulations include the Lochsa, South Fork Clearwater, and North Fork Clearwater Rivers. Of these, only the Lochsa River is functionally connected to the Selway River. The Middle Fork Clearwater River functions as a migration corridor and provides winter and early spring habitat for fluvial cutthroat trout. Clear Creek supports spawning and rearing of isolated resident subpopulations which are physically connected to the Middle Fork Clearwater/Selway/Lochsa populations but may be functionally isolated due to habitat degradation in the lower reaches.

The Selway subbasin is considered a core area for recovery of westslope cutthroat trout and was identified as a category 1 subbasin (Quigley et al., 1997). Category 1 subbasins represent systems that most closely resemble natural, fully functional aquatic ecosystems. They provide a system of habitats large enough and well dispersed enough to be resilient in the face of large-scale, catastrophic disturbance. They provide the best opportunity for long-term persistence of native aquatic assemblages and may well be the most important sources for refounding other areas. These areas are generally large enough to deal with catastrophic fire, rare events, and other uncertainties.

Historic Conditions Related to Westslope Cutthroat Trout

Inherent Habitat Capability and Historic Population Dynamics: The Selway and Middle Fork Clearwater subbasins have inherently high capability to support westslope cutthroat trout. This assertion is based on the current status and distribution of the subspecies throughout the assessment area. Habitat capability is discussed in this section as it relates to: (1) the habitat capability of the subbasin to support cutthroat trout spawning and rearing (juvenile rearing for migratory fish); (2) the subbasin’s capability to support migration and late rearing of fluvial fish, and; (3) the subbasin’s capability to support a metapopulation, or connection of local populations, of westslope cutthroat trout.

Historic key spawning and early rearing areas for fluvial cutthroat trout in the Selway subbasin included most of the upper reaches of O’Hara, Meadow, Gedney, Three Links, Mink, Marten, Moose, Pettibone, Ditch, Bear, Running, White Cap, Goat, and Indian Creeks, the Little Clearwater River, and tributaries to the upper Selway River. The high elevation ALTAs 2 and 5 were historically important areas for providing spawning and early rearing habitat for subpopulations of resident cutthroat trout. Streams in these ALTAs were cold and inherently unproductive, providing habitat for which westslope cutthroat trout are ideally suited (Liknes and Graham, 1988). High elevation ALTA 2 and 5 complexes also provided stable stream environments due to an infrequent disturbance history. These areas also functioned as sources for refounding, given downstream disturbances in the breaklands landforms.

Periodic disturbances in both breakland streams and uplands, including stand-replacing fires, floods, and debris torrents, occurred frequently. Although local impacts to cutthroat trout probably occurred, populations recovered quickly as a result both of spawning and rearing areas upstream and the influx of fluvial adult spawners from the Selway River. Both functioned effectively to provide recruitment to populations adversely affected by such pulse events. Consequently, the cutthroat trout metapopulation in the Selway subbasin was inherently quite resistant and resilient to natural disturbances in the subbasin and apparently flourished despite regular catastrophic events.

In the Middle Fork Clearwater subbasin, Clear Creek provided some spawning and early rearing habitat despite the lack of high elevation glaciated lands. Other tributaries provided limited spawning and early rearing habitat. These streams have inherent low habitat capability for cutthroat trout due to size and accessibility. Fluvial cutthroat trout in the Middle Fork Clearwater River were part of the Selway and Lochsa metapopulations.

As previously discussed, key spawning and rearing areas for cutthroat trout were located in ALTAs 2 and 5, which, in addition to offering high-elevation stable habitats, were also located away from areas where concentrated spawning and rearing by anadromous fish occurred. Areas that historically supported key anadromous spawning and early rearing habitat included most of the lower reaches of the larger tributaries in the subbasin. Rieman and Apperson (1989) reported that where cutthroat trout and steelhead trout coexist naturally, the two species exhibit strong segregation. In streams where both species occur, Hansen (1977) found that cutthroat trout were restricted to headwater reaches while steelhead trout used the lower reaches, and suggested that a form of interactive segregation isolated the two species.

Conversely, Griffith (1988) believed that selective segregation is more important, observing that westslope cutthroat trout did not replace steelhead trout when the latter declined and disappeared following construction of Dworshak Dam. Goodnight and Mauser (1980) reported an increase in the proportion of cutthroat trout to rainbow trout following the elimination of steelhead trout in the Little North Fork Clearwater River, but did not note an overall increase in cutthroat numbers. The lack of increase in cutthroat trout with a decline in steelhead trout supports the idea of selective segregation and limited competition (Griffith, 1988).

Westslope cutthroat trout preceded the advent of anadromous fish over geologic time but co-evolved with bull trout (Behnke, 1992). Sympatric spawning and early rearing areas for bull trout and cutthroat trout were common in the Selway subbasin, whereas spawning and early rearing of cutthroat trout rarely occurred where the abundance of anadromous fish was high. The advent of anadromous fish may have subsequently pushed cutthroat trout to the upper reaches of tributary streams because of niche overlap and their proportionately greater fecundity.

Smaller tributaries to the Selway River were also contributors to spawning and early rearing habitat available to westslope cutthroat trout, but would not have been considered key areas with high habitat potential. The larger of these, however, may have supported small, isolated resident subpopulations. Most of these streams are located in ALTA 8, moist breaklands. Breakland streams flowing through ALTA 3 (low elevation granitic breaklands), located mostly upstream of Moose Creek, were also used for spawning and early rearing. Both of these ALTAs are prone to frequent disturbance events, and therefore subpopulation resilience was highly dependent on the influence of fluvial fish.

The Middle Fork Clearwater River and the Selway River from its mouth to the headwaters were used by adult fluvial cutthroat trout as a migration corridor, adult rearing, and overwinter habitat. In addition, the lower reaches of large tributaries functioned similarly. Due to the common occurrence of the accumulation of anchor ice in the mainstem Selway River during the winter, there is some evidence that cutthroat trout migrated to the lower reaches of large mainstem tributaries to overwinter.

Historic Distribution in Mountain Lakes: Due to isolation and impassible barriers, most high mountain lakes in the subbasins did not support fish. Several lakes may have historically supported westslope cutthroat trout, however. Cutthroat trout in these lakes were self-sustaining and may have moved freely between the stream and lake environments. Without exception, the outlets of these lakes are low gradient and lack significant barriers to upstream migration. Cutthroat trout in the lakes differed very little, if at all, from the rest of the fish in the upper reaches of these watersheds and constituted an important part of the subpopulation where they occurred. Cutthroat trout in lakes may have tended to overpopulate the lakes, resulting in large numbers of small adult fish.

Historic Genetic Integrity: Historically, fluvial adult cutthroat trout were found throughout the mainstem Selway and Middle Fork Clearwater Rivers. Prespawning adults migrated from the river to both large and small tributaries and spawned in the middle and upper reaches of most accessible suitable habitat. In addition, many tributaries supported isolated subpopulations of cutthroat trout, which were partly or completely isolated from the rest of the watershed. Some of these populations probably developed local adaptations as a result of their isolation and were genetically distinct from the rest of the cutthroat in the subbasin. The degree of divergence was probably correlated with temporal degree of isolation. Other subpopulations were periodically affected by wide-ranging fluvial fish, which contributed to the subpopulation's genetic composition. This contribution to the gene pool served to broaden the genetic diversity of these subpopulations, and increased both resistance to environmental change and resilience. Most cutthroat subpopulations supported both a resident and fluvial component, with the relative proportion of each correlated with accessibility to the mainstem. A combination of these two life history strategies served to insulate the species from extinction in an environment that was highly prone to natural disturbance.

In general, westslope cutthroat trout were reproductively isolated and genetically distinct from redband/steelhead trout. In some areas hybridization may have occurred, but on a limited basis. Key westslope cutthroat trout spawning areas were located outside of the range of anadromous fish, as discussed above.

Historic Watershed and Subpopulation Connectivity: Connectivity was high both within smaller tributary watersheds and between tributaries and the rivers, thereby providing for both fluvial and resident life history strategies and high variation in the genetic composition at both the subpopulation and metapopulation scales. Most large and moderate-size tributaries to the Selway River were accessible to westslope cutthroat trout in the river. Connectivity of subpopulations in the upper reaches of many watersheds may have been compromised by gradient, barriers, or distance to the rivers. Subpopulations in these upper reaches contributed to downstream genetic variation (through emigration), but were not subject to influence from spawning fish migrating upstream. Genetic divergence may have occurred where differences in selection pressures existed, which presumably included stochastic environmental events such as wildfires or floods, and different habitat conditions. Areas that potentially supported isolated and genetically distinct subpopulations included the headwaters of Gedney, North Fork Moose, Rhoda (tributary to North Fork Moose Creek), East Fork Moose, Paradise (tributary to Bear Creek), Pettibone, and White Cap Creeks.

Connectivity was somewhat compromised by the existence of Selway Falls, a very steep drop in the Selway River located just downstream from the mouth of Meadow Creek. It is possible that westslope cutthroat trout in the upper portion of the subbasin were functionally isolated from cutthroat trout in lower portion, at least in terms of upstream migration. Although Selway Falls was passable at most flows by adult anadromous fish, passage by smaller cutthroat trout is uncertain. Upstream passage was probably impeded but not precluded.

Departure From Historic Conditions

Spawning and Early Rearing Areas: Currently, westslope cutthroat trout are distributed similarly to the way they were historically, with several notable departures. In some areas, habitat has been degraded by anthropogenic press disturbances on the landscape (mostly roads), which has resulted in decreased carrying capacity and a decline in the abundance of cutthroat trout. The watersheds affected in this way are largely located in the lower portions of the Selway subbasin and throughout the Middle Fork Clearwater subbasin. Although these affected streams continue to support cutthroat trout spawning and early rearing, numbers are depressed, and abundance is considerably less than it was historically.

More significantly, cutthroat trout have apparently been extirpated in other areas. Brook trout encroachment downstream from mountain lakes has occurred in several streams, and in most cases, areas where brook tout are established are devoid of cutthroat trout (USFS unpublished data, 1989-1999). Some of these areas include the upper reaches of Gedney, Three Links, East Fork Moose, Rhoda (tributary to North Fork Moose Creek), Pettibone, and Running Creeks. Brook trout encroachment has occurred in other areas, where brook trout coexist with cutthroat trout. These areas include Buck Lake Creek (Meadow Creek watershed), and Mink, O'Hara, and Clear Creeks.

Streams where brook trout are established appear to share similar characteristics. Without exception, these stream reaches are located in either ALTA 2 or ALTA 5, which were previously identified as supporting key spawning and early rearing habitat for cutthroat trout. Stream characteristics include moderate to low gradient channels, low stream temperature in the summer and, where gradients are higher, and abundance of plunge pools. Brook trout establishment does not appear to be correlated with stream order, substrate condition, or habitat complexity. Anadromous fish are also notably absent from areas where brook trout proliferate. Current distribution data suggest that brook trout are limited to areas where anadromous fish do not spawn and rear. It is unknown if the distribution of brook trout is currently changing or if it has reached equilibrium. Typically, brook trout are established as the only species downstream from their lake of origin and then are gradually replaced by cutthroat trout and steelhead/redband trout further down the watershed.

Areas which continue to function as key spawning and rearing areas for cutthroat trout include the upper reaches of Meadow, Marten, North Fork Moose, Bear, Ditch, White Cap, and Indian Creeks, the upper reaches of the Little Clearwater River, and also tributaries to the Selway River in the Selway Headwaters ERU. Populations in all these areas are comprised of both a resident and fluvial (migratory) component. Numerous resident subpopulations exist across the subbasin, some of which are functionally isolated from the rest of the subbasin.

Distribution in Mountain Lakes: Westslope cutthroat trout continue to exist in mountain lakes where they may have been historically indigenous, except for Moose Lake. The genetic integrity of cutthroat trout in lakes has likely been compromised by the introduction of Yellowstone cutthroat and/or rainbow trout in all lakes but one. Additionally, introduction of hatchery westslope cutthroat trout fry into mountain lakes may have affected the genetic integrity of indigenous westslope cutthroat trout.

Migration and Late Rearing: The Selway and Middle Fork Clearwater subbasins have inherently high capability to support migratory westslope cutthroat trout. Both rivers currently support significant numbers of adult fluvial fish. Current distribution of fish in terms of migration and late rearing differs very little, if at all, from historic migration and late rearing. Angling and harvest have probably affected the abundance of large fluvial fish in both rivers.

Genetic Integrity: In general, genetic integrity has probably been reduced from historic levels, both from elimination of some isolated subpopulations by the encroachment of brook trout, and through potential introgression with non-native Yellowstone cutthroat and hatchery rainbow and westslope cutthroat trout. Loss and/or hybridization of locally adapted subpopulations may significantly affect the fitness of the metapopulation. Adaptive genetic divergence between adjacent subpopulations confers greater average fitness to the metapopulation by allowing each unit to respond to specific environmental conditions, which maximizes overall fitness in environments that are subject to change (Ford, 1956). Therefore, loss of subpopulations or unique adaptations through introgression may have decreased the resilience of the Selway metapopulation to environmental perturbation.

Watershed and Subpopulation Connectivity: Watershed connectivity within the Selway and Middle Fork Clearwater subbasins is similar to its historic condition. Exceptions to this are rare, and are generally associated with road crossings of streams where fish passage is precluded or impeded by culverts.

Population Dynamics and Viability: Current conditions are similar to historic conditions, except for the loss of subpopulations at the headwaters of Gedney, Three Links, Rhoda, Running, and East Fork Moose Creeks due to the encroachment of brook trout. The risk of extinction for remaining subpopulations from stochastic environmental events such as wildfire or floods is highly unlikely, given that westslope cutthroat trout evolved with these types of events and are quite resilient (Rieman and Apperson, 1989). Environmental stochasticity includes random variation in mortality and birth rates driven by environmental variations (Ginzburg et al., 1990; Leigh, 1981; Shaffer, 1991). Habitat in the Selway subbasin has sustained few press impacts and retains its ability to recover rapidly from natural events. In addition, habitat connectivity is high, and subpopulation recovery is a certainty from refounding by fish from other areas. The existence of numerous interconnected healthy subpopulations in addition to an intact fluvial component of this metapopulation virtually ensures its existence through time despite the loss of several subpopulations.

Therefore, the risk of additional subpopulation and metapopulation extinction is low given current conditions. This risk could change, however, with additional introduction of brook trout to key cutthroat trout areas, a change in fishing regulations, increased human access, or widespread application of press sediment impacts in key spawning and early rearing areas.

Key Factors and Threats to Westslope Cutthroat Trout

Key factors and threats affecting westslope cutthroat trout identified in the *ICBEMP Component Report*, which are applicable to cutthroat trout in the Selway and Middle Fork Clearwater subbasins, are included below.

Introduced Species: Impacts from introduced species on westslope cutthroat trout in the Selway and Middle Fork Clearwater subbasins are primarily associated with brook trout encroachment downstream from mountain lakes where they were stocked in the 1930s. Where brook trout are strongly established, westslope cutthroat trout are not present. Areas where this has occurred probably provided historic key spawning and early rearing habitat.

Stocking of hatchery Yellowstone cutthroat trout, rainbow trout, and westslope cutthroat trout may have resulted in loss of genetic integrity of locally adapted westslope cutthroat trout subpopulations. In the Selway subbasin, westslope cutthroat trout co-evolved with steelhead/ redband trout. Although hybridization is possible, westslope cutthroat trout and steelhead/redband trout are reproductively isolated based on distribution in the subbasin and disparate spawning periods. Hybridization with hatchery rainbow trout stocked in high mountain lakes, however, may have occurred.

Angling: As previously mentioned, angling in the mainstem Selway and Middle Fork Clearwater Rivers probably affects the fluvial component of the cutthroat population, particularly in the Middle Fork Clearwater River and the Selway River below Selway Falls. Both of these areas are readily accessible by anglers, and fishing pressure is generally moderate. Upstream of Selway Falls, the State of Idaho has imposed catch-and-release regulations for all trout, which started in 1976. Following the inception of this regulation, cutthroat trout numbers and mean size increased significantly, suggesting a strong response to this restriction and a significant impact from angling prior to the regulation change (Lindland, 1979). Illegal harvest of cutthroat trout in the Selway River, both above and below Selway Falls, is probably widespread, however. The Middle Fork Clearwater and Selway Rivers both provide anglers with opportunities to catch fish greater than 300 mm in length. Many people visit the area specifically to fish.

Harvest in Selway River tributaries is limited to two trout per day. This limit is probably regularly exceeded in the wilderness and roadless portions of the subbasin. Due to a perceived low risk of detection, a seemingly limitless fishery resource, and a subsistence attitude toward fish and wildlife by many wilderness visitors, many anglers forego regulations (K. Thompson, personal observations). Although prevalent, this harvest generally does not pose a risk to the persistence of cutthroat in the subbasin. Should access change or numbers of anglers significantly increase, angling mortality could have a significant effect.

Summary of Westslope Cutthroat Trout Habitat and Population Status

Map 27 displays the habitat and population status for westslope cutthroat trout. The following ERUs and sub-ERUs are classified as strongholds: Otter and Mink, lower Moose Creek, upper Moose Creek, Ditch Creek, upper Pettibone and Bear, lower Running and Goat, upper White Cap, Indian Creek, and the lower Little Clearwater River in the Selway Headwaters ERU. ERUs or sub-ERUs categorized as stronghold watersheds comprise 42 percent of all ERUs and sub-ERUs in the Selway and Middle Fork Clearwater subbasins. It should be noted that within some of the above-mentioned areas, brook trout have encroached into portions of these watersheds and eliminated cutthroat trout. Such brook trout areas within the above mentioned ERUs include Rhoda Creek and East Fork Moose Creek in the Moose Creek ERU, and Pettibone Creek in the Pettibone and Bear ERU. Each of these areas constitutes a small percentage of the overall ERU, however.

ERUs and sub-ERUs classified as habitat strongholds, which indicate in most cases historic key spawning and rearing areas where cutthroat trout have been replaced by brook trout, include the following ERUs and sub-ERUs: lower Meadow Creek, Gedney and Three Links, and upper Running and Goat. There is one historic stronghold, which is O'Hara Creek.

BULL TROUT *(Salvelinus confluentus)*

The U.S. Fish and Wildlife Service listed bull trout as a threatened species under the Endangered Species Act in 1998, and the state of Idaho considers bull trout a species of special concern. The American Fisheries Society has also recognized the bull trout as a species of special concern. The state of Idaho has developed a bull trout conservation plan, with the stated mission to "maintain and/or restore complex interacting groups of bull trout populations throughout their native range in Idaho" (Idaho, 1996).

The historic range of bull trout included most of the Columbia River basin. Current bull trout range includes about 44 percent of the estimated historic range, with the core of the remaining bull trout distribution in the central Idaho mountains, including the Clearwater basin (Quigley et al., 1997).

Basin Context

Bull trout in the subbasins are part of the Columbia River ecologically significant unit (ESU). The U.S. Fish and Wildlife Service has listed bull trout in this ESU as a threatened species under the Endangered Species Act. The Selway subbasin represents an important metapopulation of bull trout within the Snake River. The State of Idaho has identified the Selway subbasin as a key watershed for bull trout in its *Bull Trout Conservation Plan*.

Both the Lochsa and Selway Rivers are considered refuges in the Clearwater subbasin, given their location, accessibility, high-quality habitat, connectivity among subpopulations, and number of roadless and wilderness tributaries which lack press sediment effects caused by establishment of permanent sediment-producing features. Although these watersheds are prone to natural pulse sediment events, there are enough of them to function as refuge streams in the event that other streams are impacted by such natural events.

Historic Conditions Related to Bull Trout

Inherent Habitat Capability and Population Dynamics: The Selway and Middle Fork Clearwater subbasins have high to very high inherent capability to support bull trout. The Selway portion has been identified as supporting a known and predicted strong population of bull trout in the upper Columbia basin (Quigley et al., 1997). Habitat capability is discussed in this section as it relates to: (1) the habitat capability of the subbasin to support bull trout spawning and rearing (early rearing for migratory fish); (2) the subbasin's capability to support migration and late rearing of fluvial fish (adult/subadult rearing); and (3) the subbasin's capability to support a metapopulation, or connection of local populations, of bull trout.

Historic spawning and early rearing habitat for bull trout in the Selway subbasin probably included the middle and upper reaches of many of the larger mainstem tributaries. These streams included Gedney, Meadow, Three Links, Marten, Moose (as well as North Fork Moose, Rhoda, and East Fork Moose), Bear, White Cap, Indian, Swet, and Wilkerson Creeks, the Little Clearwater River, and the upper reaches of the Selway River. The high elevation complexes found in the upper reaches of these streams provided inherently stable environments and stream conditions for bull trout spawning and early rearing due to the low disturbance frequency. Resident bull trout populations were located in the upper reaches of most of these tributaries, while fluvial bull trout used the middle reaches for spawning and rearing. Resident populations not isolated from the mainstem by migration barriers were composed of a fluvial component even if the primary life history strategy was resident.

The higher elevation complex of ALTAs, which include ALTAs 1, 2, and 4, found in the upper reaches of the above-named streams, provide inherently stable environments, cold stream temperatures, and streams of low to moderate gradient. This complex of ALTAs provides a very high habitat potential for bull trout. The productivity of these areas varies, ranging from low to moderately high

Low elevation breaklands, of which most of the lower reaches of tributaries are composed, do not have inherently high capability for bull trout spawning and early rearing and probably were not historically important for spawning and rearing. These areas almost exclusively are composed of ALTAs 8, 3, and 7. Streams in these ALTAs are subject to more frequent disturbances, higher stream temperatures, and less stable temperature regimes during the spawning period. These reaches were important, however, for adult rearing and migration.

Historically, bull trout spawning and rearing areas occurred in sympatry with westslope cutthroat subpopulations. These two species probably co-evolved and represent an example of niche segregation, where cutthroat trout provide a food source for bull trout, but the two species do not directly compete for space or other resources.

In the Middle Fork Clearwater subbasin, Clear Creek probably provided some spawning and rearing habitat, but is not considered an historic stronghold watershed. The Middle Fork Clearwater River functioned as an important migration corridor, connecting bull trout populations in the mainstem/North Fork Clearwater River, South Fork Clearwater River, and Lochsa River to the Selway population. The river also provided important overwintering habitat, and anadromous smolts migrating downstream in the spring probably served as an important food source.

Historic Connectivity: Connectivity in the Selway and Middle Fork Clearwater subbasins was high both within smaller tributary watersheds and between tributaries and the rivers, thereby providing for both fluvial and resident life history strategies and high variation in the genetic composition at both the subpopulation and metapopulation scales. Most large and moderate-size tributaries to the Selway River were important to bull trout in the river. Gradient, barriers, or distance to the river may have compromised connectivity of subpopulations in the upper reaches of many watersheds. Subpopulations in these areas contributed to downstream genetic variation (through emigration) but were not subject to influence from spawning fish migrating upstream. Streams which supported functionally isolated resident subpopulations of bull trout included Meadow, Running, and Wilkerson Creeks.

Connectivity between the upper and lower portions of the subbasins was somewhat compromised by the existence of Selway Falls, a very steep drop in the Selway River located just downstream from the mouth of Meadow Creek. Since there were no stronghold watersheds below Selway Falls in the Selway subbasin, Selway Falls as a migration barrier was more significant at the basin scale, as it potentially isolated bull trout in the Selway River from other populations in the Clearwater basin. Selway Falls, however, probably impeded upstream migration of bull trout but did not preclude it. Bull trout in the Selway River were therefore not functionally isolated from those in the rest of the Clearwater basin.

Departure From Historic Conditions

Habitat Capability and Population Dynamics: Review of the distribution of bull trout across the various ALTAs in the Selway and Middle Fork Clearwater subbasins suggests a rough correlation between ALTA 1 (broad convex ridges, high elevation, granitic) and occurrence of spawning and early rearing. Landtypes in ALTA 1 are located above 5,500 feet elevation and are dominantly low relief, with mostly low or moderate gradient small streams. Streams flowing through this ALTA include the upper reaches of Meadow Creek, Eagle and Lynx Creeks (tributaries of Running Creek), Deep Creek, the Little Clearwater River, and Wilkerson, Surprise, and Hells Half Acre Creeks. All these areas support bull trout spawning and early rearing.

The largest known concentration of fluvial spawning and early rearing is located in Wounded Doe Creek, which does not include any lands classified as ALTA 1, but does include extensive lands classified as ALTA 2 and 5 (glaciated slopes and glaciated valley bottoms, high elevation, granitic). It would appear, then, that ALTAs 2 and 5 are also important where streams meet other important criteria, such as low to moderate stream gradient and stable stream temperatures during spawning. There are a number of other streams with significant inclusions of ALTA 2 and 5 which do not currently support bull trout spawning and rearing, however, including Bear, Three Links, Gedney, Goat, East Fork Moose, Pettibone, and the upper reaches of North Fork Moose Creek (outside of the Rhoda and Wounded Doe watershed). Of these, Gedney, Pettibone, East Fork Moose, and Three Links Creeks have been colonized by brook trout, which would have effectively eliminated any bull trout populations. The upper reaches of North Fork Moose Creek and Goat Creek may be inaccessible to bull trout because of impassible barriers. The reason for the absence of spawning and early rearing of bull trout in Bear Creek is unknown. Bull trout may occur in Cub and Paradise Creeks, however, which have never been surveyed comprehensively for this species. This lack of information is considered a data gap. The occasional large fluvial bull trout has been observed in the lower reaches of Bear Creek.

Clear Creek and O'Hara Creek have been significantly affected by land management activities. Gedney, Three Links, North Fork Moose, and East Fork Moose Creeks have been impacted by encroachment of non-native brook trout stocked in high mountain lakes. In addition, habitat capability for bull trout in Gedney Creek may have been affected by debris jam removal efforts, which occurred in the 1960s.

Streams or areas described as existing strongholds are displayed on Map 28. These include Wounded Doe Creek, the upper reaches of Meadow Creek, Lynx Creek (a tributary of Running Creek), the Little Clearwater River, White Cap Creek, Deep Creek, and most of the larger order streams in the Selway Headwaters ERU, including the mainstem of the Selway itself. All these areas support early rearing and spawning habitat for fluvial and/or resident bull trout, and strong populations of bull trout currently exist in these areas.

Currently, both the mainstem Selway and Middle Fork Clearwater Rivers function as migration corridors and overwintering habitat for bull trout. In addition, the lower reaches of larger mainstem tributaries may function similarly. Habitat potential for bull trout has been reduced in specific areas, but overall the Selway River currently provides habitat similar to historic conditions.

Viability: Bull trout in the Selway subbasin are believed to represent a functional metapopulation of bull trout that is influenced by migration of other bull trout from interconnected areas. Historically, individuals in this metapopulation were distributed throughout the high potential spawning and early rearing areas, as well as in the main river itself, which provided important migratory and adult rearing habitat. Currently, habitat integrity and connectivity are similar to their historic conditions, and bull trout continue to spawn and rear in these areas.

Extinction risk of bull trout in the Selway subbasin is currently low.

Connectivity: Watershed connectivity within the Selway and Middle Fork Clearwater subbasins is similar to its historic condition. Exceptions to this are rare and are associated with road crossings of streams where passage is precluded or impeded by culverts. Culverts across Boyd and Cache Creeks, both tributaries to the Selway River below Selway Falls, block or impede fish passage into these streams. A culvert near the mouth of Swiftwater Creek impeded fish passage for decades before it was replaced in the past 10 years. None of these streams currently support bull trout.

Key Factors and Threats to Bull Trout

Key factors and threats affecting bull trout identified in the *Interior Columbia River Basin Component Report* that are applicable to bull trout in the Selway and Middle Fork Clearwater subbasins are included below.

Harvest of Adults: Harvest of adult bull trout in the Selway subbasin has been identified as a key factor and a threat. Although harvest of bull trout is not legal under current state fishing regulations, illegal harvest occurs both in the roaded portions of the subbasin and in wilderness portions. In the wilderness and unroaded portions of the subbasin, low presence of law enforcement personnel, assumed low risk of detection due to the remoteness of the area, seemingly limitless fishery resources, and a shift in attitude from fishing as a sport to fishing as subsistence all contribute to illegal harvest of bull trout in wilderness.

Introduced Species: Brook trout were introduced into the streams and lakes of the Selway and Middle Fork Clearwater subbasins in the 1930s and 1940s. Although brook trout are no longer stocked, they exist in self-sustaining populations in many lakes and streams in Clear Creek and throughout the Selway subbasin. In general, brook trout are considered a threat to bull trout in the Selway subbasin, and their presence may have resulted in extirpation of some subpopulations. Streams where this may have occurred include the upper reaches of Gedney, Running, Rhoda, Three Links, Pettibone, and East Fork Moose Creeks.

Brook trout serve as a threat to bull trout through competitive displacement and loss of genetic integrity through interbreeding and production of sterile hybrid offspring.

Summary of Bull Trout Habitat and Population Status

Map 28 displays the habitat and population status for bull trout. The following ERUs, sub-ERUs, or individual sixth-code watersheds are classified as strongholds: upper Meadow Creek ERU, Wounded Doe Creek (in Moose Creek ERU), Lynx Creek (in Running and Goat ERU), Canyon Creek (in White Cap ERU), the Little Clearwater River, Deep Creek, and the larger streams in the Selway Headwaters ERU.

Habitat strongholds include Gedney Creek, Three Links Creek, Rhoda Creek, and Running Creek.

STEELHEAD/REDBAND TROUT *(Oncorhynchus mykiss)*

The National Marine Fisheries Service listed Columbia and Snake River steelhead trout of wild or natural origin as threatened under the Endangered Species Act in 1997. Numerous state, federal, and provincial management agencies list steelhead as a species of special concern.

The following information is summarized from the *Interior Columbia River Basin Component Report* (1997). Steelhead trout, the anadromous form of redband trout in Idaho, are distributed within the upper Columbia River basin as two genetically distinct subspecies, which include coastal and inland. Each subspecies has two major forms, winter and summer, although coastal steelhead are predominately winter-run and inland steelhead summer-run.

Redband trout, which are the resident form of steelhead trout in the upper Columbia Basin, have been further divided into two groups, one group which evolved in sympatry with steelhead and the other allopatric with steelhead, or those which evolved outside the historical range of steelhead. Sympatric redband trout are considered the non-anadromous form historically derived from or associated with steelhead and have been termed "residuals." Both anadromous and non-anadromous forms exist in sympatry in most populations, and morphologically juveniles of both forms are generally indistinguishable.

The distribution and abundance of wild steelhead trout have declined from historical levels as a result of passage mortality at dams and obstructions, habitat degradation, loss of access to historical habitat, over-harvest, and interactions with hatchery-reared and non-native fishes. Concern for the persistence of wild steelhead stocks culminated in 1994 with petitions to the National Marine Fisheries Service for review of the species' status under the Endangered Species Act. Columbia and Snake River steelhead trout of wild or natural origin were subsequently listed as a threatened species in September 1997.

The historical range of steelhead trout was the eastern Pacific Ocean and fresh waters west of the Rocky Mountains, extending from northwest Mexico to Alaska (Scott and Crossman, 1973). In the Columbia River basin, steelhead trout were present in most streams, both perennial and intermittent, that were accessible to anadromous fish, including all accessible tributaries to the Snake River downstream from Shoshone Falls (Parkhurst, 1950).

Steelhead trout are currently the most widely distributed anadromous salmonid in the Interior Columbia River Basin assessment area, although they are extinct in large portions of their historical range. The current known distribution includes 46 percent of their historical range. About 7,720 miles (12,452 km) of historical range is no longer accessible in the Columbia River basin in the United States and Canada (Northwest Power Planning Council, 1986).

Despite their relatively broad distribution, very few healthy wild steelhead populations exist (Quigley et al., 1997). Recent status evaluations suggest many steelhead populations are depressed. A recent multi-agency review showed that total escapement of salmon and steelhead to the various Columbia River regions has been in decline since 1986 (Anderson et al., 1996). Existing steelhead stocks consist of four main types: wild, natural (non-indigenous progeny spawning naturally), hatchery, and mixes of natural and hatchery fish. Production of wild anadromous fish in the Columbia River basin has declined about 95 percent from historical levels (Huntington et al., 1994).

Basin Context:

Steelhead trout in the Selway and Middle Fork Clearwater subbasins are part of the Snake River ecologically significant unit (ESU) of west coast steelhead and as such are currently listed as threatened under the Endangered Species Act (ESA) by the National Marine Fisheries Service (NMFS). Steelhead trout have also been considered a species of special concern by the State of Idaho and a sensitive species by Region 1 of the U.S. Forest Service. Steelhead trout in the Selway subbasin represent an important metapopulation in the Clearwater basin. This stock is of particular interest and value because it has never been supplemented with hatchery steelhead. The Middle Fork Clearwater River functions primarily as a migration corridor for upstream migrating adult fish and downstream migrating smolts. It may also provide overwintering habitat for juveniles. In addition, Clear Creek provides significant spawning and early rearing habitat, while smaller tributaries to the Middle Fork Clearwater provide moderate to low spawning and rearing habitat.

Historic Conditions Related to Steelhead/Redband Trout

Inherent Habitat Capability and Historic Population Dynamics: The Middle Fork Clearwater subbasin has high inherent capability to support steelhead trout, while the Selway subbasin has very high capability to support this species. This assertion is based on general features such as climate, elevation, relief, geology, and the size, configuration, and accessibility of the river and its tributaries. Habitat capability is discussed in this section as it relates to: (1) the capability of the subbasins to support steelhead trout spawning and rearing; and (2) the Selway and Middle Fork Clearwater Rivers' capability to support migration.

Historic key spawning and early rearing areas for steelhead trout in the Selway and Middle Fork Clearwater sub basins included the middle and lower reaches of the larger main stem tributaries, including Clear, O'Hara, Gender, Meadow, Three Links, Marten, East Fork Moose, North Fork Moose, Petitioner, Bear, Paradise, Cub, White Cap, Running, Indian, and Deep Creeks, the Little Clearwater River, and the main stem Selway River and tributaries in the Selway Headwaters ECRU. In addition, all of the accessible, moderate-sized break lands tributaries to the Selway River supported spawning and early rearing of this species. Most key spawning and early rearing areas were located within ALTAs 3 and 8, which include low elevation, granitic breaklands and moist, metamorphic breaklands, respectively. These ALTAs historically provided the most abundant and significant spawning and early rearing habitat for steelhead trout. Streams were moderate gradient with moderate valley confinement and high energy, providing abundant spawning gravels and pocket water preferred by juvenile steelhead.

Although ALTAs 3 and 8 were subject to frequent disturbances and alteration of stream habitat, given widespread availability of habitat and high fecundity of this species, steelhead were well-adapted to function under frequent disturbance regimes. Local impacts to specific year-classes may have occurred, but given the overall availability of optimum habitat, the loss of a single year-class in any of the above tributaries from a catastrophic event was easily absorbed by the high success in other unaffected tributaries. Given high fecundity and their anadromous life history strategy, steelhead trout were inherently quite resistant and resilient to environmental perturbation, despite their apparent affinity for streams subject to frequent disturbance.

Within all steelhead trout subpopulations in the Selway subbasin, a percentage of fish adopted a resident life history strategy and remained in the natal stream or the Selway River. Both anadromous and resident forms are classified as "redband trout" in the interior Columbia River basin (Behnke, 1992). The combination of anadromous and resident life history strategies ensured the perpetuation of the species in the event of poor adult returns. Normally anadromous fish would dominate the total numbers found in any system, due to their much higher fecundity, but in years where adult returns were low, the resident forms virtually guaranteed the future persistence of redband trout.

In the Middle Fork Clearwater subbasin, Clear Creek supported key spawning and rearing areas in its lower two thirds, most of which is located in ALTA 7, which includes low elevation basalt breaklands. In addition, Suttler and Swan Creeks supported some spawning and early rearing. Other tributaries, most of which were second to third order streams, were steep and accessible to fish only in their lower reaches. These streams provided limited rearing habitat for steelhead that was important in providing thermal refuge to juveniles in the Middle Fork Clearwater River during late summer and fall. These streams are mostly located in ALTAs 15 and 7. ALTA 15 includes mid-elevation basalt plateaus located in the western portion of the assessment area.

Historic Connectivity: Historic connectivity of subpopulations of both steelhead trout and resident redband trout was high. Selway Falls constituted a partial barrier to upstream fish migration during certain flow levels, including both peak flows in the spring of many years and summer low flows. Timing of adult migration and spawning was such that adults were able to migrate through Selway Falls at optimal flow levels. Historically, adults staged below the falls and then migrated through when flows were optimal, usually in May. Access to Selway tributaries occurred at moderate and high flows, with elevation of the river and discharge of tributaries allowing access to the lower reaches of most streams. Available, accessible habitat was used for spawning, with fish concentrating on the upper, middle, and lower reaches of large streams where accessible, and the lower reaches of small streams. Early rearing occurred where summer low flows allowed, otherwise fry and juveniles migrated downstream to the river where they reared or migrated to larger tributaries.

Departure From Historic Conditions

Habitat Capability and Population Dynamics: Currently, steelhead trout are distributed similarly to the historic condition in the Selway and Middle Fork Clearwater subbasins. There are no known streams where steelhead trout have been extirpated as a result of anthropogenic activity. Abundance of steelhead trout, however, has declined significantly from historic levels. In watersheds affected by road construction and other press disturbances, carrying capacity is probably reduced. ERUs where this has occurred include Clear Creek, Middle Fork Clearwater Face, North Selway Face, O'Hara and Goddard, Running and Goat, Meadow Creek, and Deep Creek. In general, habitat in the Selway subbasin retains its inherent high capability to support and produce steelhead trout, especially in historic key spawning and rearing areas identified above in the Inherent Habitat Capability and Historic Population Dynamics section.

Current key steelhead trout spawning and rearing areas include mainstem Meadow Creek from its mouth upstream through the breaklands ALTAs, the lower half of mainstem Marten Creek, North Fork Moose Creek, the lower reaches of Bear Creek (including lower Paradise, Cub, and Brushy Fork Creeks), lower Running Creek, White Cap Creek, the Little Clearwater River, and most streams in the Selway Headwaters ERU. The Selway River system is recognized as supporting one the last remaining populations of B-run summer steelhead in Idaho that have not been supplemented with hatchery-produced steelhead. B-run steelhead are those which pass over Bonneville Dam later than other Snake River steelhead. Declines of B-run steelhead, including those returning to the Selway River, are well documented and have culminated with the species listed as threatened in 1997.

Resident redband trout appear to comprise a significant portion of at least several steelhead/redband subpopulations in the Selway subbasin (Huntington, 1997; USDA unpublished data, 1997-1998). Stream survey data and anecdotal observations suggest that North Fork Moose Creek and Meadow Creek support a significant resident component, where resident fish are physically distinct from anadromous pre-smolts, even where sizes overlap. It is possible that a measure of divergence and reproductive isolation has occurred between both forms, and with the decline in anadromous fish returns over the past decades, this divergence has intensified because resident fish are more likely to be reproductively successful and more likely to breed with each other than with adult steelhead. If returns of adult steelhead continue to decline, a resident life history strategy may become the optimal strategy in terms of probability of reaching reproductive age, and the proportion of resident fish in this population may thus increase dramatically. This change would represent a significant departure from the historic condition.

Current habitat capability is generally similar to its historic condition, but some streams have sustained significant press disturbances, and instream habitat is currently degraded. Streams where this has occurred include Clear, O'Hara, Elk City, Goddard, Island, Falls, SOB, and Deep Creeks. Of these, degradation of O'Hara and Clear Creeks is most significant, since these streams provided historic key spawning and early rearing habitat. In addition, fire suppression may have increased the interval of pulse disturbances related to wildfires in ALTAs 3 and 8. Although cessation of pulse disturbances from wildfires may be related to the current high habitat capability in wilderness watersheds, decreases in fire frequency may result in more significant impacts to streams when wildfires eventually occur, due to higher severity. This is a significant departure from the historic condition, and is important for steelhead trout because most of their key spawning and rearing habitat is located in the breaklands ALTAs.

Connectivity: Current connectivity of habitat and subpopulations remains similar to its historic condition, with some exceptions. Most notably, access above Selway Falls has been improved from construction of the Selway Falls fishway, a tunnel that was blasted out of bedrock in the early 1960s. This structure is currently in place and is used by adult migrating steelhead trout. Most tributaries to the Selway River remain accessible to steelhead.

Access into Clear Creek is impeded by the existence of the Clear Creek hatchery weir, located near the mouth of Clear Creek. Some adult hatchery steelhead trout may be collected by this facility, which is operated by the U.S. Fish and Wildlife Service, primarily for the propagation of spring chinook salmon.

Key Factors and Threats to Steelhead/Redband Trout

Key factors and threats to steelhead trout identified in the *ICBEMP Component Report* that are applicable to steelhead trout in the Selway and Middle Fork Clearwater subbasins are included below. The primary threat to the persistence of steelhead trout in the Selway and Middle Fork Clearwater subbasins, however, is probably downstream mortality. Downstream effects include predation and competition by non-native species, blocked access to historical habitat, and dam passage mortality. The effect of these on the recovery of steelhead trout is proportionately much greater than the effects listed below in the Selway and Middle Fork Clearwater subbasins.

Habitat Degradation: Principal factors related to habitat degradation in the Selway and Middle Fork Clearwater subbasins are associated with excess fine sediment deposition in some watersheds from human-caused press disturbances on highly erosive landtypes, which has resulted in a base sediment yield higher than natural, or historic, base sediment yields.

Watersheds most affected by press sediment impacts include most streams in the Middle Fork Clearwater Face ERU, Clear Creek, most streams in the O'Hara and Goddard ERU (including O'Hara, Goddard, Elk City, Island, Falls, and SOB Creeks), and streams in the Deep Creek ERU. In addition, some streams have been affected by changes in channel morphology from past logging (where logs were skidded down stream channels), past channelization, past removal of debris jams, and domestic livestock grazing. These streams include Nineteenmile Creek (past channelization), Boyd Creek (past log skidding, debris removal, domestic livestock grazing), Glover Creek (past log skidding, debris removal, domestic livestock grazing), Gedney Creek (past debris removal), and the upper reaches of Meadow Creek (domestic livestock grazing).

Harvest: Harvest of wild steelhead trout in the Selway and Middle Fork Clearwater subbasins involves three principal components. The first is the sport harvest of adult steelhead trout in the Clearwater River downstream of the subbasins. This harvest includes incidental catch and illegal harvest of adult wild steelhead trout in a sport fishery where harvest of hatchery steelhead is permitted. Although most anglers comply with legal harvest requirements, a percentage of wild adults are killed each year through incidental hooking mortality or illegal harvest.

The second harvest component involves the legal harvest of pre-smolts in tributaries to the Selway River, particularly in Meadow Creek and tributaries below Selway Falls, which are accessible by roads. Most anglers perceive pre-smolts as resident rainbow trout. Harvest of two "trout" of any size after July 1 is legal under current state fishing regulations. Although not widespread, harvest of juvenile steelhead may be significant in certain areas, especially O'Hara Creek, where a popular campground is located near the mouth and a streamside road extends up the creek six miles.

The third component of harvest involves the capture of adult steelhead trout in the Selway Falls fishway for hatchery broodstock augmentation and research purposes. In recent years, forty or more adults have been removed. The significance of this activity to the wild Selway population is unknown. Although it may contribute to the recovery of steelhead trout outside the Selway subbasin, it does not contribute to the long-term persistence of steelhead trout within the subbasin.

Summary of Steelhead/Redband Trout Habitat and Population Status

Map 26 displays information on the habitat and population status for steelhead. The following ERUs, sub-ERUs, or individual sixth-code watersheds are classified as strongholds: lower Meadow Creek ERU, Buck Lake Creek, Gedney and Three Links ERU, Moose Creek ERU, lower Pettibone and Bear Creeks, upper Pettibone and Bear Creeks, Lower Running and Goat Creeks, lower Marten Creek, White Cap ERU, Indian Creek ERU, the Little Clearwater River, and streams in the Selway Headwaters ERU.

Clear Creek and O'Hara Creek are classified as historic strongholds, where habitat has been degraded and population numbers are depressed. Upper Meadow Creek is classified as a population stronghold, especially for redband trout, because population numbers are good but habitat has been degraded.

SPRING CHINOOK SALMON *(Oncorhynchus tschawytscha)*

Spring chinook salmon in the Clearwater basin are considered a sensitive species by the U. S. Forest Service Northern Region, and are considered a species of special concern by the state of Idaho. The species' Endangered Species Act status is discussed below.

The following information was summarized from the *ICRB Aquatic Component Report*. Chinook salmon are distributed widely throughout the Columbia River basin. Spring chinook salmon, which are the salmon found in the Selway and Middle Fork Clearwater subbasins, cross Bonneville Dam on the Columbia River from March through May. Spring chinook salmon in the Snake River basin are known as "stream type" chinook, along with summer chinook, and are more widely distributed than "ocean type," or fall chinook. Stream type chinook salmon are characterized by juveniles that migrate to the ocean as yearlings, while ocean-type chinook juveniles migrate to the ocean as subyearlings.

Snake River chinook salmon (stream and ocean types) were listed as threatened under the Endangered Species Act in 1992. Spring chinook salmon in the Clearwater River basin were exempted from the listing because of uncertainty associated with the genetic integrity of this stock. Genetic integrity was questioned because the construction of Lewiston Dam in the early 1900s allegedly eliminated all runs of native spring chinook salmon into the Clearwater basin, and those currently found in the basin are derived from subsequent planting efforts following removal of this dam.

The distribution and abundance of chinook salmon in the Columbia River have declined substantially from historic levels as a result of passage mortality at dams, habitat degradation, loss of access to historical habitat, overharvest, and interactions with hatchery-reared and non-native fishes. Historic runs of chinook salmon in the Columbia River were immense; estimates of annual run sizes prior to 1850 range from 3.4 to 6.4 million fish (Northwest Power Planning Council, 1986). About 7,720 miles (12,452 km) of the historical range in the United States and Canada are no longer accessible to chinook salmon. Chinook salmon are extinct in many areas of their historic range, including the Upper Klamath, Hood, Klickitat, Umatilla, Walla Walla, Entiat, and Yakima River basins, and the Metolius River above the Pelton and Round Butte Dams.

Basin Context

Spring chinook salmon in the Snake River are considered an ecologically significant unit (ESU). Spring chinook salmon in the Selway and Middle Fork Clearwater subbasins are not considered part of this ESU, however, because it is believed that the indigenous spring chinook populations were eliminated from the Clearwater River basin by construction of Lewiston Dam. Spring chinook salmon in the Clearwater River basin are therefore not listed as threatened under the Endangered Species Act as are other Snake River salmon, despite concurrent declines in the number of returning adults. Spring chinook salmon in the Selway and Middle Fork Clearwater subbasins represent an important metapopulation in the Clearwater River basin. Others occur in the Lochsa and South Fork Clearwater Rivers and in various tributaries to the lower Clearwater River.

Historic Conditions Related to Spring Chinook Salmon

Inherent Habitat Capability and Population Dynamics: The Selway and Middle Fork Clearwater subbasins have inherently high capability to support spring chinook salmon, especially in the larger mainstem tributaries to the Selway River, including Meadow, Moose, Bear, White Cap, and Running Creeks. This is based on features such as climate, elevation, relief, and geology. Habitat capability is discussed in this section as it relates to: (1) the capability of the subbasin to support spring chinook salmon spawning and rearing; and (2) the subbasin's capability to support juvenile and adult migration.

The Middle Fork Clearwater subbasin provided key migration habitat for adult salmon and migration and overwintering habitat for juvenile salmon. Clear Creek additionally provided spawning and early rearing habitat and was a historic stronghold. Other tributaries to the Middle Fork Clearwater River may have incidentally provided spawning and early rearing, but are not considered key habitats.

The Selway River supported significant returns of adult spring chinook salmon. Historic spawning and early rearing areas in the Selway subbasin included the lower reaches of the larger mainstem tributaries and the Selway River itself. Streams flowing through the low elevation breaklands, particularly those including and upstream of Moose Creek, provided key spawning and early rearing habitat. Of all the streams in the subbasin, Bear Creek probably supported the highest concentration of spawning adult salmon of any area. Adult salmon staged in deep pools below the mouth of Cub Creek. Large, contiguous beds of appropriately sized gravels provided abundant spawning habitat for this species. In these reaches, Bear Creek meandered across a relatively wide, low-elevation glacial valley bottom, which was moderately to heavily forested. Additional spawning and rearing areas were located above these reaches in both Bear and Cub Creeks. Both streams supported large amounts of instream debris recruited from adjacent cedar stands, which were stable and provided highly complex habitats.

Other areas in the subbasin providing key spawning and rearing habitat included the lower reaches of Moose Creek, North Fork Moose Creek, East Fork Moose Creek, the lower reaches of

Running Creek, the lower reaches of White Cap Creek, and the Selway River from the mouth of Moose Creek upstream to and including the mainstem in the Selway Headwaters ERU. Although most of the areas are located within the breaklands ALTAs and were thus subject to periodic disturbances, the species persisted over a wide range of conditions. Spring chinook salmon were highly resistant to pulse environmental perturbation, probably due their proportionately high fecundity and widespread availability of habitat.

Historic Connectivity: Historic connectivity in Clear Creek and the Selway subbasin was high. Selway Falls provided an impediment to upstream adult migration, but salmon generally migrated through in June and early July when flows were high enough to provide passage. In general, key spawning and early rearing areas were readily accessible to salmon at all flow levels and were not a significant determinant of salmon distribution.

Departure From Historic Conditions

Habitat Capability and Population Dynamics: Currently, spring chinook salmon are distributed similarly to the way they were historically. Salmon found in the Selway and Middle Fork Clearwater subbasins are not of the original stock that existed historically; however, they are all derived from salmon introduced in the mid-1900s following the removal of Lewiston Dam in the 1930s. Despite decades of extensive reintroduction and hatchery supplementation, abundance of salmon is significantly reduced from historic abundance, and the persistence of this species in the Selway subbasin through the ensuing decades is questionable.

Current habitat capability for salmon in historic key spawning and rearing areas is similar to historic capability, except in Clear Creek, which has been affected by press disturbances across the watershed. These disturbances have resulted in reduced habitat quality and reduced carrying capacity, particularly in the lower reaches of the stream.

Current abundance of spring chinook salmon in the Selway and Middle Fork Clearwater subbasins is very low. Although returns of adults have fluctuated over the past decades, an overall declining trend has occurred. Although salmon continue to return to the Selway subbasin, the species is at high risk of extinction.

Returning salmon in the Selway and Middle Fork Clearwater subbasins were either released as smolts or pre-smolts or are naturally produced progeny from salmon of hatchery origin. The original stock of salmon in the subbasins is extinct, but the Selway subbasin has sustained a naturalized spring chinook salmon population for decades since they were reintroduced in the 1930s and 1940s. Spring chinook salmon are still supplemented annually, usually with fish from the Rapid River hatchery in the Salmon River basin.

A hatchery for spring chinook salmon exists near the mouth of Clear Creek. This hatchery propagates salmon annually and releases them directly into Clear Creek. A weir located near the mouth of the stream traps all adults. In years where number of adults returning is high and the hatchery egg quota is reached, some adult salmon are allowed to migrate upstream to spawn naturally in Clear Creek.

Connectivity: Current connectivity of habitat and subpopulations remains similar to its historic condition, with some exceptions. Most notably, access above Selway Falls has been improved from construction of the Selway Falls fishway, a tunnel that was blasted out of bedrock in the early 1960s. This structure is currently in place and is used by adult spring chinook salmon, although structural integrity has been compromised in recent years. Most tributaries to the Selway River remain accessible to salmon.

The fish weir associated with the hatchery at Clear Creek prevents upstream migration of adult salmon. All adults are trapped at this facility. Historically, Clear Creek was accessible to salmon.

Key Factors and Threats to Spring Chinook Salmon

Key factors and threats affecting spring chinook salmon identified in the *ICBEMP Component Report* are applicable to spring chinook salmon in the Selway and Middle Fork Clearwater subbasins, but many of these involve downstream effects. The *ICBEMP Component Report* lists five factors believed to contribute to the decline of spring chinook salmon in the upper Columbia River basin: (1) habitat degradation; (2) hydropower development; (3) hatcheries; (4) harvest; and (5) predation and competition by non-native species. Although these factors affect spring chinook salmon returning to the subbasins, they largely occur downstream. Other threats and key factors more relevant to the Selway and Middle Fork Clearwater subbasins are included below.

Habitat Degradation: Principal factors related to habitat degradation in the Selway and Middle Fork Clearwater subbasins are associated with excess fine sediment deposition. Degradation has occurred in the Clear Creek area, which has been identified as historic key spawning and rearing habitat. Other degraded streams may affect salmon cumulatively through increased sediment delivery into the mainstem Selway and Middle Fork Clearwater Rivers.

Hatcheries: As previously discussed, spring chinook salmon are heavily supplemented with hatchery salmon from outside the subbasins. It is not known if naturally-produced salmon, which have existed in the Selway subbasin for decades, have developed local adaptations which are affected by continued stocking of hatchery salmon. It is known, however, that despite heavy supplementation in the past ten years, returns of adult salmon continue to decline. Hatcheries have been identified as a major threat to the persistence of wild populations (Quigley et al., 1997). It is possible that since all salmon within the Selway and Middle Fork Clearwater subbasins are hatchery salmon, continued use of hatchery salmon should pose no threat to their continued existence. It is also possible that without continued supplementation, spring chinook salmon would be extinct in the Selway subbasin.

Harvest: Harvest of adult spring chinook salmon is not legal under existing Idaho state fishing regulations. Illegal harvest of spring chinook salmon probably occurs in remote areas where salmon are readily visible in late August and September, which coincides with the wilderness big game hunting season and associated high numbers of people traveling on mainline trails adjacent to streams.

Summary of Spring Chinook Salmon Habitat and Population Status

Map 25 displays habitat and population status for spring chinook salmon. The following ERUs, sub-ERUs, or individual sixth-code watersheds are classified as habitat strongholds: lower Pettibone and Bear, lower Meadow Creek, lower Moose Creek, lower Running and Goat, lower White Cap, and streams in the Selway Headwaters ERU. Clear Creek is classified as a historic stronghold. Due to extremely low numbers of returning adult salmon, no watersheds are classified as strongholds.

PACIFIC LAMPREY *(Lampetra tridentata)*

The Pacific Lamprey is listed as a state endangered species by the Idaho Department of Fish and Game.

The following information is summarized from the *ICRB Aquatic Component Report*. The Pacific lamprey is an anadromous and parasitic lamprey widely distributed along the Pacific coast of North America and Asia. Traditionally, Pacific lampreys were an important ceremonial and subsistence resource for native peoples. They occur in all areas that remain accessible to salmon and steelhead (Simpson and Wallace, 1978).

Historic runs of Pacific lamprey were large; some years 400,000 lampreys were counted as they migrated past Bonneville Dam on the Columbia River (Harrison, 1995). Counts of lampreys passing Ice Harbor Dam on the Snake River totaled 40 in 1993 and 399 in 1994; in comparison, nearly 50,000 were counted annually in the 1960s (Harrison, 1995).

Similar to other anadromous fishes, the distribution and abundance of the Pacific lamprey has been reduced by the construction of dams and water diversions, as well as degradation of spawning and rearing habitat. The species is excluded from large areas where it was historically present, including upstream from Hells Canyon Dam on the Snake River and upstream from Chief Joseph Dam on the Columbia River. Landlocked populations have been found in areas from which the anadromous form has been precluded (Wallace and Ball, 1978), but they have not persisted, and Beamish and Northcote (1988) concluded that metamorphosed lampreys were unable, in such areas, to survive to maturity.

Juvenile lampreys have been observed in the Selway River during Idaho Department of Fish and Game surveys. The location of these observations is upstream of Bear Creek in the Selway River. No known observations have been made in the Middle Fork Clearwater River, or elsewhere in the Selway River. Total distribution and abundance of this species in the Selway subbasin is completely unknown. Considering the facts discussed above, it is very likely that this species' distribution and abundance are significantly reduced from historic conditions.

Key Factors and Threats to Pacific Lamprey

The Idaho Chapter of the American Fisheries Society concluded that dams on the Snake and Columbia Rivers, alteration of streams, and harvest of ammocoetes by bait anglers are the most serious threats to the Pacific lamprey in Idaho. Pacific lampreys, similar to salmonid fishes, are likely vulnerable to land disturbances that cause sedimentation in nursery streams. The ammocoetes depend on quality habitat in freshwater for up to six or seven years before they immigrate to the ocean. Such an extended period in freshwater makes them especially vulnerable to degraded stream conditions. Their anadromous life history necessitates maintenance of spawning and rearing areas. Water quality consistent with robust diatom production may be a key factor for their continued existence.

Although information specific to the Selway and Middle Fork Clearwater subbasins is lacking, key factors and threats affecting the Pacific lamprey are probably largely due to downstream effects.

MOUNTAIN WHITEFISH *(Prosopium williamsoni)*

Historic and Current Status in the Selway and Middle Fork Clearwater Subbasins

USFS and Idaho Department of Fish and Game stream and river survey data indicate that mountain whitefish are by far the most abundant salmonid in the Selway and Middle Fork Clearwater Rivers. Additionally, this species is the most abundant fish in the lower reaches of the larger mainstem tributaries, including Meadow, Moose, Bear, and White Cap Creeks. It is assumed that historic distribution and abundance were similar or the same as existing distribution and abundance. Mountain whitefish in the Clearwater basin are not imperiled. Because of apparent wide distribution and high numbers of adults and juveniles, data collection efforts are not focused on this species, and data are lacking.

NORTHERN PIKEMINNOW *(Ptychocheilus oregonensis)*

Historic and Current Status in the Selway and Middle Fork Clearwater Subbasins

Northern pikeminnow are known to inhabit the Middle Fork Clearwater River and the Selway River below Selway Falls, and are abundant where they occur. Pikeminnow may also occur in the Selway River above Selway Falls. This species is not known to inhabit any tributaries of the Middle Fork Clearwater or Selway Rivers. The species is not imperiled in the subbasins or elsewhere. Current distribution and abundance is assumed to be the same or similar to historic distribution and abundance. There are no known threats to the future persistence of pikeminnow in the subbasins.

OTHER NATIVE AQUATIC SPECIES

The Selway and Middle Fork Clearwater subbasins support a variety of aquatic organisms for which there is a lack of information concerning status, distribution, abundance, and species identification. Aquatic organisms known to inhabit the subbasins include suckers (*Catastomus* spp), dace (*Rhinichthys* spp), other unidentified cyprinids, sculpins (*Cottus* spp), a wide variety of macroinvertebrates (including insects and crustaceans), at least one unidentified centrarchid (which may not be native), mussels, filamentous algae, diatoms, mosses, and various vascular aquatic plants. Some non-vertebrate aquatic organisms found in mountain lakes may be endemic, having never been described or found elsewhere. Lack of information concerning these organisms is considered a significant data gap. Further investigation is recommended.

Amphibians (frogs, toads, salamanders, and their larvae) are present throughout the analysis area. Amphibian species are discussed under the Terrestrial Species subheading.

NON-NATIVE (INTRODUCED) AQUATIC SPECIES

Aquatic species not native to the Selway and Middle Fork Clearwater subbasins have been widely introduced into the subbasins over the past 100 years and represent a significant departure from historic conditions. Introduced species include brook trout, Yellowstone cutthroat trout, hatchery rainbow trout, German brown and Lochlaven brown trout, golden trout, arctic grayling, and coho salmon. Non-native species have been introduced into both stream and lake environments.

Current Status of Introduced Species

Brook trout *(Salvelinus fontinalis)*: In the 1930s and 1940s, brook trout were stocked widely across the Selway and Middle Fork Clearwater subbasins, in both streams and lakes. Brook trout were stocked into all fish-bearing streams in the portion of the watershed below Selway Falls, including the mainstem Selway and Middle Fork Clearwater Rivers. Brook trout from this series of stockings are currently present in O'Hara Creek and Clear Creek. Recent survey efforts of other streams below Selway Falls suggest that brook trout are not present except for in the upper reaches of Gedney Creek.

Brook trout are also strongly established in lakes in the Selway subbasin. Although no longer stocked, self-sustaining populations are found within lakes located at the headwaters of Gedney, Three Links, North Fork Moose, East Fork Moose, Running, Pettibone, Mink, and Meadow Creeks. Stream-dwelling populations are found in Gedney, Three Links, Rhoda (Moose Creek ERU), Lizard (Moose Creek ERU), East Fork Moose, Pettibone, and Running Creeks, downstream of lakes where they were stocked. Brook trout were not stocked in these streams, but stream-dwelling populations became established as fish from the lakes emigrated downstream. All populations are considered strong and are at low risk of extinction. Adverse ecological effects associated with brook trout include elimination of native westslope cutthroat trout, elimination of and/or hybridization with bull trout, and disruption of fragile lake ecosystems where brook trout occur.

Yellowstone Cutthroat Trout *(Oncorhynchus clarki bouvieri):* Yellowstone cutthroat trout were stocked into every road-accessible fish-bearing tributary to the Selway River, including Deep and Running Creeks, and the Middle Fork Clearwater River from the early 1930s through the 1950s. Yellowstone cutthroat trout have not been stocked in streams since the late 1950s.

In addition to stream stocking, Yellowstone cutthroat trout and rainbow/cutthroat hybrids were stocked in many mountain lakes in the Selway subbasin. This subspecies was stocked in lakes as recently as 1982. Stocking occurred in lakes in the following watersheds: Three Links, North Fork Moose, East Fork Moose, Bear, White Cap, Marten, Pettibone, Bitch (Upper Selway Canyon ERU), Little Clearwater, and in the Selway headwaters.

Hatchery Rainbow Trout: Similar to Yellowstone cutthroat trout, hatchery rainbow trout were stocked widely in streams throughout Selway and Middle Fork Clearwater subbasins, including the mainstem Selway and Middle Fork Clearwater Rivers. Hatchery catchable rainbow trout were stocked in the mainstem Selway River below Selway Falls as recently as 1991.

Hatchery rainbow trout have also been introduced into mountain lakes in the Selway subbasin. Rainbow trout were stocked in lakes at the headwaters of the following streams: North Fork Moose Creek, East Fork Moose Creek, Bear Creek, White Cap Creek, Three Links Creek, and streams in the Selway Headwaters ERU. In a few lakes, rainbow trout were stocked as recently as 1995 and are the only species found in these lakes.

Arctic Grayling *(Thymallis arcticus)*: Arctic grayling were historically stocked into a small number of lakes in the Selway subbasin over the past decades, and in Three Links Creek in 1941. The species is currently not present in any of the locations where it was stocked or anywhere in the Selway subbasin. No known encroachment and establishment of grayling into streams has occurred.

Golden Trout *(Oncorhynchus aquabonita)*: Golden trout were introduced into a number of mountain lakes over the past decades, including lakes in the Moose, Bear, and Marten watersheds. Stocking in these areas occurred as recently as 1977. Mountain lake surveys conducted in the 1980s and 1990s did not document the presence of golden trout in these lakes or in any other lakes in the Selway subbasin. It is possible that golden trout are still present in lakes in the White Cap ERU, however, which have not been recently surveyed.

German Brown and Lochlaven Brown Trout *(Salmo trutta)*: Brown trout were widely introduced into the mainstem Selway River in the 1940s. Past and current surveys and creel censuses have not documented the presence of brown trout anywhere in the Selway and Middle Fork Clearwater subbasins. Brown trout were also stocked in Clear Creek in the early 1940s. No brown trout have been found in past and current survey efforts.

Coho Salmon *(Oncorhynchus kisutch*): Coho salmon were introduced to Meadow Creek, O'Hara Creek, and the mainstem Selway River in the mid- to late 1990s in an effort to establish a run of adult coho salmon in Meadow Creek and tributaries to the Selway River below Selway Falls. Although coho salmon pre-smolts have been observed during post-stocking surveys, the number of adult returns is unknown due to monitoring difficulties. Stocked coho salmon were obtained from a lower Columbia River hatchery.

Smallmouth Bass *(Micropterus williamsoni)*: Smallmouth bass were introduced into the Clearwater River in the 1950s, 1960s, and 1970s. Smallmouth bass are common in the Clearwater River between the confluence of the South Fork and Middle Fork Clearwater Rivers and the mouth of the North Fork Clearwater River. Bass occur in the lower reaches of the Middle Fork Clearwater River. The species has not been documented in the Selway River, but may be present in low numbers in the very lowest reaches of the river. In general, the population of smallmouth bass in the Middle Fork Clearwater River is not strong, and is considered transitory at best, occurring in these areas opportunistically during the hottest summer months.

Adverse impacts to native fish are associated primarily with predation of juvenile native fish by adult bass. Competitive displacement of native fish appears not to have occurred.

LANDSCAPE ECOLOGY

COMPOSITION, STRUCTURE AND PROCESS

Plant communities in the Selway and Middle Fork Clearwater subbasins can be seen as a mosaic of patches that change in composition, size, and juxtaposition over time. Wildlife and human uses respond to the existing pattern of vegetation. Processes like plant community succession, fire, insect and disease activity, drought and grazing, all change the pattern that exists at any one time. Features like climate, soil, slope, aspect and elevation, control the bounds within which patterns can change.

Vegetation response units (VRUs) and habitat type groups (HTGs) within VRUs were used to describe the bounds within which patterns of vegetation change. Within these delineations, presettlement processes like climate, fire, and insect and disease activity were likely to operate within predictable ranges. See appendix B, Vegetation Response Units and Appendix A, Habitat Type Groups. VRUs are shown in Map 30, and HTGs are shown in Map 31.

Understanding how the disturbance regimes worked, and the pattern of vegetation change, is fundamental to ecosystem management in the subbasins. This understanding can be used to design management systems that sustain patterns of vegetation and the scale, frequency, and kind of change to which native species are adapted.

Historic Vegetation Conditions

John Leiberg surveyed the Selway and Middle Fork Clearwater subbasins as part of the Bitterroot Forest Reserve in 1897 and 1898 (Leiberg, 1898). Recent burns (to perhaps 40 years old) covered about 35 percent of the area surveyed. Small trees (poles) or open stands of medium trees probably amounted to about another 40 percent. Dense stands of medium trees or large trees in open or dense stands occupied less than 25 percent of the subbasins. Thirty-four percent of the area surveyed was dominated by Douglas-fir. Ponderosa pine (21 percent) occurred as pure and mixed stands in the canyons below 6,000 feet. Lodgepole pine (17 percent) dominated mid elevation forests in the Selway headwaters and headwaters of Meadow Creek. Grand fir dominated old growth was abundant near Clear Creek and old growth cedar in valley bottoms from O’Hara Creek to Moose Creek and Bear Creek. Western larch and western white pine were quite uncommon. Whitebark pine and alpine larch were widely distributed above 6,000 feet but seldom dominant (less than one percent). Subalpine fir and Engelmann spruce occupied about 18 percent of the subbasins between 6,000 and about 8,000 feet. Acres and percent in each class are shown in Table 4.22.

Table 4.22: Historic Vegetation Classes from 1914

Size Class in 1911	Acres	Percent of Surveyed Part of the Subbasins
Not mapped	69,984	5
Alpine	92,942	7
Barren	167,826	12
Grassland	38,753	3
Recent burn (includes seedling and sapling)	180,348	13
Low volume timber (open pole or medium trees)	208,350	15
High volume timber (closed pole, medium tree or large tree)	669,331	47

Departures of Current Vegetation Composition and Structure from Historic Conditions

The following analysis and discussion of historic and current vegetation is based on aerial photo interpreted data from 1932 to 1939 and photo interpreted and satellite imagery for three subsampled areas equivalent to about 10 percent of the Selway and Middle Fork Clearwater subbasins. Ecologists also used satellite imagery and photo interpretation for the entire assessment area for current status information. Limitations in these data occur because some data are 20 years old or because of inherent limitations in satellite image classification or photo interpretation. Cover type, size-class and canopy information for subsampled areas in the 1930s are shown in Maps 38 to 40. Current vegetation cover types, size class, and tree canopy cover for the entire assessment area are shown in Maps 41 to 43.

Departures In Composition: The greatest departures from historic conditions are:

- Severe declines in whitebark pine due to fire exclusion, blister rust, and mountain pine beetle. Alpine larch has also been affected by fire exclusion.
- Significant declines in ponderosa pine (especially large pine in open stands) due to fire suppression and forest succession.
- Increases in more shade tolerant tree species, like grand fir and western red cedar, due to fire suppression and forest succession. Subalpine fir does not appear to have increased.
- An increase in lodgepole pine, probably due to conifer establishment on old burns.
- Moderate declines in shrubland due to forest succession.
- Loss of recent burn patches. Some insect-affected areas now provide patches of fresh snags.
- Establishment of annual grasslands and noxious weeds on grassland habitat types on low elevation steep south facing slopes.
- A decline of western white pine, never abundant, due to blister rust.
- An increase of montane park due to succession on burned areas and areas of thin soil.

Table 4.23 shows changes in cover types from the 1930s to the 1990s in subsampled areas.

Table 4.23: Changes in Vegetation Cover Types in Subsampled Areas

Cover Type	1930s Acres (Percent of Area)	1990s Acres (Percent of Area)	Percent Change
Grassland	1,447 (1)	1,799 (1)	+24
Herbaceous clear cut	0 (0)	647 (<1)	+
Montane park	3,138 (2)	11,291 (8)	+260
Shrubland	20,965 (15)	15,421 (10)	-26
Ponderosa pine-Douglas-fir	17,100 (12)	13,585 (9)	-21
Lodgepole pine	9,303 (7)	15,129 (10)	+63
Subalpine fir	32,140 (23)	32,435 (22)	+1
Mesic mixed conifer	33,436 (24)	42,809 (29)	+12
Whitebark pine	4,077 (3)	316 (<1)	-92
Rock or barren land	15,220 (11)	14,659 (10)	-4

Table 4.24 shows the current extent of cover types and size classes for the entire assessment area, from aerial photo interpretation and satellite imagery.

Table 4.24: Cover Types and Size Classes in the Selway and Middle Fork Clearwater Subbasins

Cover Type	Total Acres	Percent of Subbasins
Agriculture: hay, crop, or pasture	259	<1
Foothills Grassland	23,896	2
Disturbed Grassland	153*	<1
Montane park	56,762	4
Alpine scrub	303	<1
Mesic shrub	73,585	5
Cold shrub	55196	4
Xeric shrub	6	<1
Hardwoods	2173	<1
Herbaceous clearcut	3165	<1
Riparian forest	3	<1
Riparian meadow-shrub	479	<1
Xeric forest: ponderosa pine and Douglas-fir	70,650	5
Douglas-fir, xeric or mesic	144,582	11
Mesic mixed conifer	355,725	26
Spruce-fir forest	330,109	24
Lodgepole pine	207,297	15
Whitebark pine	5197	<1
Rock-barren	43,082	3
Water	2194	<1
Snow	970	<1

* Note: The area of disturbed grassland is known to be much higher than shown here.

Forest structure within communities includes lifeform, size, canopy density, or canopy layers. Table 4.25 and Map 39 show forest size classes in the 1930s for subsampled areas and Map 42 shows forest size classes for the entire assessment area in the 1990s.

Departures In Size-Class: The greatest departures in size-class are:

- The decrease in nonforest cover is due to forest establishment on old burns. Harvest has increased nonforest in other areas, but to a relatively small degree. The consistently large area of nonforest is due to the abundance of high elevation rocky ridges and dry slopes that cannot support tree growth.

- The increases in seedling/sapling and pole classes are due to tree growth on old burns, while relatively few recent burns have occurred.
- The decreases in medium and large tree classes are more difficult to interpret because the area affected by fire suppression, resulting in tree growth, is much larger than the area affected by recent harvest, resulting in loss of large trees. The Middle Fork Clearwater area has lost large trees due to harvest, and the White Cap Creek area has lost large trees either due to fire or a mapping inconsistency. It is probable that net loss of the large tree component is confined to moist areas in the lower Selway and Middle Fork Clearwater subbasins where harvest of mixed conifer old growth has been extensive.

Table 4.25: Changes in Tree Size Classes in Subsampled Areas

Size Class	1930s Acres (percent)	1990s Acres (percent)	Percent Change
Nonforest	51,523 (35)	44,935 (31)	-13
Seedling/Sapling	5761 (4)	12,991 (9)	+125
Pole	6402 (4)	24,626 (17)	+284
Medium tree	59,164 (41)	45,651 (31)	-23
Large Tree	22,606 (16)	17,131 (12)	-24

Table 4.26: Existing Tree Size Classes

Size Class	Percent of Area in Entire Subbasin
Nonforest or nonstocked	27
Seedling/sapling	13
Pole	9
Medium tree	23
Large tree	28

Departures In Canopy Density: Canopy density is an important structural attribute because it affects plant vigor, susceptibility to insects and disease, potential for crown fire, wildlife cover, and successional pathways. Table 4.27 and Maps 40 and 43 display tree canopy cover for the 1930s in the subsampled areas and the 1990s for the entire assessment area. Departures in canopy density have occurred in all classes as follows:

- More acres are forested, probably due to fire exclusion.
- The increase in acres with low canopy is probably due to establishment of seedling and sapling stands on burns, and to a lesser extent, on old harvest units.

- Areas with moderate canopy have declined while areas of high canopy have increased, probably due to fire exclusion. This has likely been accompanied by increased vertical layers within the canopy, as young, more shade tolerant trees grow up beneath the overstory.
- Increased canopy density and layering indicate a greater probability of crown fire, potentially more severe fire effects, and consequent effects to sediment regimes and successional pathways.

Table 4.27: Changes in Tree Canopy Cover in Subsampled Areas

Size Class	1930s Acres (percent of forested)	1990s Acres (percent of forested)	Percent Change
Low (10-39%)	21,884 (23)	25,811 (26)	+18
Moderate (40-69%)	52,670 (56)	45,908 (46)	-13
High (70% +)	19,379 (21)	28,599 (29)	+48
Total forested acres	93,393	100,318	+7

Table 4.28 shows tree canopy cover for the entire assessment area. Current tree canopy cover across the subbasins is similar to that in the subsampled areas, indicating that changes in canopy density have likely occurred throughout the subbasins.

4.28: Existing Tree Canopy Cover

Tree Canopy Cover	Percent of Forested Area in Entire Subbasin
Low	24
Moderate	46
High	30

Landscape Structure

Across landscapes, the variation in patch size and extent has implications for the wildlife species that use the landscape, watershed processes like erosion, and the plant species that are adapted to certain scales of migration and colonization. Patches are defined as contiguous areas of similar general vegetation structure. Patches are defined by their seral conditions:

- Open early seral includes shrubs and herbaceous communities, and open seedling or pole stands.
- Closed early seral includes seedling or pole stands with moderate or high canopy.
- Open mid-seral includes medium trees with low canopy.
- Closed mid-seral includes medium trees with moderate or high canopy.
- Open late seral includes large trees with low canopy.

- Closed late seral includes large trees with moderate or high canopy.

Table 4.29, below, shows how seral patch properties have changed in the subsampled areas of the subbasins. These data must be interpreted with caution because of the differences in methods and resolution in delineation.

Allowing for inconsistencies in mapping resolution between the 1930s and 1990s, it appears the following departures in landscape structure have occurred:

- The decrease in the average and maximum patch size of open early seral communities is probably due to fire suppression and succession toward closed forests. Harvest has increased nonforests in limited areas, but to a relatively small degree, while average size of harvest openings is uniformly smaller than many fire-created openings. That the total extent of open early seral communities has appeared to increase may be due to the development of montane park or alpine scrub on formerly barren ridges.
- The increases in the closed seedling-sapling and pole classes are due to increasing stand density on old burns.
- Mid-seral open forest has increased in extent, but declined in patch size. Some of the increase may be due to mortality in mixed subalpine fir-whitebark pine stands, increased root rot mortality in mixed mesic conifer stands, or the increase may be a product of mapping inconsistency.
- Mid-seral closed forest has decreased in extent, patch size, and variability. Some of these changes may be due to transition to late seral closed forest, or mortality that has shifted the stands to more open conditions.
- Late seral open forest has decreased in extent, patch size, and variability of patch size. This decrease is probably due to increasing stand density and coalescence of adjacent stands into closed canopy conditions, due to fire exclusion.
- Decreases in late seral closed canopy forest may be due to fragmentation effects of harvest in the Middle Fork Clearwater and lower Selway areas.

Table 4.29: Historic and Current Patch Characteristics for Subsampled Areas

Seral Stage	Decade	Total Acres	Average Patch size (acres)	Max patch Size (acres)	Standard Deviation (acres)
Early Seral Open	1930s	33,369	402	17,308	1,918
	1990s	38,677	55	4,520	259
Early Seral closed	1930s	4,546	162	2,685	502
	1990s	28,020	55	8,706	417
Mid-seral Open	1930s	10,641	150	1,291	243
	1990s	15,828	29	1,135	74
Mid-seral Closed	1930s	48,615	1,157	26,666	4,266
	1990s	29,823	53	4,237	220
Late Seral Open	1930s	4,435	193	456	175
	1990s	466	15	87	18
Late Seral Closed	1930s	20,248	1,558	9,295	3,194
	1990s	16,665	73	2,742	280

Old Growth Forests

Old growth may be described simply as forests having old trees and related structural attributes, like snags and down wood (Moir, 1992). Old growth characteristics vary by region, forest type, and local conditions. In the Selway and Middle Fork Clearwater subbasins, old growth and its historic settings can include: (1) open stands of ponderosa pine maintained by frequent low severity fire; (2) single or multilayered old cedar in valley bottoms; (3) multilayered stands of grand fir and Engelmann spruce with periodic small fires, much rot and down wood; (4) mixed stands of young and old Douglas-fir, western larch, and grand fir with periodic mixed severity fire that usually left some large old trees intact; (5) multilayered stands of Engelmann spruce and subalpine fir along stream bottoms or other areas protected from fire, and: (6) occasional stands of whitebark pine, lodgepole pine, or Douglas-fir missed by past fire, but seldom persisting long in a specific landscape position.

Leiberg described only a few types and areas of extensive old growth in 1898: open ponderosa pine in the canyons and old growth cedar in the valley bottoms. To develop a basis for estimating the possible amount and location of current old growth, ecologists delineated areas of mature forest in the 1930s and subtracted the areas that had been affected by harvest or high severity fire. Map 44 shows where large trees dominated stands in the 1930s and 1940s and where the same stands remain today. Also see Appendix H: Old Growth.

Many of the stands of fairly large trees in the 1930s, that still exist, would probably be considered old growth today, using the north Idaho criteria (Green et al., 1992). Some of the extensive lodgepole, ponderosa pine and Douglas-fir stands in the Selway Headwaters ERU are also known to be old, although they were not delineated because of their small size, so actual old growth is probably more extensive than displayed here. In the 1930s, at least 16 percent of the potentially forested acres on the national forest lands of the subbasins were stands of mature (probably 80 years or more), but not necessarily old growth at that time. Total area in mature forest is greater today (between 20 and 25 percent) than historically, due to fire exclusion.

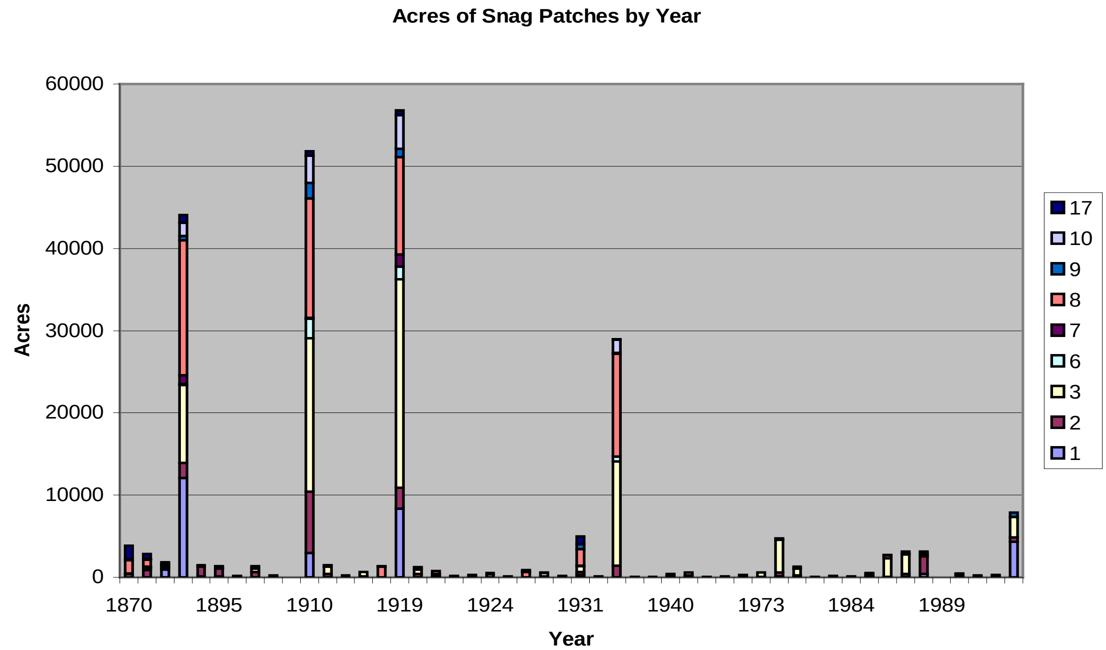
Stands with large trees historically tended to be concentrated at the west end of the assessment area (VRUs 7, 10 and 17) or in areas maintained by frequent low severity fire (VRU 3). In VRUs 7, 10 and 17, these large blocks of mature forest have been highly fragmented by recent harvest. See Map 44. In VRU 3, which is mostly in wilderness, ingrowth due to fire exclusion has probably exceeded losses due to fire. However, the kind of old growth is changing, due to fire exclusion. More multilayered, mixed species old growth occurs, while open ponderosa pine old growth has decreased. In other parts of the subbasins, stands with large trees historically tended to be more fragmented and isolated from one another, often associated with north slopes and draws where fire might miss them. This old growth has probably increased in extent and connectivity with fire exclusion.

Snags

Snags and down wood are among the most critical products of natural fire and pathogen regimes in the subbasins. These materials provide foraging and nesting sites for birds and small mammals, enrich chemical and physical properties of soil, and provide diverse microsites for establishment of plants and sites for nitrogen fixation.

Episodic pulses of snag production were an important source of snag patches in natural ecosystems (see Figure 4.28). Stand replacing and mixed severity fire in mature forests would generate snag densities of 40 to more than 200 snags per acre, nine to more than 21 inches in diameter.

Figure 4.28: Acres of Snag Patches by Year



The frequency and size of such pulses were estimated by VRU (vegetation response unit) for the period 1870 to 1996 for the subbasins. These are conservative estimates based on fire area, fire regime (typical percent mortality), and percent of burn likely affecting stands of medium or large trees. From 1889 to 1934, prior to effective fire suppression, about every 15 years very large areas of fresh snags were produced (20,000 to more than 50,000 acres in patches of a few to several thousand acres). This frequency of large fire is well correlated with other time periods and areas in the northern Rocky Mountains. From 1870 to 1934, not counting the large fire years, an average of about 857 acres of smaller patches of dense snags (tens of acres to a few thousand acres) were produced annually, most often in VRUs 3 and 8, and about every other year in the subbasins.

In areas where fire is excluded or timber harvest removes live or dead trees, these pulses do not occur. Since 1935, large pulses of fire-killed snags have been absent and the period between small pulses has increased. This underscores the need for restoration of more natural fire regimes throughout the subbasins, but particularly in VRUs 3 and 8 which seem to have historically provided for the most abundant snag production because of the extent of these VRUs, likelihood of fire, and productivity sufficient to grow medium and large trees between fires. The fires that occurred in 2000 were not included in the following figure or discussion, and have added additional snags in the Selway Headwaters ERU and some in the Upper Selway Canyon ERU.

LANDSCAPE DISTURBANCE

A disturbance is an event that causes a significant change from the normal pattern in an ecosystem (Pickett and White, 1985). A disturbance regime refers to the frequency, severity, scale and other attributes of a recurring disturbance (Hobbs and Huenneke, 1992). Plant and animal species have typically evolved adaptations to survive in the disturbance regimes typical of their environment. When human management drastically alters the frequency, severity or scale of disturbance, some plant, fish and wildlife species will not be able to adapt, or certain habitats or landscape elements may be lost, and this may impact dependent species.

This section describes changed disturbance regimes for terrestrial systems in the subbasins. Restoration of the pattern of disturbance appropriate to a given setting was a key consideration in developing management themes and recommendations.

Insects and Disease

An index of forest health is its capacity for renewing itself (Leopold, 1949). This assessment has used the comparison of historic and current pattern and process as the most appropriate measure of ecosystem health. A landscape that retains critical elements (communities, processes, and patterns) is considered to have the most likelihood of being able to renew itself after stress and to retain its productive potential (Hahn and Hagle, 1993). The following discussion addresses just one aspect of forest health: the changes that have occurred in forest vegetation, and how this is likely to affect susceptibility to some insect and disease organisms.

Budworm: Engelmann spruce budworm is a common defoliating insect in the subbasins (Carlson, 1993). Outbreaks seem to be sporadic and cause some mortality or susceptibility to bark beetle attack in susceptible tree species. Host species are later seral species like grand fir, subalpine fir, Engelmann spruce, and Douglas-fir, which have increased with fire suppression. Trees stressed by overcrowding or other sources of drought, and multistory stands of susceptible trees, increase the severity of attacks. Natural controlling agents are predators and parasites including wasps, flies, birds, ants, spiders, and beetles. Changes in vegetation in the subbasins suggest that susceptibility to budworm outbreaks has probably increased over historic levels, because of changes in tree species composition and stand density, mostly at mid and low elevations. However, actual changes in activity levels have not been observed, perhaps due to the sporadic nature of budworm outbreaks, and their dependence on other climatic factors.

Beetles: Mountain pine beetles attack ponderosa pine, lodgepole pine, western white pine and whitebark pine. They select larger (usually older) trees and trees stressed by drought or other agents. The cycle in which older lodgepole pine (Amman, 1991) are killed by beetle activity, are replaced by fire, and regenerate to lodgepole pine, is widely recognized. Ponderosa pine is a host for western pine beetle, and Douglas-fir is a host for Douglas-fir beetle. With fire suppression, more Douglas-fir has grown into larger size classes, susceptible to beetles. Regional aerial surveys of insect caused tree mortality indicate high levels of Douglas-fir beetle activity in the Upper Selway Canyon ERU, where departures from historic fire frequency are marked, and stand density has increased. Nematodes, fungi, flies, beetles, birds, and cold temperatures are important controls on beetle populations. Beetle activity levels were historically strongly linked to patterns of fire and drought. Fire weakened or drought stressed trees are most susceptible. Large patches of post-fire stressed trees used to occur periodically. Today, larger, continuous areas of older, more susceptible trees are now present in the subbasins in the lodgepole, whitebark, and Douglas-fir communities. The possibility exists for larger epidemic outbreaks of some bark beetles.

Blister Rust: Blister rust is an exotic pathogen introduced to the United States in 1909 (Monnig and Byler, 1992). Western white pine and whitebark pine are highly susceptible. Western white pine has been virtually eliminated from its historic range. Whitebark pine has suffered high mortality in many areas. There has been considerable progress in development of rust resistant white pine varieties, but little work has been done with whitebark pine. Whitebark pine is being replaced in the Selway subbasin by subalpine fir, Engelmann spruce, lodgepole pine, or montane herb or shrublands (Quigley et al., 1997).

Root Diseases: Root diseases are fungi that can affect all sizes, ages and species of tree (Hagle, Tunnock, Gibson, and Gilligan, 1987). In the subbasins, grand fir and Douglas-fir are most highly susceptible and the prevailing root pathogens affecting them are armillaria and annous root rots. Areas susceptible to root disease appear to have increased as forests in the subbasins have shifted to more grand fir and Douglas-fir. In grand fir habitat types, the effect has been to create stands of young, uneven aged grand fir and Douglas-fir, with shrubs and hardwoods. Where ponderosa pine or larch are present, these trees may grow more rapidly because of the thinning effect of root diseases. In red cedar habitat types, the progression of root disease is rapid and favors dominance by more resistant cedar. Levels of inoculums have probably increased in some areas. At very high levels, more tree species become susceptible. Fire tends to decrease root rot by favoring species like pine or western larch that are more resistant to fire and root rots.

Mistletoe: Five species of dwarf mistletoe affect conifers in the subbasins. Douglas-fir and lodgepole pine are most commonly infected. The characteristic witch's brooms indicative of mistletoe provide hiding cover and resting areas for birds and small mammals. Mistletoe decreases tree vigor. It increases with development of dense or two-story stands in which the plant parasite is spread more readily. These changes are likely to have occurred in many low and mid elevation Douglas-fir stands. Lodgepole stands are more likely to have Engelmann spruce and fir in the understory, so spread is unlikely. Stand replacing fire will eliminate mistletoe from the affected area for a short while.

Fire Disturbance

This section addresses fire history in the Selway and Middle Fork Clearwater subbasins, presettlement fire regimes, current fuel accumulations, and ignition probabilities. Fire has been a keystone process of nutrient cycling and plant community dynamics for millions of years. Changes in fire regimes have consequences for both terrestrial and aquatic ecosystems. Factors considered in assessing current risk of wildfires compared to presettlement conditions are: changes in vegetation structure indicative of changes in fuel quantities and distribution; number of fire intervals missed; and likelihood of ignition.

Fire History: Large fires of more than 1,000 acres occurred somewhere in the subbasins about every three years, based on analysis of fire history data from 1870 to 1934. Fire history from about 1870 to 1934 is shown in Map 32, and from 1935 to 2000 in Map 33. Of the national forest area where fire history is known, about 22,285 acres burned annually from 1870 to 1934 when fire suppression became effective. This amounted to about 2.2 percent of the area burned annually. Most of these acres burned in a few severe fire years: 1889, 1910, 1919, and 1934. A severe fire year once in about 15 years has been common in the Northern Rocky Mountains since at least about the 1500s (Barrett et al., 1997).

From 1935 to 1978, when fire suppression was the policy on all lands in the subbasins, a total of 13,805 acres burned, or less than 314 acres annually. This was more than a 95 percent decline from the presettlement record. During the implementation of a fire use program in the Selway-Bitterroot Wilderness from 1979 to 1996, about 159,143 acres have burned over the subbasins, or about 8,842 acres annually. This is a 60 percent decline from the presettlement record, if we assume similar climatic conditions during the two periods. Prescribed management ignited fires have been used to reduce fuels or improve wildlife forage since the 1960s. An average of 845 acres have been burned annually from 1980 to 1998, often in the spring and in low elevation dry environments. The season and severity of disturbance have not simulated presettlement processes.

Fire Regimes: For millions of years, lightning has ignited fires and changed the pattern and composition of communities and habitats in the landscape. Most native species have evolved in an environment of characteristic frequency, severity, and scale of wildfire. Presettlement fire regimes are described by their characteristic severity (nonlethal, mixed severity, lethal) and frequencies (very frequent: 5 to 25 years, frequent: 25 to 75 years, infrequent: 75 to 150 years, and very infrequent: 150 to 300 years) (Morgan et. al., 1996). Fire regimes are inferred from habitat type group and terrain setting. Presettlement fire regimes are shown in Map 34. See also Appendix E, Fire Regimes.

Since fire has been such a prevalent agent of change and pattern in the landscape, understanding fire regimes is useful in interpreting existing conditions and in designing activities that provide the array of communities and habitats historically represented. Severity of an individual fire depends greatly on local fire weather. Fire regimes describe the typical fire pattern, but not necessarily the behavior of any specific fire. Most vegetation types and terrain in the subbasins are prone to fires at 75 to 150 year intervals. These fires are often of mixed severity, with large patches of lethal fire under severe fire weather conditions. Less severe fires may occur at more frequent intervals in many stands, but change stand composition only slightly.

Table 4.30: Presettlement Fire Regimes in the Subbasins

Fire Regime	Area (acres)	Percent of Subbasins
Very frequent, nonlethal	217,586	16
Frequent, Mixed	188,997	14
Infrequent, Lethal	270,852	20
Very Infrequent, Mixed	645,903	47
Extremely infrequent, Mixed	46,717	3

Fuels: Wildland fuels provide the energy source for fire. Fuels consist of both living and dead vegetation, the latter in various stages of decay. Fuels occur in three fairly distinct strata: ground, surface, and aerial. A fire can burn in one, two, or all three strata at once, or change the layer in which it is burning as fuels and environmental conditions change throughout an area.

Fuels vary across the landscape and over time in their quantity, flammability, vertical distribution and spatial distribution. Quantity increases with increasing biomass or accumulation of dead material on a site. As stands age, they accumulate both living and dead material. Flammability is controlled largely by moisture content and plant phenology. Vertical connection of fuels (ladder fuels), tend to increase with succession as young trees grow up underneath older trees. This increases the potential for crown fire. Spatial distribution changes with time and environments. With increasing fuel loads, and shifts in structural stage from open young forest to closed canopy mature forest, both vertical and horizontal continuity of fuels has increased in many areas of the subbasins.

Patterns of fuels in the 1930s contrast strongly with those that occur today. Areas of grassland and open forest with grassy understories prone to low severity surface fires have declined. Areas of shrubs, seedlings, and saplings less susceptible to severe fire have declined, while areas of mature forest with greater fuel accumulations and connection of ground fuels to the tree crowns have increased. These mature forests are prone to severe crown fires when conditions are both dry and windy.

Departures in Fire Regimes: Over much of the subbasins, fire is now allowed to burn much less often, and over smaller areas, than in presettlement times. The interval between fires has increased most markedly in the very frequent and frequent fire regimes. Where this interval has increased, the potential severity of fires has increased because over longer intervals, more fuels accumulate. To evaluate where this has occurred, ecologists assumed that if the last fire or harvest disturbance has occurred within the range of the presettlement fire-free interval, potential fire severity would be within the presettlement range. Map 35 shows where the disturbance interval and expected fire severity have increased over presettlement times. This information can be used to help prioritize areas for vegetation restoration through harvest, other vegetation treatment, or use of fire.

Typically, areas of frequent and very frequent fire in presettlement times are highly departed from their fire regimes. It is likely that fuels in these areas are increased in quantity and ability to carry fire into the tree crowns and have the potential to burn with greater lethality and effects to plant communities and watershed conditions, than under presettlement disturbance regimes.

Areas of infrequent fire are little departed from their presettlement fire intervals, considered stand by stand, but are departed at the landscape scale, because of the increasing dominance of structural stages more prone to severe fire behavior under certain weather conditions.

Departures in Fuel Accumulations: Areas with fuel accumulations and distributions outside the range of historic variability may pose some risk for large fires, more severe in fire intensity and watershed impacts, than was typical of presettlement times. The Boise National Forest developed an approach adapted and used here to identify these areas (USDA Forest Service, 1996).

Where missed disturbance intervals or high fuel accumulations coincide with high natural fire ignition rates, actions to reduce fuel quantity or connectivity may be appropriate. Map 37 shows areas of potentially high fuel accumulations in dry habitat types, and subwatersheds with relatively high ignition rates (more than one fire start per square mile per decade).

Through querying the timber stand data base or the attribute tables of satellite imagery covers, the following habitat type groups, cover types, and canopy closure classes were identified as likely to have fuel types outside the range of natural variability:

- Habitat type groups 1 and 2 (Douglas-fir and ponderosa pine), on all VRUs, all cover types, and canopy closure classes greater than 40 percent;
- Habitat type group 3 (dry grand fir), on VRU 3 or 4, Douglas-fir and ponderosa pine or mixed conifer cover types, and canopy closure classes greater than 70 percent;
- Habitat type group 9 (dry subalpine fir), VRUs 1, 2, 5, 6, 9; lodgepole pine cover type, pole size or larger, that have not burned within the last 120 years.

Areas with more than 20 percent of the watershed in these fuel types were rated as having a high likelihood of extensive fuel accumulations outside the presettlement range. These are usually in Douglas-fir and ponderosa pine cover types with moderate or high canopy closure. These would likely have high vertical fuel continuity as well, which would support crown fires readily. Areas with 10 to 20 percent of the watershed in these fuel types were rated as moderate (having a moderate likelihood of fuel accumulations outside the presettlement range). Areas with less than 10 percent of the watershed in these fuel types were rated as low risk for alteration of fuel conditions.

Ignition probabilities within watersheds were evaluated for the last twenty years. If more than one ignition per decade per square mile occurred in the watershed, it was assumed ignition risk was high. High ignition probabilities generally occur in the Middle Fork Clearwater and lower Selway subbasins, from Kooskia to Selway Falls.

Map 37 shows where watersheds with potentially unnaturally high fuel accumulations are expected to occur, and where ignition probabilities are high. Some of these watersheds include private inholdings and administrative facilities that may be at risk of fire: North Star Ranch, Running Creek Ranch, Paradise, Moose Creek, and campgrounds on Paradise and Deep Creek Roads.

Areas of highest departure in fuel conditions and missed fire intervals are in Running Goat, Upper Selway Canyon, Whitecap Creek, Indian Creek, Deep Creek and the Little Clearwater portion of the Selway Headwaters ERUs, as well as the some of the private lands in lower Clear Creek and Middle Fork Clearwater. Historic ignition probabilities are not known for the private lands, but the juxtaposition of fuels and private development suggest some need for fuel treatments, either fire or thinning. Not shown are smaller areas, such as face drainages in Meadow Creek, which also likely have high fuel accumulations.

Historic ignition probabilities have not been high in the Upper Selway Canyon and adjacent ERUs, but the juxtaposition of potentially high fuels augmented by recent bark beetle mortality suggest that ignitions that do occur at low elevations may result in higher probability of more severe fire than historically. Higher elevations in Running Goat, Little Clearwater, Indian Creek and Pettibone and Bear Creek ERUs also have significant areas near the outside of their fire interval for lodgepole pine or spruce-fir forests; the potential for large severe fires in these ERUs may be increased over historic conditions. Ignition risk from human causes will likely increase along low elevation travel routes as visitor use increases.

Departures In Area Affected by Fire or Harvest: Table 4.31, below, shows acres of wildfire and harvest by decade the national forest portion of the subbasins. Map 32 shows fires burned by decade prior to fire suppression (about 1934) and Map 33 shows acres burned since fire suppression. Areas burned in the wilderness since 1978 include fires allowed to burn for resource benefits.

The map, table, and stand origin information suggest that fire was a pervasive disturbance within the subbasins before Euro-American settlement. Information in Barrett et al. 1997 also supports the conclusion that extensive fire activity occurred at least every decade or two from the mid 1500s (oldest fire scar data) to the early 1900s, and that changing land use patterns and attempts to exclude fire have succeeded in greatly reducing the scope of fire on the landscape. Fires affected more than 22,000 acres per year before 1935. From 1935 to 1978, fires have only burned about 313 acres annually, and since the institution of the prescribed natural fire program, about 8,800 acres have burned annually, mostly confined to wilderness.

Acres of timber harvest replaced acres of fire disturbance from 1960 through the 1990s in the lower Selway, but the kind and pattern of harvest did not replicate the ecological effects of fire. Harvest removes trees and sometimes heavily disturbs soil. Few snags and low levels of large down wood remain after harvest and slash treatment. The variation in distribution of fire patches in the landscape and over time is also more random and varied than regulation of the landscape through harvest.

A management ignited prescribed fire program was initiated in the 1960s for wildlife browse production on south aspects in the lower part of the canyon. This program has begun to compensate for years of fire suppression. The program has been implemented more frequently than natural fire regimes in the North Selway Face ERU, and many other areas, especially on north aspects, have not been treated. See the discussion of disturbance frequency and size by watershed for further treatment of how natural disturbances resulted in variation in states across the landscape.

Table 4.31: Fire, Harvest and Prescribed Fire Disturbance by Decade

Decade	Wildfire acres (percent)	Harvest acres (percent)	Management ignited fire (percent)	Cumulative disturbance (percent per decade)
1870s	10,764 (0.8)	unknown	none	.8
1880s	198,066 (15.0)	unknown	none	15.0
1890s	38,286 (2.8)	unknown	none	2.8
1900s	38430 (1.1)	unknown	none	1.1
1910s	553.047 (40.8)	unknown	none	40.8
1920s	25,107 (1.9)	unknown	none	1.9
1930s	145,082	136 ac	none	10.7

Decade	Wildfire acres (percent)	Harvest acres (percent)	Management ignited fire (percent)	Cumulative disturbance (percent per decade)
	(10.7)	(<0.1)		
1940s	5092 (0 .4)	unknown	none	.4
1950s	0 ac (0.0)	484 ac (<0.1)	none	0.0
1960s	5452 (0.4)	7448 ac (0.5)	unknown	.9
1970s	30896 (2.3)	9989 ac (0.7)	41 (<0.1)	3.0
1980s	82905 (6.1)	7132 ac (0.5)	13,405 (1.0)	3.0
1990s	64,624 (4.5)	7551 ac (0.6)	2066 (0.2)	4.7

Disturbance Regime Alteration

One of the principle goals of ecosystem management is to maintain evolutionary and ecological processes (Quigley et al., 1996). Hydrologic cycles, carbon cycles, and plant succession are essential ecological processes. Disturbance regimes describe the frequency, severity and scale of events, including fire, erosion, and peak stream flows that provide settings for plant and animal communities. Significant alteration of disturbance regimes can affect the persistence of plant and animal communities, and exceed the rate of change to which species can adapt.

Fire has been a principal agent of change in landscapes in the subbasins. Fire regimes describe the frequency, severity, scale and pattern of fire in the landscape (Heinselman, 1981). Timber harvest and fire suppression have been more recent agents of change, and may not be sustaining ecological processes. To test this, we evaluated three forms of departure from historic fire regimes: frequency of disturbance, severity of disturbance, and size of disturbance, comparing historic fire to recent harvest.

Disturbance Frequency and Severity at Stand and Watershed Scales: Disturbance frequency was evaluated at two scales: the stand and the watershed. To evaluate changes in disturbance frequency at the stand scale, we used harvest history, wildfire history and prescribed fire history, as well as historic fire regime. If a stand had been harvested or was within a fire perimeter, and the fire or harvest had occurred within the maximum period for the fire regime of that stand, the stand was considered within the historic range for disturbance frequency. Stands outside that range are shown in Map 35.

Departures from stand level disturbance frequency are dominantly in the low elevation and canyon sites where historically frequent fire had been typical. These departures are especially marked in the Upper Selway Canyon, Running and Goat, Indian Creek, Deep Creek and Little Clearwater ERUs. Fires in year 2000 addresses some of this departure in Upper Selway Canyon and Little Clearwater ERUs. Management ignited prescribed fires have compensated for some of the effects of past fire suppression on low elevation south aspects in the North Selway Face ERU. About 1,000 acres have been burned annually since 1985. These are usually spring burns and do not necessarily replicate the effects of historic fires, but do reduce fuel accumulations.

The disturbance frequency at the watershed scale was evaluated by computing the frequency of harvest and fire, normalized to a 100-year scale. Only disturbances of more than 10 acres were considered. Results are shown in Table 4.32. Watersheds are stratified by their dominant expected fire regime. Departures in disturbance frequency at the watershed scale include:

- From 1935 to 1978, during the period of fire suppression, wildfire frequency was substantially below the range from 1870 to 1934 in all areas.
- From 1979 to 1996, fire frequency was still below presettlement ranges over the subbasins as a whole.
- Currently, many fires are still suppressed in wilderness before they become large, and all fires are suppressed outside of wilderness or other approved fire use areas.

Harvest frequency in the lower part of the Selway subbasin and the Middle Fork Clearwater subbasin has been more frequent than historic fire disturbance in two settings: the watersheds dominated by high elevation lands subject to infrequent severe fire (upper Meadow Creek), and the low elevation, moist canyons and uplands subject to infrequent mixed severity fire (most of the Lower Selway, Clear Creek, and Middle Fork ERUs).

In the low elevation watersheds subject to frequent low severity fire, harvest frequency has been comparable to presettlement fire frequency. The 44-year period of fire suppression and little harvest means that many disturbances that we would now expect to be about 20 to 60 years old, never occurred, so that sapling and pole size communities are in relatively short supply compared to historic, while medium tree stands are more abundant than we would expect in a natural landscape.

Management ignited fire has been more frequent in all settings than presettlement fire frequency. This, combined with smaller disturbance size, means that management ignited fires tend to be more frequent, but smaller, than historically. This is exemplified by the repeated burning of North Selway Face ERU winter range.

The combined effects of harvest, wildfire, and prescribed burning suggest that disturbance processes in roaded portions of the subbasins are at a higher frequency, smaller scale, and lower variability in size and severity than historically. Wilderness areas still do not experience natural variability in frequency and size compared to presettlement process.

Table 4.32: Median Disturbance Frequency/100 Years by Watershed

	Watersheds with mixed high and low elevation, frequent and infrequent fire regimes	**High elevation watersheds with infrequent, severe fire regimes**	**Low elevation watersheds with frequent, low and mixed severity fire regimes**	**Low elevation watersheds with infrequent, mixed severity fire regimes**
1870-1934 Pre Fire Suppression	Fire: 4.6 Harvest: 0	Fire: 3.1 Harvest: 0	Fire: 3.1 Harvest: 0	Fire: 3.1 Harvest: .05
1935-1978 Fire	Fire: 0.0	Fire: 0.0	Fire: 0.0 Harvest: 2.8	Fire: 0 Harvest: 4.5

	Watersheds with mixed high and low elevation, frequent and infrequent fire regimes	High elevation watersheds with infrequent, severe fire regimes	Low elevation watersheds with frequent, low and mixed severity fire regimes	Low elevation watersheds with infrequent, mixed severity fire regimes
Suppression	Harvest: 0	Harvest: 9.1		

RARE AND IMPORTANT PLANTS AND PLANT COMMUNITIES

Arcoss the Middle Fork and Selway subbasin, there are unique areas, special features and localized environmental conditions that provide habitat for many rare and uncommon plants. Because of its maritime climate, the low elevation canyons of the Middle Fork and Lower Selway support species adapted to temperate, more humid zones of the Pacific Northwest. This suite of species is referred to as coastal disjuncts because they are isolated from the coastal populations. They are thought to be relicts of Miocene vegetation that survived regional climatic changes in these protected canyons (Lichthardt and Moseley 1994). The Clearwater basin also contains plant species near the southern limits of their range or disjunct from the boreal regions to the north, and a few plants found only within the western drainages of the Northern Rocky Mountain region. The mixing of boreal, maritime and rocky mountain flora in the Clearwater Basin and Selway Subbasin creates unique floristic areas that contribute greatly to the local plant diversity.

The sites for these important plants are microhabitats of the VRUs dicussed in Chapter 5.

Coastal Disjunct Plant Communities

Perhaps the floristic zone that best represents the uniqueness of the analysis area is the low elevation canyon of the Middle Fork and Selway rivers. Due to the high number of coastal disjunct species along with a number of endemic species, the habitats found within these low elevation moist canyons can be considered as rare or sensitive. Core areas of the Clearwater Canyon refugium are closely tied to the distribution of the western red cedar/maidenhair fern habitat type and inclusions of wetter fern understory unions.

The following are relatively rare species associated with the canyon refugia, in these subbasins:

Blechnum spicant (deerfern) - coastal disjunct
Botrychium spp. (moonworts) - generally rare
Cardamine constancei (Constance’s bittercress) - Idaho endemic
Carex hendersonii (Henderson’s sedge) - coastal disjunct
Cornus nuttallii (Pacific dogwood) - coastal disjunct
Mimulus clivicola (bank monkeyflower) regional endemic
Corydalis caseana var. hastata (Case’s corydalis) - Idaho endemic
Cypripedium fasciculatum (Cluster lady’s slipper) - generally rare
Equisetum telmatiea (Giant horsetail) - coastal disjunct
Festuca subuliflora (crinkle-awn fescue) - coastal disjunct
Eburophyton austinae (Phantom orchid) - coastal disjunct
Selaginella douglasii (Douglas’s spike-moss) - disjunct

The best expression of the Clearwater refugium in the planning area occurs along the north facing slopes from the forest boundary to Meadow Creek below 3,000 ft elevation (VRU’s??). This area supports the highest concentration of Constance’s bittercress within the Clearwater and St Joe River Basins (Lichhardt and Moseley, 1994). Henderson’s sedge, Cluster lady slipper, Phantom orchid, Case's corydalis can also be found scattered in many of the smaller drainages. Potential coastal disjunct habitat in the planning area was modeled using elevation, aspect, and geographic boundaries, and known plant locations, and is shown on Map 48.

A similar pattern can be seen in the bryophyte flora. A number of bryophytes with maritime affinities are commonly found in the Selway and Middle Fork river canyons. Generally bryophytes have a wider distribution than vascular plants and tend to develop similar flora under widely dispersed climatic regions (Schofield 1985). Within the Clearwater refugium area a combination of relatively high humidity, mild winters, indirect illumination and diverse substrate provide conditions that are relatively rare in the Rocky Mountains. Therefore, the bryophyte assemblages associated with these river canyons are relatively rare in the intermountain west. The following are a few uncommon bryophyte associated with Western Red Cedar habitat along the Selway river canyon.

Scapania bolanderi
Tripterocladium leucocladulum
Buxbaumia viridis
Orthotrichum striatum
Porella platyphylloidea
Rhytidiadelphus loreus
Thamnobryum neckeroides
Hookeria lucens
Rhizomnium nudum
Claopodium crispifolium
Neckera douglasii
Anitrichia curtipendula
Isothecium stoloniferum

Status and Threats to Coastal Disjunct Species*:* The most widespread threat to coastal disjunct populations is due to their occurrence within the river corridor, in the path of residential and recreational development, recreational activities, and invasion by non-native plants.

Table 4.33 shows the distribution of potential coastal disjunct habitat and that remaining after campground, road, trail, and residential development, and probably loss to private ownership. The Middle Fork and Clear Creek have probably lost important proportions of their habitat and populations.

Table 4.33: Potential and Existing Coastal Disjunct Habitat and Percent Remaining after Impacts of Human Activities

ERU	Potential Habitat (acres)	Existing Habitat (acres)	Percent Remaining
Middle Fork Clearwater	17,066	9657	57
Clear Creek	4441	579	13
North Selway Face	686	681	99
Lower Selway Canyon	7801	7445	95
Middle Selway Canyon	5849	5717	98
Otter-Mink	971	971	100
Lower Meadow Creek	5341	5279	99
O'Hara Goddard	7612	7370	97
Gedney Three Links	554	545	98

Pacific Dogwood: Pacific dogwood occupies forest edge and gap openings, and may require some level of disturbance to maintain or create adequate light conditions. Pacific dogwood is also in a severe decline due, at least in part, to a fungal disease known as dogwood anthracnose (Hibben 1992). Population numbers may have decreased 75-90 percent over the past 10-15 years (Lichthardt 1991). Seed have been collected and are being stored as an emergency conservation measure.

Constance's Bittercress: Constance's bittercress appears to have some dependence on periodic low or moderate severity fire to induce flowering and seed set, and to reduce overstory shading. It also appears capable of persistence for long periods by vegetative reproduction, under fairly closed canopy conditions. Because Cardamine populations are small and isolated from one another, they may be subject to local extinction from severe harvest, fire, or other ground disturbance. Clear-cut harvest or severe burns may provide too intense light and drought conditions (Crawford 1980, Lichthardt and Moseley 1994).

Henderson Sedge: Henderson sedge may be associated with elk travel routes, so ungulates may be a spread vector. The species occurs in canopy gaps in old growth forest, to shaded understory positions. Source areas may be linked to moist microhabitats with mild winters. Its response to disturbance is not known.

Deerfern: Deerfern occurs at the cold, moist edge of coastal disjunct habitat, and is associated with varied overstory structure, but generally under moderate to high canopy cover. Effects of disturbance are little known, but the small and isolated populations, and occurrence in forest types little visited by fire, suggest that disturbance due to fire or harvest may pose a risk to the species' persistence.

Bank Monkeyflower: Bank monkeyflower occurs over a wider range of sites than coastal disjunct species proper, and occupies microsites of open pockets of exposed mineral soil within forest openings in the local Douglas-fir zone, but within the range of cedar. It is an annual that requires spring moisture and exposed soils for germination. It has been associated with small depressions created by ungulate hooves. Invasion by non-native plants could threaten its persistence in these openings, which are susceptible to weed expansion. Little is known about the persistence of seed viability and germination characteristics.

Mature Lodgepole Pine Communities

Most of the Wilderness ERUs as well as Meadow Creek support lodgepole pine communities that comprise 15-25 percent of the ERU. These plant communities are found on well-drained coarse textured soils of low productivity at upper elevations of the montane zone. The sites receive heavy snows in the winter and rain in the spring, but turn droughty in the summer and fall. The lodgepole stands are seral to subalpine fir and grand fir. The understory is open with grouse whortleberry and scattered beargrass. Plant diversity is relatively low. However, mature lodgepole communities that develop a sparse but sheltered understory provide suitable habitat for candystick (*Allotropa virgata*) a rare plant in the northern Rocky Mountains and a Regional Sensitive Species (Lichthardt and Mancuso 1991, Lichthardt 1992) *Need citation*. It also provides substrate to a rare granite moss, *Andreaea heimemanii*.

Candystick is a non-chlorophyllous plant that forms a three-way relationship (tripartite symbiosis) with lodgepole pine, occasionally with grand fir or subalpine fir, and mycorrhizal fungi. Large woody debris from decaying logs and buried decomposed wood are important in maintaining moisture on the well drained sites for both the fungi and candystick. The species forms a complex relationship with fungi and lodgepole pine. It is not known if this species can switch hosts as lodgepole is replaced by subalpine fir, or how long it takes this species to recolonize disturbed sites.

Andreaea heimemanii is rare in Idaho. It is found on medium to coarse grain granite boulders at the soil surface within the upper montane zone sheltered by lodgepole pine. The rock substrate tends to be gentle sloping to flat with micro-depressions and fissures. The position, texture and micro-relief of the rock seem to capture and hold moisture longer than fine-grained granite or boulders with sloping faces.

Status and Threats to Lodgepole Pine Communities - Periodic fire that regenerated lodgepole pine communities would seem to threaten local populations of candystick as would severe logging that removes the host trees and the sheltering canopy. Monitoring has documented declines in candystick populations as the lodgepole canopy is removed. However, without periodic fire, the lodgepole pine would not persist in the landscape. It is likely that Candystick slowly recolonized burned sites from unburned or lightly burned refugia that contained the critical structural components needed by the plant to persist after large fires. Maintaining presettlement frequency and scale of fire disturbance in lodgepole pine communities may provide the basis for the long-term persistence of candystick at the landscape scale.

Sub-Alpine Plant Communities

High elevation plant communities include parklands of sub-alpine fir and whitebark pine communites, non-forested sub-alpine balds and ridge tops and upper montane herblands dominated by grasses, sedges and forbs. These communities occur in all Wilderness ERUs except for the low elevation canyon ERUs. The comprise 1-10 percent of each ERU. Some montane park is recently burned herblands, and some is more persistent. Many areas, now considered herbland, may once have supported open stands of whitebark pine. These herblands may provide habitat for rare plant communities, as well as provide forage for domestic and wild animals, including small mammals.

This zone contains a variety of high elevation plant species that are relatively rare or are of concern in the Selway and Middle Fork Drainages:

Idaho douglasia (*Douglasia idahoensis)* - Idaho Endemic
Whitebark Pine (*Pinus albicaulis) -* Western Endemic
Tweedy's ivesia *(Ivesia tweedyi)* - Disjunct

California sedge *(Carex californica)* - Coastal disjunct
Dasynotus *(Dasynotus daubenmirei)* - Idaho Endemic

Idaho douglasia– This forb species grows in high elevation subalpine habitats in VRU 9. It is a Idaho endemic of the central mountains of Idaho. Idaho douglasia prefers open subalpine ridges, summits and adjacent slopes on north to northeast aspects with gravely soils and scree of recently decomposed granite. Vegetation is typically sparse, with widely spaced plants.

Whitebark Pine - Whitebark pine is a tree that occurs in high elevation environments. Whitebark persists as a climax species near timberline and is scattered in closed canopy forests of subalpine fir, Engelmann spruce, and lodgepole pine (Murdock 1991). In whitebark pine forests, fires occurring every 30 to 300 years have been important for the survival and regeneration of this species and is a key process affecting whitebark pine forest structure and composition (Morgan et al. 1994) *Need citation*. Both low intensity and stand replacing fires provide openings for regeneration and areas for wildlife species to cache seeds. Many wildlife species depend on whitebark pine as a valuable food source (Clark's nutcracker, red squirrel, and grizzly bears), as well as areas to roost and nest.

Status and Threats of sub-Alpine Communities: Ridgeline roads, trails, recreation sites and livestock trampling have negatively impacted a low percentage of the high elevation communities. Generally, the long term trends for these plant communities appears stable and to have changed little from historic levels. Localized impacts to specific population could occur from future trail construction, recreation use and livestock (horses) trampling. A noteable exception is whitebark pine.

Over the past few decades whitebark pine has declined in abundance over most of its range (Murdock 1991, Morgan et al. 1994). In the absence of major disturbances, whitebark pine is becoming replaced by more shade tolerant species of subalpine fir and Engelmann spruce. White pine blister rust and the mountain pine beetle have been attributed to whitebark pine declines, by reducing cone production and killing mature trees (Morgan et al. 1994). The decline in whitebark pine abundance also threatens the availability of seeds that many species rely on as a food source. All the Wilderness ERUs with the exception of the low elevation canyon ERUs have experienced these declines. Restoration of fire and concurrent identification and protection of rust resistant seed sources are major priorities in suitable ERUs. More direct manipulation using prescribed fire and slashing may be possible in the O'Hara-Goddard and Running-Goat ERUs in nonwilderness areas.

The extent of the herbland communities has increased significantly (Appendix L), probably due to both conversion from whitebark pine communities and succession after fire. They are not hospitable sites for weed establishment, but are very sensitive to trampling damage, because of their very thin, gravelly soils and popularity for hiking. Monitoring some representative sites subject to such damage, to assess plant community change, is recommended.

Grand-fir Mosaic

Grand-fir mosaic is locally common in the subbasin but rare outside the Clearwater basin. Typically the zone is a mixture of grand fir interspersed with sitka alder glades and tall forb communities of bracken fern and western coneflower. Pacific yew can be common as a secondary canopy under the grand-fir. Patches of old growth with natural openings of tall shrubs and forbs are important characteristics of the grand-fir mosaic. The mosaic has a combination of unique environmental and biological factors that appear to create and maintain the diverse patchiness and community structure (Ferguson 2000). Compared to the surrounding area the mosaic tends to have increased soil moisture, a shorter growing season, strongly acidic soils, allelopathic plants, and mixed severity infrequent fires. While conifer regeneration can be affected by these acidic soils, allelopathy, and pocket gophers (Ferguson 2000), old growth conditions can develop as a result of the infrequent fires. The grand-fir mosaic also provides habitat for a number of endemic and disjunct plants such as the following.

Oregon bluebell (*Mertensia bella)* - Disjunct
Evergreen kittentail (*Synthris platycarpa)* - Idaho endemic
Idaho barren strawberry (*Waldsteinia idahoensis)* - Idaho endemic
Payson's milkvetch (*Astragalus paysonii)* - Regional endemic

Pacific Yew Communities

Pacific yew is a slow-growing tall shrub or small tree that occurs as scattered individuals or small groves in low and mid elevation grand fir and cedar forests. It may occur on upland sites or in some riparian habitats, but not on poorly drained soils. Pacific yew is highly sensitive to fire and its presence is often an indicator of infrequent fire. Birds and rodents spread its seeds. Its bark and other parts contain taxol, a compound found to be effective in treatment of some forms of cancer. It is an important substrate in the Clearwater basin for epiphytic bryophytes. Plant communities with Pacific yew are a key winter range for moose. Pacific yew is most abundant in the Clear Creek, Middle Fork, and O'Hara-Goddard ERUs and lower Meadow Creek. Fire suppression has probably resulted in increased frequency and extent of Pacific yew, but timber harvest has been concentrated within the same areas. Pacific yew was typically slashed and burned during the course of harvest prior to 1987. From 1987 to 1991, timber harvest and burning were constrained in areas allocated to moose winter range. After the discovery of taxol, and development of the Conservation Guidelines for Pacific yew (USDA 1992), timber harvest and burning impacts to Pacific yew have been much reduced. Harvest for taxol ceased about 1994, but the Conservation Guidelines remain in effect.

Status and Threats to Pacific Yew Communities - Clear-cut harvest methods and broadcast burning for slash removal threaten Pacific yew. Forest fragmentation by harvest in the western portion of the subbasin has isolated Pacific yew stands, but spread by birds should help overcome this isolation. Some areas at increasing risk of large severe fires may pose a threat to loss of Pacific yew over large areas, in the event of such a fire. Introduction of lower severity fire to break up the continuity of fuels in the landscape could reduce this risk, and better sustain yew at the landscape level over the long-term.

Wetlands and Fen Communities

Wetland/fen complexes are limited in extent and rare in the subbasin. They are most prominent in upper Meadow Creek, Long Prairie Creek, and as small communities within shrub-forest-fen complexes along low gradient glacial valley bottoms and surrounding glacial lakes. Important remnants of boreal fens occur in the headwaters of West Fork O'Hara Creek. Wet sedges or Sphagnum and other mosses may dominate the Wetland and fens. These small wetlands may develop peat or organic soils as result of anaerobic conditions that make it possible for the rate of organic accumulation to exceed the rate of decay. Wet meadows and seeps along streams and Fens in the upper drainages provide habitat for a number of rare plants including the following.

moonworts (Botrychium spp.)
tall swamp onion (Allium validum)
sitka clubmoss (Diphasiatrum sitchense)
Mendocino sphagnum (Sphagnum mendocinum)
Helodium blandowii

Status and Threats to Wetlands and Fen Communities - There is little data available on the effects of fire suppression on these communities. There may have been some encroachment by conifers, but this is not documented. Fire suppression may also have affected hydrologic regimes, since most watersheds historically showed more evidence of fire disturbance, and consequently probably had higher water yields. All terrain vehicle use has impacted wet meadows in Upper Meadow Creek. Cattle may have affected wet meadows in Clear Creek, but little data are available. Restoration of presettlement fire regimes in wilderness and suitable roadless areas would sustain these communities over the long-term. Monitoring of local impacts of grazing and all terrain vehicle use is recommended to adjust management to protect and restore these communities.

O'Hara Research Natural Area

The subbasin contains a research natural area (RNA) in the O'Hara Creek watershed (approximately 7000 acres). This RNA includes the East Fork of O'Hara Creek and parts of adjacent drainages. Its aquatic features are the primary focus of this RNA: a network of streams ranging from first to fifth order, and anadromous fish population, a series of cascades and waterfalls through narrow canyons, beaver-created ponds, and wet streamside meadows used by elk and moose. The plant communities include coastal disjunct species: *Syntheris platycarpa*, *Equisetum telmateia*, and *Lycopodium selago*. Elevations range from 2100 feet at the northern boundary to 6815 feet atop Iron Mountain. The current management of this area is to not allow any disturbance. However, fire has been a key process that occurred in this landscape, and maintained the diversity of plant communities. The management of the O'Hara Research Natural Area should be reevaluated to incorporate use of naturally ignited fire under some conditions, and possibly prescribed fire if needed to maintain landscape diversity.

Warm Springs Creek Research Natural Area

This RNA occurs in the Running Creek watershed. It comprises about 530 acres and includes two warm springs underlain by igneous rock of the Idaho batholith. This area is near the southern limits of western redcedar in Idaho. Pat fires have perpetuated a stands of old growth ponderosa pine. Elevations range from 3910 feet to 5320 feet at the northern end of the RNA.

NOXIOUS WEEDS AND EXOTIC PLANTS

Introduction

Exotic plant species is an important ecosystem attribute to consider when assessing watershed conditions and vegetation objectives. Invasive exotic plants have the potential to affect native species richness and frequency (Forcella and Harvey, 1990) erosion rates (Lacey et. al., 1989), ecological processes (Whisenant, 1990; Vitousek, 1986) and rare plants (Rosentreter, 1994). Bedunnah (1992) noted that exotic plants may alter ecological equilibrium to a point where the change is permanent.

Significantly higher rates of sedimentation from runoff in knapweed-dominated sites has been documented in Montana (Lacey et. al., 1989). Cheatgrass and medusahead have altered fire frequencies in many areas of the Great Basin and intermountain region (Whisenant, 1990; Young, 1992). Purple loosestrife has significantly changed wetland vegetation structure in eastern North America, and the Pacific Northwest. Plant community structure along many canyon slopes in the Snake and Salmon River basins has shifted from a fibrous rooted bunchgrass community to one dominated by tap-rooted yellow starthistle, affecting habitat for chukar and other grassland birds.

Invasive exotic plants can expand following human-caused or natural disturbances and colonize degraded as well as intact habitats (Tausch et al., 1994; Watson et al., 1989; Willard et al., 1988; Belcher and Wilson, 1989). Forcella and Harvey (1983) documented Eurasian weeds dominating relatively undisturbed grasslands in Montana. Tyser and Key (1988) reported spotted knapweed invaded and reproduced in rough fescue communities in Glacier National Park.

Historical records indicate that many of these exotics were introduced from Eastern Europe into North America in the early 1900s, some as a contaminate in crop seed and animal feed and others as simply an ornamental flower. Without their natural predators and pathogens or with novel competitive mechanisms (Callaway and Aschehoug, 2000), these weeds have continued to expand and in some cases become the dominant species. Spotted knapweed has expanded in

Montana to over four million acres (Lacey et. al., 1995). Since 1977 yellow starthistle infestations in northern California have spread from one million acres to over ten million acres. This species also infests millions of acres in Oregon and Washington. In Idaho over 500,000 acres are infested, with the plant increasing at a rate of 6 to 60 percent per year (Callihan and Lass, 1996). Rush skeletonweed in Idaho has expanded from 40 acres in the early 1960s to over four million acres.

Present Situation

Weed colonization is an active process influencing many habitats in the Selway and Middle Fork Clearwater subbasins. Invasive exotic plants are a serious threat to the biodiversity and other resource values within the subbasins. In addition, new weeds first introduced in other parts of North America are now reaching the Northern Rocky Mountain area and the Clearwater basin. These new weeds present an additional threat to the habitats within the Selway subbasin.

Over the past few years agencies have been working on weed inventories across the Clearwater River basin. Based on herbarium records, University of Idaho Weed Diagnostic Lab records and agency reports, approximately 250 exotic plants have been found in the five-county area that makes up the Clearwater River basin. Fifty-three of these species are designated noxious by Idaho or adjacent states (Rice, 1997). Over 400,000 acres in the Clearwater River basin are infested with 40 invasive weeds according to the *Clearwater Basin Weed Management Area*, 1999).

Noxious weeds found in the Selway and Middle Fork Clearwater subbasins include:

- Spotted knapweed (*Centaura maculosa*)
- Canada thistle (*Cirsium arvense*)
- Sulfur cinquefoil (*Potentilla recta*)
- Japanese knotweed (*Polygonum cuspidatum*)
- Everlasting peavine (*Lathyrus latifolius*)
- Scotch broom (*Cytisus scoparius*)
- Cheatgrass (*Bromus tectorum*)
- Common burdock (*Arctium minus*)
- Yellow starthistle (*Centaurea solstitialis*)
- Houndstongue (*Cynoglossum officinale*)
- Other common weeds

The weeds currently found in the subbasins have spread throughout the transportation system and occupy many habitats. Since the land is made up of both roaded and wilderness areas, this transportation network consists of roads and many miles of trails that extend from the valley bottom along the Middle Fork Clearwater and Selway Rivers to the high elevation peaks of the Bitterroot Mountains. Many of the existing weeds as well as new exotics have the potential to colonize many additional acres and spread to susceptible habitats.

Field surveys conducted over the past few years have documented many of the existing and potential problem weeds that occur in the subbasins. Individual infestations range in size from several square feet to hundreds of acres. Although the entire watershed has not been thoroughly surveyed, suitable locations such as roads, trails, dispersed and developed recreation areas, and outfitter and guide camps have been surveyed to indicate an upward trend in exotic species spread. It appears from field observations that the established weeds in the subbasins continue to spread from these highly used and disturbed areas into previously uninfested sites.

The majority of the identified infestations occur near roads, trails, and campsites, as well as in disturbed grasslands and open pine stands. Spotted knapweed is the most abundant weed and occupies thousands of acres within the Selway River corridor from the headwaters in the Frank Church River of No Return Wilderness to the private lands at Lowell. Yellow starthistle is present along lower Clear Creek and is moving east from Kooskia in the transportation corridors. It has not been found along the Selway River; however, a small starthistle infestation has recently been found at Lowell. Canada thistle is common in the mid-elevation (2,500 to 5,500 feet) timber harvest units on the Nez Perce National Forest as an early pioneer weed in heavily disturbed soils.

Habitats Susceptible to Weed Colonization

All plant communities are subject to invasion or colonization, but they vary in their susceptibility to exotic plants. Both native and exotic plants establish themselves where resources are available. Plants may disperse and occupy areas within existing plant communities where light, space, water, and nutrient requirements can be met. Exotic plants can be expected to colonize those sites or habitats that provide the necessary requirements to complete their life cycle. Those habitats that lack the necessary resources for specific weeds are not considered susceptible to colonization. Habitat type groups (HTGs) found within the Selway and Middle Fork Clearwater subbasin assessment area have been rated for their susceptibility to exotic plants and noxious weed guilds found in the Clearwater River basin. The following ratings were used to classify habitat susceptibility:

- *Closed*: Habitat is effectively closed to weed colonization due to elevation, climate, substrate or existing plant community structure.
- *Low*: Habitat is slightly susceptible to weed invasion. Existing community structure and/or site characteristics limit weeds from exhibiting invasive behavior. Species may colonize highly disturbed sites but acts as ruderal species in the plant community.
- *Moderate*: Habitat is moderately susceptible to weed invasion. Sites provide characteristics where species can invade the herbaceous layer and become a common element across the plant community in the absence of intense and frequent disturbance.
- *High*: Habitat is highly susceptible to weed invasion. Site characteristics and plant community structure is such that species can colonize and dominate the herbaceous layer even in the absence of intense and frequent disturbance.

Weed Guilds

Weed guilds are groups of exotic plants or noxious weeds that share common growing requirements and generally colonize and affect similar habitats. Many weeds are capable of growing across a greater range of environmental conditions than those of their guild; however, weeds have been placed in the guild for which they have the greatest potential to impact the existing plant community.

Steppe and Savanna Weeds: This group of exotic plants has the greatest impact on hot and dry steppe grasslands and open dry ponderosa pine savannas. Habitats tend to be southerly aspects, relatively open vegetation structure with rocky shallow soils. Weed species include yellow starthistle, scotch thistle, dyers woad, rush skeletonweed, dalmatian toadflax, cheatgrass, common crupina, diffuse knapweed, and medusahead rye.

Montane Weeds: This group of exotic plants is capable of colonizing and becoming a member of warm and moist plant communities. Weed species include leafy spurge, sulphur cinquefoil, spotted knapweed, orange hawkweed, and Canada thistle. HTG 2, HTG 3, and drier portions of meadows (HTG 60) are often susceptible to these species.

Wetland and Meadow Weeds: This group of exotic plants is capable of affecting meadows, riparian areas and wetlands. Weed species include meadow hawkweed, common tansy, hoary cress, purple loosestrife, and matgrass. Not all wet meadows are delineated at the scale of this assessment.

Table 4.34 shows the habitat type groups that are vulnerable to the three noxious weed guilds and Table 4.35 shows the habitat type groups vulnerable to various noxious weeds.

Table 4.34: Habitat Type Groups Vulnerable to Three Noxious Weed Guilds

Noxious Weed/ Exotic Plant Guilds	HTG 15 Bunch grass	HTG 30 Dry Shrub	HTG 60 Bottom-lands	HTG 1 Dry P. Pine	HTG 2 Doug-Fir	HTG 3 Dry Grand Fir	HTG 4 W/M GF	HTG 7/8/9 Sub-alpine Fir	HTG 10/11
Steppe/Savanna	High	High	Low	High	Moderate	Low	Low	Closed	Closed
Montane	Moderate	High	Moderate	High	High	Moderate	Low	Closed	Closed
Wetland/Meadow	Closed	Low	High	Closed	Low	Low	Closed	Closed	Closed

Table 4.35: Habitat Type Groups Vulnerable to Various Noxious Weeds

Susceptible Habitat	HTG 1 Dry conifer	HTG 15 Grassland	HTG 30 Shrub	HTG 60 Meadows	HTG 2 (with disturbance)
Acres susceptible to weeds (entire subbasin)	4,322	3,058	Unknown, none mapped	655	204,065
Acres susceptible to weeds (NFS lands)	<200	<500	Unknown, none mapped	655	184,094

Map 46 shows areas most susceptible to weed invasion in the subbasin, based on habitat type group. Habitat type groups 1 (warm/dry ponderosa pine), 15 (bluebunch wheatgrass and Idaho fescue), 30 (dryland shrub habitat types), and 60 (meadows) are inherently susceptible habitats that specific weeds can colonize and dominate without human-caused or natural disturbances. The weeds are capable of invading intact native plant communities and out-competing native plants for nutrients, water and growing space. HTG 2 (Douglas-fir, ponderosa pine or dry grand fir habitat types with shrub understories) is vulnerable to weed colonization if soil is disturbed. The disturbance could be human-caused or natural.

Noxious weeds can also be found along the edges and openings of habitats that are not inherently susceptible to weed invasion, like roadsides and trails. Disturbances may allow short term expansion of weeds into areas. These weeds may not represent a risk to the existing plant community or pose a threat to ecosystem process and function, but can act as a seed and propagule reservoir for future dispersal into more suitable sites. Weeds establish from many small disjunct patches from independent populations (Moody and Mack, 1988). With time and available suitable habitat, these patches may expand and coalesce into an apparently single infestation. Small infestations that do not pose a current threat to the existing plant community may still contribute to the spread of the species by acting as a founder population for new disjunct patches.

Risk of Weed Expansion

Weed expansion in the analysis area is greatly influenced by habitat susceptibility, seed availability, seed or propagule dispersal, and habitat disturbance. The probability that weeds will expand in the assessment area depends on the interaction of these four factors. Weed expansion begins with the dispersal of seed from existing weed infestations adjacent to uninfested areas. Roads and trails are the primary means by which people and domestic animals interact with the environment and therefore are an important spread vector. These linear corridors act as dispersal networks for exotic plants. In addition, road and trail management creates sustained levels of soil disturbance that promotes exotic plant densities there by increasing seed for ongoing dispersal into adjacent areas. The majority of documented infestations within the assessment area is along the transportation corridors.

Disturbance creates spatial and temporal openings where sites become suitable for plant establishment, and where usable light, space, water and nutrients are available to meet the specific growing requirements of the plant. Disturbance may increase the susceptibility of an otherwise intact plant community to weed invasion by increasing the availability of a limited resource. Natural or human caused fires along with timber harvest and grazing are board scale disturbances that influence the amount of available habitat for weed establishment.

Weed expansion risk in the assessment area was determined by assessing the susceptibility of habitat type groups, the presences of weed infestations (seed source), the amount of recently burned or harvested areas (site disturbance), and the density of roads or trails (spread vector). Table 4.36 summarizes the rating matrix that determined the probability of expansion for invasive weeds.

Table 4.36: Probability of Weed Expansion

<table>
<tr><th>Habit. Suscept.</th><th>Seed Source</th><th>Site Disturbance</th><th>Spread Vector</th><th>Expansion Probability</th></tr>
<tr><th>Rating</th><th>Weeds Present or Adjacent</th><th>Fire/harvest/ Grazing</th><th>Adjacent Road/trail</th><th>Rating</th></tr>
<tr><td rowspan="8">High</td><td rowspan="4">Yes</td><td rowspan="2">Yes</td><td>Yes</td><td>Extreme</td></tr>
<tr><td>No</td><td rowspan="4">High</td></tr>
<tr><td rowspan="2">No</td><td>Yes</td></tr>
<tr><td>No</td></tr>
<tr><td rowspan="4">No</td><td rowspan="2">Yes</td><td>Yes</td></tr>
<tr><td>No</td><td rowspan="3">Moderate</td></tr>
<tr><td rowspan="2">No</td><td>Yes</td></tr>
<tr><td>No</td></tr>
<tr><td rowspan="8">Moderate</td><td rowspan="4">Yes</td><td rowspan="2">Yes</td><td>Yes</td><td>High</td></tr>
<tr><td>No</td><td rowspan="3">Moderate</td></tr>
<tr><td rowspan="2">No</td><td>Yes</td></tr>
<tr><td>No</td></tr>
<tr><td rowspan="4">No</td><td rowspan="2">Yes</td><td>Yes</td><td>High</td></tr>
<tr><td>No</td><td rowspan="2">Moderate</td></tr>
<tr><td rowspan="2">No</td><td>Yes</td></tr>
<tr><td>No</td><td>Low</td></tr>
<tr><td>Low</td><td>Yes</td><td>Yes</td><td>Yes</td><td>High</td></tr>
</table>

Habit. Suscept.	Seed Source	Site Disturbance	Spread Vector	Expansion Probability
			No	Moderate
		No	Yes	
			No	
	No	Yes	Yes	
			No	Low
		No	Yes	
			No	

Table 4.36, above, summarizes the probability rating that invasive weeds would expand within the analysis area. Map 47 displays the spatial arrangement of areas with the greatest risk of weed expansion. These zones contain moderately to highly susceptible habitats, frequent disturbances, roads and trails. The interaction of these three factors creates conditions very conducive to weed establishment and dispersal. Areas were rated as extreme if weed infestations were found within or adjacent to high probability zones. Extreme risk of spread suggests that all factors that contribute to weed expansion (habitats, seed source, disturbance, and spread vector) are present over a relatively small area. Upper Selway Canyon, Selway Headwaters, White Cap, and Deep Creek ERUs are probably at highest risk, because of susceptible habitat, roads, and recent fires. Clear Creek and Middle Fork Clearwater River ERUs are not appropriately assessed because information on disturbance is lacking for other land ownerships.

In the past, weed management has been uncoordinated, sporadic, and largely ineffective in controlling weed invasions in the assessment area. Since noxious weeds and other invasive exotic plants can affect ecological integrity, habitat conditions, and the achievement of restoration objectives, exotic plants must be integrated into management strategies and prescriptions developed for the subbasins.

TERRESTRIAL WILDLIFE

INTRODUCTION

Terrestrial environments within the Selway and Middle Fork Clearwater subbasins are diverse and provide habitat for an estimated 190 avian species, 61 mammalian species, 8 reptilian species, and 6 amphibian species. The subbasin landscape is mountainous and highly dissected with deeply incised canyon stream courses. It varies from the dry, low-elevation Selway River canyon characterized by ponderosa pine, shrubland, and bunchgrass communities, to subalpine fir and whitebark pine habitats in cold, alpine elevations that range to 9,000 feet and above and are interspersed with lake basins.

Fire is a prominent influence in defining the Selway and Middle Fork assessment area landscape and the native species that evolved with it. Fire maintains mosaics of vegetative diversity that provide early seral communities and sustain old growth by periodically reducing fuel accumulations. Climatic variations within the subbasins also contribute to the area's biological diversity. A warm and moist maritime climatic influence belt along the Selway River canyon is responsible for an array of coastal disjunct species, including western red cedar and Coeur d'Alene salamander.

The vast expanse of remote, relatively undisturbed lands in and adjacent to the subbasins is a notable influence on the quality of wildlife habitat. Seventy-eight percent, or nearly a million acres of the 1.4 million-acre Selway and Middle Fork Clearwater Rivers subbasins is within the Selway-Bitterroot Wilderness Area. The Selway-Bitterroot Wilderness is a 1.3 million-acre contiguous tract of wilderness administered by three national forests. The subbasin assessment area also includes 261,000 acres of roadless lands. Only 14,500 acres, or one percent, of the assessment area is not classified as wilderness or roadless. The wilderness and roadless characteristics provide habitat for many species dependent on remote environments with relatively little human disturbance including grizzly bears, wolverines, lynx, wolves, bighorn sheep, mountain goats, and harlequin ducks.

Traditionally, the focus on wilderness and wild country management has been to provide for important human uses like recreation, trail access, and outfitting with less emphasis on wildlife and other ecological considerations that define wilderness environments. Environmental impacts are magnified in wilderness because the Wilderness Act mandates significantly higher standards for degradation. Wilderness also provides unique habitat for security sensitive species that are absent or rare outside wilderness. These populations need adequate evaluation of existing and potential threats to their viability and their contribution to wilderness environments.

HISTORIC AND CURRENT HUMAN INFLUENCES AND VALUES ASSOCIATED WITH SUBBASIN POPULATIONS AND HABITATS

Historic Influences and Values

Prior to Euro-American settlement, the Nez Perce people occupied a territory that included the Selway and Middle Fork Clearwater subbasins assessment area. The aboriginal territory is estimated at 13,204,000 acres; it encompassed the entire Clearwater River basin in Idaho, the Wallowa country in northeast Oregon, and the upper portion of the Salmon River basin. Historically, the Nez Perce was one of the largest Plateau tribes in the Northwest (Walker, Jr., 1978 in Johnson, 1980).

The Nez Perce people depended on wildlife for food, clothing, shelter, and other implements used in daily life. They acquired horses in the 1750s and subsequently made annual trips to Montana to hunt buffalo and antelope. Buffalo hides gradually replaced mats to cover houses and were also used for clothing, blankets, saddles, rope, and tepees. The Nez Perce hunted numerous other species that inhabited their territory including deer, elk, moose, bighorn sheep, grouse, waterfowl, black bear, and grizzly bear. Many other birds and small mammals were also snared or shot. The Nez Perce intentionally ignited fire to create more abundant forage for their livestock and the wild ungulates the people depended upon.

Deer and elk hides were used for clothing and robes were made from bison skin. Women decorated their dresses with elk teeth and wrapped their braids with fur. Porcupine quills and beads of bone and shell were also used for ornamentation. Splitting wedges were made from antlers and some spoons and drinking cups were made from horn. Bows were made of syringa and yew and backed with sinew. Bows were also made from the horns of bighorn sheep that were boiled and straightened. These were valued for superior strength and superior penetration of arrows shot from them. The bows of bighorn sheep became rare by the turn of the century as bighorn populations declined.

Hunting was a sacred part of Nez Perce life. The Nez Perce believed in a supernatural side to their existence and to all nature. They believed that all natural things including rocks, trees, birds, animals, rivers, fish, and heavenly bodies could influence them in important ways. Most ceremonies included many expressions of respect for animals. It was believed that before human beings came, animals dominated the earth and behaved like human beings. When humans arrived, the animals maintained the ability to withhold their flesh from people if they were offended. Each animal species was represented in the guardian spirits who gave people power and abilities for success in life.

The Nez Perce people were closely attuned to the signs of nature. They watched for any unusual behavior by animals, insects, birds, and even the moon or sunsets, which helped them to predict weather conditions. Wild animals remain an integral part of Nez Perce culture today, providing food, clothing, and shelter, as well as spiritual significance (Slickpoo and Walker, Jr., 1973).

Euro-Americans arrived in Nez Perce country in the early 1800s. The fur trade flourished from 1811 to 1840. Missionaries arrived with aspirations to convert the Nez Perce from a hunter-gatherer culture to an agrarian one. Although the concept of land ownership was previously foreign to the Nez Perce, they were allocated a portion of their original territory when they signed their first treaty with the United States government in 1855. They defined the boundaries of their territory and a 7.7 million acre reservation was established. Consequences of the 1860s gold rush and subsequent treaties and wars with the United States government resulted in a significantly diminished reservation by the late 1800s, which is now restricted to only a portion of the Middle Fork Clearwater River basin.

The Nez Perce were one of the few tribes that negotiated to retain off-reservation hunting and fishing rights in their treaties with the United States. Off-reservation hunting and fishing rights are considered to be exercisable only on the lands that were part of the tribe's usual and accustomed hunting and fishing area. A tribal member with these rights may hunt anywhere on the open and unclaimed lands that were ceded by his specific tribe to the government. Several court cases have determined that tribes have the authority to regulate hunting and fishing by their tribal members within their ceded lands and usual and accustomed sites (Cohen, 1982 in Johnson, 1980).

Current Influences and Values

Court decisions in the 1970s affirmed tribal management authority for off and on-reservation hunting and fishing, resulting in tribes becoming active in developing their own fish and wildlife programs. The Nez Perce Tribe wildlife program was established in 1987 and is responsible for developing wildlife management plans, assessing mitigation needs, and conducting monitoring for deer and elk populations within the ceded lands (Johnson, 1990). In 1996, the Nez Perce tribe also assumed management and monitoring of the central Idaho wolf recovery program. In more recent years, the Tribe has undertaken active management of tribal property to benefit wildlife, both on the reservation and off the reservation within ceded lands. These efforts are primarily associated with mitigating losses of inundated habitat, including low elevation winter range and riparian areas, as a result of hydropower development. Mitigation includes acquisition of additional property within the ceded lands (Sondenna, 2001)

Subsequent to Lewis and Clark's 1806 encounter with the Nez Perce people, American and Canadian trappers established trading posts in the area. Settlement accelerated with the discovery of gold on the Nez Perce reservation near Orofino, Idaho. Trappers supplied a growing fur market and settlers depended on wildlife for food and other survival needs. As settlement progressed, some of the species indigenous to the area were extirpated, including the gray wolf and grizzly bear.

Settlement of the west and conversion of natural landscapes continued to accelerate in the 1900s. Concern for negative influences on the environment and biological diversity led to subsequent passage of laws designed to reduce environmental impacts. The most influential laws addressing wildlife and wildlife habitats in relation to human activities are the National Environmental Policy Act of 1969, the Endangered Species Conservation Act of 1973, the Federal Land Policy and Management Act of 1976, and the National Forest Management Act of 1976. These laws require that animal populations and habitats be assessed before the effects of an environmental disturbance can be addressed (Hunter, 1990).

Two federal agencies, the U. S. Fish and Wildlife Service and the U. S. Forest Service (Northern Region) have designated many species within the subbasins for special consideration. The Endangered Species Act, administered by U. S. Fish and Wildlife Service, mandates protection of threatened and endangered plant and animal species. Such species typically are very habitat-specific with narrow geographic and environmental distributions. These species use specific and often scarce or declining habitats. They are also typically rare, and some with large bodies and large home ranges use a variety of environments and resources across landscapes for meeting individual, breeding, and population needs for persistence.

Additional federal legislation, such as the Migratory Bird Conservation Act and regulations concerning air and water quality, has implications for providing habitats at landscape and geographic scales.

Table 4.37 lists federally designated assessment area species with associated designations. The "endangered" designation signifies any species in danger of extinction throughout all or a significant portion of its range [ESA 3(8)]. "Threatened" species are any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

A “proposed” species is any species of fish, wildlife, or plant that is proposed in the *Federal Register* to be listed under section 4 of the Endangered Species Act [50 CFR 402.02]. No assessment area wildlife species are proposed for listing at this writing.

“Candidate” species are those species that, in the opinion of the USFWS, may become endangered or threatened. There are three categories of "candidate" species --- C1, C2, and C3. No subbasin wildlife species are designated in the C1 and C3 categories, but there are several C2 designations. The C2 category includes taxa for which information now in possession of the USFWS indicates that proposing to list the species as endangered or threatened is possibly appropriate, but for which conclusive data on biological vulnerability and threats are not currently available to support proposed rules.

The Northern Regional Forester of the U. S. Forest Service has designated as "sensitive" those species for which population viability is a concern. Management indicator species are designated by national forests to serve as “bellwethers” that are sensitive to and reflect a range of changes in environmental and ecological conditions and processes on each forest.

In addition, the state of Idaho (Idaho Department of Fish and Game) maintains a list of “species of special concern.” These include native species that are either low in numbers, limited in distribution, or have suffered significant habitat losses. Species of special concern within the subbasins are also listed on Table 4.37.

Table 4.37: Selway and Middle Fork Clearwater Rivers Subbasin Wildlife Species with Federal and State of Idaho Designations

Amphibians				
Scientific Name	Common Name	USFWS Status	USFS Region 1 Status	State of Idaho Status
Plethodon vandykei idahoenis	Coeur d’Alene Salamander	C2	S	SC
Dicamptodon atterimus	Idaho Giant Salamander	C2		
Ascaphus truei	Tailed Frog	C2		
Rana pretiosa	Spotted Frog	C2		SC
Bufo boreas boreas	Boreal Toad		S	SC
Rana pipiens	Northern Leopard Frog		S	SC
Reptiles				
Diadophis punctatus	Ring-necked Snake	C2		SC
Thamnophis sirtalis	Common Garter Snake	C2		
Birds				
Haliaeetus leucocephalus	Bald Eagle	T	MIS	

Falco peregrinus anatum	Peregrine Falcon		S/MIS	
Histrionicus histrionicus	Harlequin Duck	C2	S	SC
Gavia immer	Common Loon		S	SC
Aegolius funereus	Boreal Owl	C2		SC
Oreotyx pictus	Mountain Quail	C2	S	SC
Otus flammeolus	Flammulated Owl	C2	S	SC
Glaucidium gnoma	Northern Pygmy Owl	C2		SC
Picoides arcticusi	Black-backed Woodpecker	C2	S	SC
Picoides albolarvatus	White-headed Woodpecker	C2	S	SC
Accipiter gentilis	Northern Goshawk	C2	S/MIS	SC
Dryocopus pileatus	Pileated Woodpecker		MIS	SC
Strix nebulosa	Great Gray Owl	C2		SC
Sitta pygmaea	Pygmy Nuthatch	C2		SC

Mammals				
Canis lupus	Gray Wolf	E/XN	MIS	
Ursus arctos horribilis	Grizzly Bear	T	MIS	
Felis lynx	Lynx	T		SC
Gulo gulo	Wolverine	C2	S	SC
Plecotus townsendi	Townsend's Big Eared Bat	C2	S	SC
Myotis ciliolabrum	Western Small-footed Myotis	C2		
Myotis evotis	Long-eared Myotis	C2		
Myotis thysanodes	Fringed Myotis	C2		SC
Myotis yumanensis	Yuma Myotis	C2		
Martes pennanti	Fisher	C2	S/MIS	SC
Martes americana	Pine Marten		MIS	
Alces alces shirasi	Shira's Moose		MIS	
Ovis canadensis	Bighorn Sheep		MIS	
Cervus elaphus	Rocky Mountain Elk		MIS	

U. S. Fish and Wildlife Service (USFWS) Designations, July 2000

E = Endangered; **T** = Threatened; **XN** = Experimental or non-essential population; and **C** = Candidate.

U. S. Forest Service Northern Region and National Forest Designations (USFS), July 2000

S = Sensitive in the Northern Region; **MIS** = Management indicator species on the Nez Perce National Forest

State of Idaho Designations, February 2001

SC = Species of Special Concern

In accordance with the Endangered Species Act, gray wolf reintroduction was initiated in central Idaho in 1995. Wolves are now successfully reproducing in and adjacent to the subbasins. Grizzly bear recovery planning is ongoing. The U. S. Fish and Wildlife Service prepared the *Final Environmental Impact Statement For Grizzly Recovery In The Bitterroot Ecosystem* in March 2000 and a subsequent decision to reintroduce grizzlies was signed. The wilderness portion of the Selway subbasin comprises most of the proposed core recovery area for the grizzly bear, in addition to the adjacent Frank Church-River of No Return Wilderness Area.

Important human influences affecting wildlife habitat and species vulnerability in the subbasins are the following: disturbances associated with transportation systems, including roads, trails, and airfields; administrative sites and residential developments; logging; grazing; fire suppression; weed encroachment; recreation; and hunting, trapping, and baiting activities.

The lower portion of the subbasins not designated wilderness or roadless, has been impacted by road building and logging, primarily on the flatter uplands. Residential, recreational, and administrative developments are primarily confined to the lower Selway canyon, although Moose Creek Ranger Station and Airfield is a significant developed administrative site in the Selway-Bitterroot Wilderness interior and a few private inholdings are also within the wilderness boundaries. The wilderness portion of the subbasins has an extensive trail system associated with numerous outfitter camps, non-outfitter camps, and Forest Service administrative sites. Weed encroachment, especially spotted knapweed and sulfur cinquefoil, has influenced the native plant composition, and thus wildlife habitat, in the Selway River canyon. Fire exclusion has impacted the abundance of important dead wood and early seral habitats, maintenance of ponderosa pine and other old growth, winter range integrity, and high elevation whitebark pine communities used by grizzly bears.

The trend in public demand for special, wild forest products like mushrooms, huckleberries, and beargrass is increasing with associated impacts to wildlife habitat. Mushrooms and huckleberries are important food sources for subbasin wildlife. Bear grass is utilized by some species for forage and for nesting cover. Other consequences of harvesting these products to ecosystem integrity and function are largely unknown. The extent of special harvest in the subbasins is unknown, but dramatic declines in revenue to rural forest communities from harvest of federal timber are increasing the importance of the special forest products industry in rural economic recovery and development (Kohm and Franklin, 1997).

HISTORIC AND CURRENT STATUS OF SUBBASIN HABITATS AND POPULATIONS

Habitats and Associated Species Guilds

This assessment primarily addresses species by guilds according to three broad habitat associations. Other unique habitats and species groups that need special consideration are addressed as well.

Habitats in each of the assessment area ERUs were analyzed on a coarse scale and divided into three primary categories based on habitat type group (Appendix A) aggregations. These three categories are referred to as *xeric*, *mesic*, and *alpine* (Map 49).

Each of the three habitat aggregations is further divided into four structural or successional classes with corresponding size class ranges (Map 50 and Tables 4.38, 4.43, and 4.44). Canopy density for each structural class was described using four divisions: high with greater than 70 percent canopy cover; moderate with 40 to 69 percent canopy cover; low-moderate with 15 to 39 percent canopy cover; and low with 0 to 15 percent canopy cover (Maps 51, 52, and 53). These habitat parameters are also displayed in tables by ERU in Appendix F.

Representative species assemblages are identified for each of the three habitat aggregations. Relationship to habitats, departures from historic conditions, and key threats are discussed for each species. Conservation recommendations for each species are addressed in Appendix Q.

XERIC HABITATS AND ASSOCIATED SPECIES

Xeric habitats are uncommon in the subbasins and represent only 15 percent of the habitats. They are concentrated in the upper Selway, lower Middle Fork Clearwater, lower Clear Creek, and on the north and east faces of tributaries. Key habitat features of the xeric aggregation include ponderosa pine old growth and winter range bunchgrass communities (Map 51).

Xeric habitats include habitat type groups (HTGs) 1 and 2 and grasslands. Habitat type groups 1 and 2 are characterized by warm and dry ponderosa pine and Douglas-fir, and moderately warm and dry Douglas-fir and grand fir. Trees in these habitats are typically open grown with bunchgrass and shrub understories. The xeric habitats primarily occur at low elevations on south and west aspects. Some slopes in the drier habitats are steep. The following table describes the elements of the xeric habitat aggregation.

Table 4.38: Xeric Habitat Aggregations

Xeric Habitats				
Structure	Early seral	Mid-seral	Late seral	Old growth
Potential Vegetation	HTG 1and 2 and grasslands	HTG 1and 2	HTG 1and 2	HTG 1and 2
Size Class	Herbaceous, shrub, seedling, sapling, small pole	9 to 21 in. dbh	≥ 21 in. dbh and not old tree	Old tree

dbh=diameter at breast height

Departures from Historic Conditions

Ponderosa pine communities in xeric habitats have significantly declined in the subbasins compared to historic representation. The large, old trees, important to species like the white-headed woodpecker have declined the most due to timber harvest in the roaded areas and fire suppression throughout the subbasins. Risk for stand replacing fires has also increased due to encroachment of shade tolerant understories and reduction in open stands in the absence of fire. Dead and dying wood habitat that provides important foraging, nesting, and denning sites is also diminished from historic occurrence due to fire suppression, timber harvest, and firewood gathering in localized areas.

Winter range integrity has diminished in the subbasins as a result of fire suppression, weed encroachment, motorized use, and agricultural and residential development. These changes have important habitat implications for ungulates, including bighorn sheep, elk, and mule deer, and carnivores that prey on them. Impacts to open xeric habitats, including weed encroachment and reduction of shrub galleries have also reduced mountain quail habitat.

Representative Species Associated with Xeric Habitats

- Carnivores: Mountain lion
- Birds: White-headed woodpecker, flammulated owl, mountain quail
- Reptiles: Western rattlesnake
- Ungulates: Rocky Mountain bighorn sheep, Rocky Mountain elk, mule deer

MOUNTAIN LION (*Felis concolor*)

Status

Status Designation: Federal, not listed; State of Idaho, game species.

The mountain lion was selected as the carnivore representative for this guild because it depends on winter range prey in xeric habitats in the most prey-limited season and because it has large space requirements that encompass habitats for many other species in the subbasins. Mesic and alpine communities also provide important habitat for mountain lions.

Mountain lions are commonly hunted in central Idaho, where populations have been relatively high since the 1980s. Once a rare occurrence, mountain lions have frequently been observed in daylight hours in the subbasins in the last 10 years. According to harvest data collected by Idaho Department of Fish and Game biologists, populations began to decline in the Clearwater basin in 1997 along with black bears (Nadeau, 2000). The decline may be related to the sharp decrease in elk populations.

Ecology

In Idaho, mountain lions prefer montane and semi-wooded canyon habitat, but in winter they rely heavily on winter range in xeric habitats. Mountain lions require large tracts of land and available prey for their habitat needs. In winter, they rely heavily on winter range prey in xeric habitats. Mountain lions are opportunistic and prey on large and small mammals including bighorn sheep, coyotes, and livestock. Hornocker (1970) reported mule deer and elk were the primary food in Idaho from September through May, and Columbian ground squirrels were the most common food source in summer.

Departures from Historic Conditions and Current Threats

Historically, mountain lions were hunted for bounty in the subbasins and populations were significantly reduced by 1935. In 1946, only 20 mountain lions were estimated to occur in Moose Creek (Smolinski and Biddison, 1988). Today, hunting mountain lions is regulated and populations remain viable. However, resources are limited for enforcement of regulations in the field to deter poaching in the subbasins and associated mortality is unaccounted for. When populations decline, this factor becomes more important.

Most lion hunters outside the wilderness use motorized vehicles to locate tracks and to transport hunting hounds. The type, density, and distribution of roads within a lion's home range can greatly influence hunter success (Murphy 1983; Barnhurst, 1986). The assessment area, most of which is designated wilderness, provides abundant habitat over a large geographical area for mountain lions. No significant impediments to security or dispersal and genetic interchange within the subbasins and between adjacent areas are currently evident. Impacts to winter range, including motor vehicle access and weed encroachment, have decreased winter range habitat quality for mountain lion prey.

WHITE-HEADED WOODPECKER (*Picoides albolarvatus*)

Status

Status Designation: Federal, candidate (C2) species (U. S. Fish and Wildlife Service) and sensitive species (USFS); State of Idaho, protected species of special concern.

As well as being designated a sensitive species in the U. S. Forest Service Northern and Intermountain Regions, the white-headed woodpecker is also listed as a protected species of special concern in Idaho and as a sensitive-critical species in Oregon. Additionally, the white-headed woodpecker is considered at risk under land management alternatives proposed for interior Columbia River basin (Lehmkuhl et al., in press).

The white-headed woodpecker is a year-round resident of the Nez Perce National Forest and the adjacent Payette National Forest. The Nez Perce is the only national forest in the Forest Service Northern Region with suitable habitat for white-headed woodpeckers. Although there are no documented sightings in the Selway and Middle Fork Clearwater subbasins, white-headed woodpeckers were observed at Jersey Mountain Ridge in the adjacent Salmon River basin in 1990. Current white-headed woodpecker population status in the subbasins is unknown.

Ecology

The white-headed woodpecker is associated with open-canopy, old ponderosa pine and mixed ponderosa pine and Douglas-fir forests, usually from 3,900 to 8,900 feet elevation. The white-headed woodpeckers nest in hollows of large-diameter snags or leaning logs (Milne and Hejl, 1989). White-headed woodpeckers avoid recently cut and early seral clearcuts but have been known to occupy uncut coniferous forest and shrublands if snags and dying trees are retained (Hagar, 1960). The most significant suitable habitat for white-headed woodpeckers occurs in the White Cap Creek ERU in the largest patch of old ponderosa pine forest within the subbasins.

Departures from Historic Conditions and Current Threats

Old ponderosa pine with high commercial value has been reduced by timber harvest in Middle Fork Clearwater and Clear Creek ERUs and this reduction of old ponderosa pines has contributed to white-headed woodpecker habitat loss in the subbasins.

Fire exclusion in old pine forests throughout the subbasins has accelerated fuel accumulation with increased risk for stand replacing fire events and has facilitated encroachment of shade tolerant tree species that reduces ponderosa pine habitat. Removal of standing snags in old ponderosa pine stands for firewood may have reduced white-headed woodpecker nesting, roosting, and foraging sites. White-headed woodpeckers are also sensitive to nest tree disturbance that can increase mortality rates and result in use of less preferred habitats (Blair and Servheen, 1993). Historic white-headed woodpecker population status in the subbasins is unknown.

Flammulated Owl (*Otus flammeolus*)

Status

Status Designation: Federal, candidate (C2) species (U. S. Fish and Wildlife Service), sensitive species (USFS); State of Idaho, species of special concern.

The flammulated owl is designated as a sensitive species in the Northern, Rocky Mountain, Southwestern, and Intermountain Regions of the U. S. Forest Service. It is classified as a species of concern in Idaho, Montana, and Oregon, and a candidate species in Washington. The North American populations of flammulated owls are considered neotropical migrants and breed from British Columbia through the western U. S. and south to central Mexico. The flammulated owl winters from central Mexico, south in the highlands to Guatemala and El Salvador, and casually north to southern California.

Although limited survey work has been done in the subbasins, the owl has been documented in the lower and upper Selway River canyon. Formal surveys for flammulated owls were conducted adjacent to the subbasins in the Salmon River canyon and the South Fork Clearwater River canyon in 1992. Singing male flammulated owls were recorded in the Salmon River canyon. No flammulated owl observations were recorded in the South Fork Clearwater River canyon (Shepherd and Servheen, 1992).

Ecology

In Idaho, the flammulated owl prefers old growth and occupies older ponderosa pine and Douglas-fir, and mixed coniferous forests. Stands used by flammulated owls also tend to be relatively open (Goggans, 1986). The presence of cavities and snags is important in habitat selection (Reynolds and Linkhart, 1992). Flammulated owls have a low reproductive rate and one of the lowest and least variable clutch sizes of North American owls. They must be extremely specialized for high longevity and low reproductive output.

Departures from Historic Condition and Current Threats

Habitat loss, including loss of old ponderosa pine and Douglas-fir forests and associated nest cavities, is the greatest threat to flammulated owls in the subbasins. Timber harvest in Middle Fork Clearwater and Clear Creek ERUs has reduced flammulated owl habitat. Changes in forest structure may also have impacted insect communities that owls depend on for forage. The decline in snag recruitment in the subbasins through fire suppression and timber harvest has impacted habitat for flammulated owls. Removal of dead trees for firewood in ponderosa pine and Douglas-fir forests can potentially impact flammulated owl nesting and foraging habitat.

Fire exclusion in old pine throughout the subbasins has accelerated fuel accumulation with increased risk for stand replacing fire events and artificially high insect and plant pathogen populations, and has facilitated encroachment of shade tolerant tree species.

Metapopulation structure has not yet been documented but may be important where the ponderosa pine and Douglas-fir forest type has been fragmented.

MOUNTAIN QUAIL *(Oreortyx pictus)*

Status

Status Designation: Federal, candidate (C2) species (U. S. Fish and Wildlife Service), sensitive species (USFS); State of Idaho, species of special concern.

The mountain quail is native only to the western mountains of the United States and the Baja peninsula of Mexico. It is a resident from southwestern British Columbia, western and southern Washington, and central Idaho, south through the mountains of California and northern and western Nevada, to northern Baja California and Mexico.

The mountain quail is limited in the Forest Service Northern Region to north central Idaho and is considered a sensitive species in the Northern Region. It is listed as a species of special concern in the State of Idaho. In Idaho, mountain quail hunting season has been closed statewide since 1984 to protect the remnant population (Vogel and Reese, 1995).

The remaining mountain quail population nucleus in Idaho occurs in the Little Salmon River, the Salmon River, and the Snake River canyons of west-central and north-central Idaho (Heekin, 1994). Mountain quail historically occurred in the subbasins. Observations were documented in the last 10 years in the Clear Creek ERU near Kooskia and one observation at the Fenn Ranger Station was recorded in 1974. An account of a mountain quail at the site once occupied by Three Links Ranger Station in the Gedney and Three Links ERU was documented in the 1950s. Current population status in the subbasins is unknown.

Potential mountain quail habitat in the subbasins occurs in the lower Middle Fork Clearwater canyon, lower Clear Creek, the Selway River canyon, and xeric tributaries including White Cap, Indian, Deep, and Three Links Creeks.

Ecology

Mountain quail are year-round residents with only nominal vertical migration (Ormiston, 1966). They live in ponderosa pine and Douglas-fir forest types with shrub communities, forest and meadow edges, and dense undergrowth. In Idaho, mountain quail habitat was dominated by tall shrubs that averaged 10 feet in height with an average canopy density of 45 percent that were within a few hundred meters of water. They occur most frequently in draws with shrub galleries along the breaks and secondary drainages of the Snake, Salmon, and Clearwater Rivers.

Mountain quail are adapted to habitats in disturbance dependent environments. Wildfire is probably significant in range expansions and contractions and in local population dynamics. In the long term, habitat suitability is increased after fire when senescent vegetation is removed, new plant growth is generated, and native shrub communities recolonize.

Departures from Historic Condition and Current Threats

Populations have declined in Nevada, Idaho, eastern Oregon, and eastern Washington. Reasons for declines remain unknown and mountain quail breeding biology is poorly understood (Delehanty et al., 1995). The Idaho population has been declining since 1990, possibly due to riparian habitat degradation, fire suppression, disease, and other factors. Predation by feral cats may also be a factor. The decline of mountain quail in Idaho after hunting stopped suggests that other factors also contributed to the decline (Brennan, 1991).

Mountain quail populations have been extirpated from regions within historic range following systematic fire suppression (L. Brennan, personal communication). Heekin (personal communication, 2000) believes that mountain quail declines in Idaho can be attributed to habitat loss. Reduction in deciduous shrub cover on wintering range, especially Douglas hawthorne, is often due to road building or residential development and landscaping that replaces native shrubs with exotics. Loss of ponderosa pine breeding and brood rearing habitat through advancement of succession in the absence of fire has also diminished mountain quail habitat in the subbasins. Weed encroachment has probably influenced availability of native forage species.

Logging in nesting habitat during the nesting period has resulted in mountain quail nest loss (Miller, 1950), but logging may also benefit mountain quail by conversion of forest to shrub cover, and other early seral vegetation.

Past heavy grazing by cattle and sheep in mountain quail habitat may have reduced availability of important annual foods and perennial shrubs (Belding 1878; Miller 1950; Brennan 1991). But moderate grazing on the Little Salmon River in Idaho appeared to improve mountain quail mobility by opening the dense grass and forb ground cover (Heekin, personal communication, 2000).

WESTERN RATTLESNAKE *(Crotalus viridus)*

Status

Status Designation: Federal, not listed; State of Idaho, not listed.

The western rattlesnake is an unprotected nongame species in Idaho. It is the only dangerously venomous snake species in Idaho. The Northern Pacific subspecies (*Crotalus viridis oreganus*) is found in west-central Idaho in the Selway and Middle Fork Clearwater Rivers subbasins and in the drainages of the Salmon, Clearwater, and Snake Rivers. Potential rattlesnake habitat in the subbasins occurs in the lower Middle Fork Clearwater canyon, lower Clear Creek, the Selway River canyon and its xeric tributaries including White Cap, Indian, Deep, and Three Links Creeks. The status of rattlesnake populations and the significance of rattlesnake harvest in the subbasins are unknown.

Ecology

Western rattlesnakes are usually found in xeric habitats with sparse vegetation (Storm and Leonard, 1995). The area typically has a rocky component or has one in adequate proximity to be utilized as a hibernaculum during the winter. Hibernacula are generally on south facing slopes and are not shaded by vegetation (Nussbaum et al., 1983).

Primarily terrestrial, western rattlesnakes are usually active during the day in cool weather but active at night in hot weather. Western rattlesnakes live in mammal burrows, crevices, or caves when inactive. They are active from late March to October in southern British Columbia and northern Idaho. Individuals usually return to the same den each year. They hibernate for about 210 days and can suffer up to 34 percent mortality during that time.

Departures from Historic Conditions and Current Threats

Historic rattlesnake population status in the subbasins is unknown. Threats to rattlesnakes in the subbasins include disturbance or destruction of hibernacula and other habitat reduction. Trail and road maintenance and construction, extraction of rock and other fill material, and logging in rattlesnake habitat may directly impact rattlesnakes, especially during hibernation from October to March and during aestivation in extreme hot weather. Agricultural, domestic, and commercial development is also a potential threat to rattlesnake habitat, which is synonymous with environments attractive to human habitation.

The western rattlesnake is adapted to habitats in disturbance dependent environments. Fire exclusion in the subbasins may have impacted rattlesnake prey base by reducing habitat for small mammals.

Rattlesnakes are collected for both personal and commercial purposes and collection is unregulated in Idaho. Collectors have markets for live snakes, rattlesnake meat, and parts of rattlesnakes including skins, heads, and rattles. Rattlesnakes are often feared by humans and are commonly killed when encountered in the subbasins. Fueling and torching rattlesnake dens has been common in the Kooskia area according to local residents.

ROCKY MOUNTAIN BIGHORN SHEEP *(Ovis canadensis canadensis)*

Status

Status Designation: Federal, management indicator species (USFS, Nez Perce National Forest; State of Idaho, not listed.

The Rocky Mountain bighorn is designated a management indicator species on the Nez Perce National Forest. It is also considered a wilderness sensitive species in much of the literature (Garton and Hayward, 1989). Wilderness sensitive species generally have more restrictive habitat needs and rely on wilderness or other remote environments with limited disturbance.

Bighorn sheep winter in the upper and middle Selway River canyon in the assessment area. Summering sheep have also been observed in the upper and middle Selway canyon and at high elevations in Meadow Creek.

Klaver (1978) estimated the upper Selway bighorn population at 90 sheep during his investigation in 1975 through 1976. In 1981, bighorn counts indicated a population of 125.

Twenty-nine bighorns were transplanted into the subbasins in 1989 through a cooperative effort between Idaho Department of Fish and Game and the Nez Perce National Forest. By 1998, bighorn population estimates declined to 50 (Toweill, 1999).

Ecology

Bighorn sheep depend on open bunchgrass communities for foraging and prefer south slopes and cliffs in winter. Peek (1988) assessed habitat characteristics of three areas in the Selway drainage that have been historically occupied by bighorn sheep. These are the Eagle Rock and Elevator Mountain area, the 62 Ridge area, and lower Meadow Creek.

Peek rated the Eagle Rock and Elevator Mountain area as the highest quality habitat of the three and concluded that none of the three areas appear capable of supporting large herds; populations of less than 100 should be expected to persist.

Currently, the largest concentration of bighorns in the subbasins is in the upper Selway canyon in winter, between Magruder Mountain and Sheep Creek. The upper Selway herd’s summer and fall range is on the east side of the Bitterroot Mountains. The herd migrates to the Selway winter and spring range in late fall.

Departures from Historic Conditions and Current Threats

Bighorn sheep may once have been the most common ungulate in mountainous regions of North America (Toweill and Geist, 1978). The Nez Perce Indians told Lewis and Clark of large numbers of bighorns in the Bitterroots with the greatest density along the main divide.

Winter range condition is a critical factor influencing bighorn sheep survival. Domestic sheep grazed the Selway bighorn winter range prior to 1927 until 1942. Cattle grazed the Montana summer range between 1943 and 1967 (Klaver, 1978). Carrying capacity for bighorns was probably reduced to some extent through grazing by other ungulates.

Klaver found the Selway winter range to be diminished due to fire exclusion and subsequent forest succession, resulting in poor range condition due to overgrazing by bighorns. Overgrazing can stress sheep and initiate a population crash due to lungworm pneumonia (Demarchi, 1975 in Klaver, 1978).

Fire suppression could also reduce or eliminate montane and subalpine meadows that bighorns depend on for summer range. Bighorns depend on open habitat with long sight distances to avoid predators. The absence of fire in xeric grasslands has facilitated reductions in open habitats as tree cover encroaches.

Weed encroachment is a significant impact to Selway bighorn winter range. Infestations have diminished native bunchgrass forage and reduced the ability of fire to restore bighorn habitat.

Winter is a time of stress for bighorns. Selway lambs suffered approximately 50 percent mortality from December to May during Klaver's (1978) study. Winter snowmobile use occurs on Deep Creek Road 468 and Paradise Road 6223 in bighorn winter range. Use is primarily associated with lion hunting, both commercial and private, and other recreational pursuits. Reportedly, snowmobiles encounter bighorns on Paradise Road (Pauley, personal communication, 2000).

Traffic associated with the spring boating season on the Selway River in bighorn winter and spring range has escalated and is expected to increase each year. New technology has allowed vehicles to penetrate snowdrifts on Nez Perce Pass and access the river portal at Paradise Guard Station earlier in the season. Boating traffic in bighorn winter and spring range now begins as early as April, when bighorns are probably still present on spring range.

Disturbance can cause sheep to vacate their accustomed habitats and seek refuge on terrain where they would normally be rarely found, resulting in loss of habitat. Loss of wintering habitat is the most significant habitat loss to bighorns and typically means a reduction in population size (Geist, 1971 in Klaver, 1978). Conversely, if sheep habituate to human presence on winter range, they may become less wary and more vulnerable to hunters on summer and fall range.

The loss of a sheep population cannot be easily restored to the vacant range. Wild sheep have great difficulty colonizing new or abandoned ranges. They maintain their native home ranges with a "living tradition" based on knowledge of seasonal feeding and travel routes passed down from generation to generation. When these traditions are disrupted due to loss of older, experienced individuals, or other factors, a sheep population can be easily extirpated (Toweill and Geist, 1978). New, transplanted sheep do not have the traditional knowledge of the new range and cannot be expected to effectively utilize it.

In some areas, lungworm infections may predispose bighorn to respiratory bacterial infections. Klaver (1978) found very low lungworm loads in the Selway herd although the herd was 76 percent infected.

Although Native Americans and early settlers historically hunted Selway bighorns, the state of Idaho has never permitted a hunting season on the wintering Selway herd. However, the herd is hunted legally in Montana on the summer and fall range.

ROCKY MOUNTAIN ELK (*Cervus elaphus*)

Status

Status Designation: Federal, management indicator species (USFS Nez Perce National Forest); State of Idaho, game species.

Elk were historically widespread in North America but are now primarily restricted to western regions with small, reintroduced populations elsewhere.

The Rocky Mountain subspecies is designated a management indicator species on the Nez Perce National Forest and is classified as a game species in the state of Idaho.

Long considered the most important elk herd in Idaho, the Selway elk population significantly declined between 1995 and 1999.

Although elk are not rare or imperiled range-wide, the dramatic decline in subbasin populations in the past decade has generated much debate on which factors are most significant. Elk are important to the state economically and measures implemented to restore elk may have significant implications for other subbasin species as well. Elk are also the only subbasin species for which there is consistent population data over a 10-year period.

Ecology

Elk are primarily grazers, but they are habitat generalists and use a diversity of forest types and structures that provide grass, forb, and browse forage. They use climax mesic meadows and early seral communities for foraging in spring through fall. Winter range is their most limiting habitat where they depend on low elevation, warm aspect, snow free environments for available forage, although bulls often winter much higher in elevation than cows and immature elk. Elk also require forest cover for security and thermal regulation. Calving areas are traditional and preferred sites are generally large meadows in close proximity to water and cover. A mosaic of structural diversity with available water, healthy winter range, and adequate security characterizes good elk habitat.

History of Elk in the Subbasin

Historically, elk populations in the subbasins were relatively insignificant until a series of major fire events occurred in 1910, 1919, and 1934, that significantly increased forage availability and population levels in the subbasins.

Before the elk herd expanded in response to the fires, an effort was made to protect the small population. As a result, Idaho County, which includes the entire assessment area, was closed to elk hunting between 1911 and 1917.

When the Idaho Legislature re-opened Idaho County to elk hunting in 1917, it also established a 194,000-acre Selway Game Preserve in which all game animals were protected. By 1936, the herd rebounded and the preserve was again open to hunting (Parsell, 1990).

By 1940, the Selway elk herd may have grown to about 25,000 in response to increased forage and the19-year absence of hunting in the Selway Game Preserve. Eventually the herd exceeded the capacity of its winter range and a major die-off occurred in the winter of 1948 to 1949. When the population recovered, increased hunting pressure followed. As natural forest succession began to shrink foraging habitat, and hunting pressure increased, the population declined again. Subsequent bull-only harvest regulations were imposed and resulted in a more sustainable population in the 1980s (Weaver, 1989).

Departures from Historic Conditions and Current Threats

The severe winter of 1996 and 1997 devastated the greater Clearwater elk herds. The Selway herd within the greater Clearwater basin declined from a population estimate of 5,000 to 3,200 between 1995 and 1999 (Idaho Department of Fish and Game, 2000). Predator populations were at a high level prior to and during the decline. Other factors likely compounding the severe winter effects on the subbasin elk population include forage availability, hunting, and factors influencing bull vulnerability and calf recruitment.

Elk habitat availability is largely a reflection of natural disturbance dynamics, notably fire, in the subbasins. Much of the xeric winter range elk depend on is significantly beyond expected fire return intervals. Fire maintains grasslands and early seral structure that elk require for foraging. Fire invigorates shrubs and initiates re-sprouting, producing additional forage for elk. The upper Selway canyon indicates the most departure from historic fire regimes.

Weed encroachment in xeric, winter range habitats has undoubtedly influenced the availability of native bunchgrass forage for elk. Aggressive species like spotted knapweed, sulfur cinquefoil, and cheat grass have invaded subbasin winter range. Yellow starthistle is common in the lower Middle Fork and Clear Creek ERUs and can be expected to advance into the Selway canyon winter range.

Seventy-eight percent of the subbasins is designated wilderness. Hunted populations of elk in wilderness areas significantly test the Wilderness Act mandate to “leave no lasting trace”. Evidence from the Lochsa elk population and the Sun River population in Montana, both of which occupy wilderness areas at least part of the year, indicates that hunter harvest and associated influences have affected elk population characteristics and disrupted migration patterns (Thomas and Toweill, 1982).

Distribution of elk is significantly influenced by the presence of human activity. Elk will abandon preferred areas during spring, summer and fall when they are disturbed at these sites. High open road densities reduce elk habitat effectiveness. Hunted populations of elk require considerable forest cover to provide effective habitat security (Stalling, 1994).

Bull Vulnerability: Mature bulls are preferred by most hunters and are therefore more vulnerable to mortality during hunting season than other classes of elk. Lack of mature bulls in a herd can disrupt breeding seasons, conception dates, and calf survival. Younger bulls breed later, over a longer time period in the fall, than mature bulls. This results in longer calving seasons with many calves born in late spring. Late born calves spend less time feeding on high quality forage and may enter winter in poorer condition than calves born earlier. Longer calving seasons also make elk calves more vulnerable to predators for longer periods. Mature bulls also maintain social order in a herd and their presence reduces strife, exhaustion, and wounding among bulls and protects cows from harassment by socially inept young bulls (Stalling, 1994).

Research funded by the Forest Service, the Idaho Department of Fish and Game, and the Rocky Mountain Elk Foundation compared bull mortality in areas with low, moderate, and high road densities. Open road density influenced bull mortality significantly. In the high density area, hunters killed nearly two out of three bulls. In the moderate density area, almost half the bulls were taken. In the low road density area, hunters killed less than a third of the bulls. In all three areas, hunters caused 90 percent of the bull mortality. The level of open road density is also negatively correlated with the percent of bulls living to maturity, defined as four and one-half years. An Idaho Department of Fish and Game study found that only five percent of bulls lived to maturity in a high road density area while in a roadless area, 30 percent of the bulls lived to maturity with most reaching 10 years with nearly 35 bulls per 100 cows.

The Idaho Department of Fish and Game has established a bull:cow elk ratio objective of 25 bulls to 100 cows. The Department uses a bull elk vulnerability model to predict bull:cow ratios for various levels of open road density in game management units.

The achievement of the bull:cow ratio objective is a dual responsibility shared by the Forest Service and the Idaho Department of Fish and Game. In order to achieve the 25:100 objective, the Forest Service would manage motorized access for an open road density of 0 to 1.5 miles of road per square mile within the game management units while the Idaho Department of Fish and Game manages hunter density at 3 to 18 hunter days per square mile per season.

Elk Security Associated with Motorized Access: Elk are sensitive to disturbance and avoid roads in all seasons. Individuals exhibit high fidelity to their home range, but may abandon it if excessively disturbed. Road access and intensity of disturbance is generally thought to be more influential to elk than habitat parameters (Unsworth et al., 1993).

Within national forest lands in the subbasins, the highest open road density is four to five m/m^2 and occurs in upper Clear Creek and extends into lower Clear Creek on private land (Map 54). The high-density area in upper Clear Creek also connects with national forest lands west of Pine Knob that have an open road density of two to three miles per square mile and adjacent densities up to two miles per square mile. Open road densities of two to three m/m^2 also occur on national forest lands between Smith Creek and Pete King Creek on the north face of the Middle Fork Clearwater River, and west of the mouth of Meadow Creek in association with Slim’s Camp Road and Falls Point Road.

The highest open road density within the subbasins is concentrated on the state and private non-federal lands in lower Middle Fork and lower Clear Creek ERUs. Of these, the highest density is four to five mi/mi^2 of road and this occurs on a large portion of lower Clear Creek that extends into upper Clear Creek in national forest. Open road density of three to four mi/mi^2 is located primarily on state land on the north face of lower Middle Fork below Woodrat Mountain. Much of the remaining non-federal portion has open road density of two to three mi/mi^2.

Some motorized access closures are frequently breached and resources for monitoring and enforcement are inadequate. Access violations add to actual open road density and elk vulnerability.

Motorized trail access also occurs throughout the non-wilderness portion of the subbasins. Meadow Creek ERU is considered primarily roadless, but 14 of 22 trails are open to motorized use (Map 54). An extensive mesic meadow complex in upper Meadow Creek provides important elk calving habitat and summer range. Motorized use during calving season in late May and early June may be detrimental to calving elk and to calf recruitment. The average annual rate of increase over the last 10 years for wintering elk populations in Meadow Creek is far less than the average for the other combined non-wilderness general management units and the combined wilderness general management units (Table 4.39).

Trails where motor vehicle use is allowed also access important calving habitat on Glover Ridge between the North Selway Face ERU and Gedney and Three Links ERU. This area is known to be the most significant elk calving habitat in the greater Clearwater River basin. A motorized trail in Gedney Creek also accesses important spring calving habitat. Motorized use in these areas during calving season is a potential threat to calving success. These areas and others accessed with motorized trails on the north face of the Selway are also important elk winter and spring range. Wildlife is most vulnerable to the motorized use in these areas on winter range and during hunting season.

Wintering elk are also vulnerable to motor vehicle access. Roads open to snowmobiles on winter range in the lower Selway include Selway Road 223, Fog Mountain Road 319, Indian Hill Road 9720, Falls Point Road 443, and Swiftwater Road 470. In the upper Selway, Deep Creek Road 468 and Paradise Road 6223 are open to snowmobiles on winter range. These routes are groomed with the exception of Selway Road, Fog Mountain Road, and Indian Hill Road. Use varies on the ungroomed roads depending on snow conditions.

Summer Range Conditions: A habitat effectiveness model that considers road density, livestock grazing, and cover-forage ratios is used to evaluate summer elk range outside the wilderness. Summer range habitat effectiveness objectives are established for each elk analysis unit. All three of the analysis units in the Clear Creek ERU do not meet objectives with two substantially below. In the O'Hara and Goddard ERU, five of the analysis units are below objectives with two substantially below. Five other units are above objective with four substantially above. The single analysis unit in Middle Fork Clearwater ERU is just above objective. In Meadow Creek ERU, three units are just above objective and four units are just below.

The lower habitat effective ratings in Clear Creek and O'Hara and Goddard are primarily related to open road density, with cover to forage ratio and livestock grazing secondary in most cases.

Climax meadow habitat provides important elk summer range but is limited in the subbasins. Significant meadow complexes occur in upper Meadow Creek, North Moose, Rhoda Creek, and Goat Creek. These meadows are also valued for campsites and pack stock grazing, which may displace elk and reduce forage availability.

Unauthorized salting is a frequent problem in the backcountry that increases elk vulnerability through habituation and promotes artificial distribution patterns.

The distribution of elk can also be influenced by the distribution of domestic cattle. Two cattle allotments are permitted within the subbasins. Both the Clear Creek and Tahoe allotment in the

Clear Creek and Middle Fork Clearwater ERUs and the Hamby allotment in the O'Hara and Goddard ERU currently meet grazing objectives for utilization, dispersal, and riparian protection. Potential conflicts with elk include displacement and forage reduction.

Winter Range Conditions and Elk Populations: The Forest Service and Idaho Department of Fish and Game cooperated in evaluating the relationship between the average rate of increase in elk populations over the last 13 years and winter range condition in the subbasins (Pauley, High, Koehler, 2000). The Clearwater Region of Idaho Department of Fish and Game conducts winter elk counts and calculates average annual rates of increase (ARI) for populations in game management units (GMUs). Systematic aerial counts have been conducted for the 13-year period from 1988 through 2000 (Pauley, 2000).

Aerial counts are made of the sub-units within game management units. The sub-unit counts were grouped according to the ERU they fell within, so average annual rates of increase by ERU could be calculated. Some sub-units were winter counted more frequently than others and some ERUs contained only one sub-unit from which rates were derived for the whole ERU in general.

When an ERU, such as one of the canyon ERUs, had distinct north-south or east-west faces, scientists looked at the ERU as a whole and also looked at the two faces individually. This is important because south and west aspects receive more insolation, are warmer and characteristically provide better winter range conditions than north and east aspects. However, roads are often located on south and west aspects because of less snow load and fewer trees. Motorized traffic on these roads can decrease use of winter range.

Although elk generally exhibit high habitat fidelity, in extreme winter conditions they may be forced to move from traditional winter range in search of better conditions. This could influence winter counts in years with extreme winter conditions.

Table 4.39 depicts average ARIs for four elk population classes within each sub-basin ERU and the year's winter counts were conducted. The ERUs and associated ARIs are grouped into three categories:

- *Front Country* - includes all roaded non-wilderness ERUs in the sub-basin.
- *Meadow Creek* - consists of a single ERU that is designated roadless with motorized trails and is the second largest ERU in the sub-basin.
- *Wilderness* - includes all wilderness ERUs that are primarily roadless except for a few road corridor inclusions.

As shown in Table 4.39, the four elk population classes evaluated are the calf:cow ratio, and the cow, bull, and total elk population classes. The calf:cow ratio is important as an indicator of population recruitment and long term herd viability. A ratio of at least 24 calves to 100 cows is needed to offset natural mortality. Since bulls are more vulnerable to hunting and often use higher elevation winter habitat than other elk classes, the bull class warrants individual evaluation. The cow class is the largest and is useful as an indicator of the status of the general elk population. The total elk class is a combination of all elk classes including immature cows and bulls, and calves.

Twelve of the 19 ERUs evaluated were found to have significant numbers of wintering elk. The 7 ERUs found to have less significant numbers are primarily limited by high elevations and lack of adequate winter range habitat. These ERUs provide valuable summer range, however.

Upper Selway Canyon, Middle Selway Canyon, Meadow Creek, Lower Selway Canyon, Middle Fork Clearwater River, and Clear Creek ERUs, in order of significance, support the highest numbers of wintering elk in the sub-basin.

Across the 12 significant ERUs, average ARI ranges vary considerably for each elk population parameter evaluated. For the calf:cow ratio, the average ARI range is 64.2 percent to –9.0

percent. For bulls the range is 0.3 to –15.1. For cows, it is 25.5 to –18.1, and for total elk, the range is 14.2 to –17.5.

Table 4.39: Elk Winter Population Data by Ecological Response Unit and Annual Rate of Increase (Percent)

Front Country ERUs	Calf:Cow	Cow	Bull	Total Elk	Years Surveyed*
Clear Creek	-3.4	-18.1	-11.1	-17.5	93, 96, 00
Lower Selway Canyon	5.9	8.2	-5.2	3.7	93, 96, 00
Lower Selway Canyon - North Side of the River	0.8	5.5	-13.2	-3.3	93, 96, 00
Lower Selway Canyon – South Side of the River	13.9	12.5	1.4	13.1	93, 96, 00
Middle Fork Clearwater River	2.7	7.6	-1.1	2.1	85-88, 91-96, 99, 00
MFCR – North Side of River	2.7	7.2	-0.8	1.9	85-88, 91-96, 99
MFCR – South Side of River	no data	23.2	-4.3[†]	10.5	93, 96, 00
North Selway Face	0.8	5.5	-13.2	-3.3	93, 96, 00
O'Hara and Goddard Creeks	5.9	-4.3	-1.3	-3.6	93, 96, 00

Meadow Creek ERU	Calf:Cow	Cow	Bull	Total Elk	Years Surveyed*
Meadow Creek	-9.0	-7.3	-9.6	-8.3	88, 91, 93, 95, 96, 99, 00

*Only a portion of each ERU was surveyed each year.

[†] Data was available from only one Game Mgmt. subunit. May apply to a whole ERU or a single rate calculation.

Wilderness ERUs	Calf:Cow	Cow	Bull	Total Elk	Years Surveyed*
Deep Creek	-57.0[†]	-29.2	25.8	-17.2	88, 95, 99
Ditch Creek[†]	-11.8	-5.9	-33.0	-11.0	91, 95, 99
Gedney and Three Links Creeks	12.0	-9.4	-3.2	-10.8	88, 91, 93, 95, 96, 99, 00

Wilderness ERUs	Calf:Cow	Cow	Bull	Total Elk	Years Surveyed*
Indian Creek	12.7	-4.0	-18.5	-3.8	91, 95, 99
Marten Creek[†]	0.0	-1.7	17.0	1.8	91, 95, 99
Middle Selway Canyon	-0.6	-6.6	-11.5	-8.0	88, 91, 93, 95, 96, 99, 00
Middle Selway Canyon – North Side of the River	0.3	-8.2	-10.3	-9.1	88, 91, 95, 99
Middle Selway Canyon – South Side of the River	-3.6	-1.8	-14.6	-4.4	88, 91, 93, 95, 96, 99, 00
Moose Creek	-7.0	-10.4	0.3	-10.9	88, 91, 95, 99
Otter and Mink Creeks	13.5	-12.4	-19.9	-14.3	88, 91, 95, 99
Pettibone and Bear Creeks	6.3	6.1	-15.1	1.0	88, 91, 95, 99
Running and Goat Creeks	-0.1	0.5	-13.5	-0.7	88, 91, 95, 99
Selway Headwaters	-4.4	-11.9	-3.3	-11.5	88, 91, 95, 99
Selway Headwaters – East Side of the River	2.3	-11.4	2.8	-9.2	88, 91, 95, 99
Selway Headwaters – West Side of the River	-28.7	-13.6	-18.1	-19.3	88, 91, 95, 99
Upper Selway Canyon	-1.7	-2.1	-4.3	-3.7	88, 91, 95, 99
Upper Selway Canyon – East Side of the River	-2.4	-1.2	-5.8	-3.0	88, 91, 95, 99
Upper Selway Canyon – West Side of the River	2.3	-7.2	-0.7	-7.1	88, 91, 95, 99
White Cap Creek	64.2	25.5	-8.3	14.2	88, 95, 99

***** Only a portion of each ERU was surveyed each year.

[†] Data was available from only one Game Mgmt. subunit. May apply to a whole ERU or a single rate calculation.

The following summary Table 4.40 consolidates the ERUs and associated ARIs within the front country, Meadow Creek, and wilderness categories.

Table 4.40: Wintering Elk Population Annual Rates of Increase by GMUs Selway and Middle Fork Clearwater Subbasins

	Calf:Cow ARI (%)	Cow ARI (%)	Bull ARI (%)	Total Elk ARI (%)
Front Country (GMUs 10A, 12, 16)	3.5	-1.0	-6.3	-3.7
Meadow Creek (GMU 16A)	-10.2	-8.6	-11.7	-9.9

Wilderness (GMU 17)	-0.1	-3.2	-6.6	-4.8

GMU: Game Management Unit; ARI: annual rates of increase

Notes for Table 4.40: Only those subunits within the Selway and Middle Fork subbasins analysis area were used to compile these composite ARIs. Only small portions of GMU 10A and GMU 12 fall within the analysis area. A portion of Unit 16A lies outside the Meadow Creek watershed.

Table 4.41: Findings by Elk Population Class - Annual Rates of Increase by Percent

The two ERUs with the highest annual rates of increase and the two ERUs with the lowest ARIs for each elk population class are shown below. A single ERU that represents the mid-range ARI for each elk population parameter is also shown.

High ARI Range ERUs	**Calf:Cow**	**Cow**	**Bull**	**Total Elk**
White Cap Creek	64.2%	25.5%		14.2%
Moose Creek			0.3%	
Gedney and Three Links Creeks	12.0%			
Lower Selway Canyon		8.25%		3.7%
Middle Fork Clearwater			-1.1%	
Mid ARI Range ERUs	**Calf:Cow**	**Cow**	**Bull**	**Total Elk**
Upper Selway	1.7%	2.1%		-3.7%
Lower Selway Canyon			-5.2%	
Low ARI Range ERUs	**Calf:Cow**	**Cow**	**Bull**	**Total Elk**
Moose Creek	-7.0%			
Selway Headwaters		-11.9%		-11.5%
Running and Goat			-13.5%	
Meadow Creek	-9.0%			
Clear Creek		-18.1%		-17.5%
Pettibone and Bear			-15.1%	

White Cap Creek ERU appears to have the highest ARI for all elk classes except for bull, which is mid range (Table 4.41). Limited survey data may have influenced the very high calf:cow, cow, and total elk ARI in White Cap Creek ERU. Two sub-units were surveyed (flown) in 1995 and 1999 and another sub-unit was flown only in 1988. Idaho Department of Fish and Game winter surveys in 1999 noted that elk were using recently burned areas on the south face of White Cap Creek rather than on the warmer north face. The north face, where potential winter range is concentrated, is reportedly infested with spotted knapweed and very little grass forage remains (Pauley, 1999). Xeric habitats in White Cap Creek ERU are significantly beyond the expected fire return interval and winter use of the area may have significantly increased as a result of the recent burns.

Gedney and Three Links Creeks ERU has the second highest calf:cow ARI and has the third highest bull ARI. Glover Ridge bounds the ERU on the west and is known as the most important calving area in the greater Clearwater River basin. Extensive meadows with adjacent forest cover at low elevations provide high quality calving habitat. The cow ARI for Gedney and Three Links Creeks is in the low range. The high calf:cow ratio increase could be a reflection of the drop in cows. Gedney and Three Links fire return intervals in the xeric habitats are closer to historic than many other ERUs in the sub-basin. The Boyd-Glover NRA Trail # 703 on Glover Ridge is open to motorized vehicle access yearlong. Although currently the area is thought not to receive substantial use during calving season, the potential for increased activity is significant.

Lower Selway Canyon has the second highest cow and total elk ARI and is in the lower end of the high range for calf:cow and is mid range for bulls. It is the lowest elevation ERU with the least snowfall in the Selway canyon. Fire intervals in xeric habitats in this ERU are not as far beyond expected return as many other ERUs in the sub-basin. It is notable that most of the winter population occurs on the south side of the Selway, and not the north, which would be expected. The north side of the canyon is comprised of xeric winter range habitats while the south side is more mesic. Selway Road, open to motorized vehicles year long, is located on the north side and may be a factor influencing winter elk use on that side of the canyon. The dry, north side is also heavily infested with spotted knapweed and other noxious weeds that decrease grass forage and may also contribute to loss of winter range habitat there.

Moose Creek has the highest bull ARI of the 12 ERUs evaluated. The ARI for the other elk classes in Moose Creek are lower than the average for the wilderness ERUs. Although Moose Creek does not have extensive xeric, low elevation winter range, bulls typically winter higher in elevation than cows and immature elk, which may be reflected in the relatively high ARI. Another influential factor may be the 6-year absence of the outfitter operation that was permitted to hunt the largest outfitter area in the ERU.

Moose Creek has the second lowest calf:cow ARI. An important calving area occurs on East Moose Creek at Moose Creek Ranches. Until 6 years ago, an outfitter base camp was situated at the Ranches. Spring bear hunts coincide with elk calving in the area with unknown influences. Moose Creek is in the low range ARI for cows and total elk. Extensive unauthorized salting has probably influenced the distribution and vulnerability of elk in Moose Creek. Meadow habitats in Moose Creek are less well represented than historically, probably due to fire exclusion. Mesic meadows in East Moose, Rhoda, and North Moose Creeks areas are important for elk calving and summer range. The meadows are also valued for camping and pack stock grazing and the significance of potential impacts to elk is unknown.

Mountain lion and black bear populations were at high levels in the subbasins until 1997, when they began to decline (Nadeau, 1999). Although they are hunted in the subbasins, their influence on elk populations may have also contributed to population declines.

Middle Fork Clearwater ERU has a significant winter elk population and has the second highest bull ARI of the 12 important winter range ERUs. It is also in the high range ARI for cows and total elk and in the mid range for calf:cow. All elk classes except calf:cow have higher ARI than the average for the front country ERUs combined. Most of the elk in Middle Fork winter on national forest lands between Lowell and Little Smith Creek at Syringa. Fire return intervals are less inconsistent with historic intervals than in many other ERUs.

Meadow Creek ERU has the lowest calf:cow ARI of the 12 ERUs. Meadow Creek bull, cow, and total elk ARI are in the low end of the mid range for the ERUs. All elk classes in Meadow Creek have a significantly lower ARI than the average for the combined front country ERUs and for the combined wilderness ERUs. Potential factors influencing elk populations in Meadow Creek may be associated with disturbance from motorized use in calving areas and summer range in upper Meadow Creek and on winter range in lower Meadow Creek. Past high predator populations may also be important. The Selway wolf pack has hunted Meadow Creek since 1996. Beginning with one pair, the pack has since reproduced. Xeric habitats are rare in Meadow Creek and are somewhat beyond the expected fire return interval. Early seral forage has declined as tree canopy density has increased. Wintering elk also use the low elevation mesic habitats in Meadow Creek. These habitats are significantly beyond the expected fire return interval and important recently burned habitat is absent due to fire exclusion.

Clear Creek ERU has the lowest ARI for cows and total elk of the 12 ERUs evaluated (Table 4.41). All elk classes in Clear Creek have a significantly lower ARI than the average for the combined front country ERUs (Table 4.41). The Clear Creek bull ARI is in the high end of the low range for bulls. Most of the wintering elk in the Clear Creek ERU are found surprisingly high in elevation on national forest lands in Middle Fork Clear Creek and Solo Creek and in upper Clear Creek. This elk wintering area is an island of low open road density, which would not be an expected influence in winter. But the Clear Creek ERU does have some of the highest open road densities in the subbasins, which undoubtedly contribute to the low ARI. The high road density also influences elk summer range habitat effectiveness in Clear Creek, which is substantially below objective. The lower portion of the ERU is developed private and state land and has the highest road densities in the subbasins. Winter snowmobile recreation is common in Clear Creek. Extensive weed encroachment has also significantly impacted winter range. Recently burned habitat that is important for foraging is absent due to fire exclusion.

The Selway Headwaters ERU has the second lowest ARI for both cows and total elk. The calf:cow ARI is in the low range and bull ARI is in the low end of the high range. The ARI for all elk classes except bull is much lower than the average for the combined wilderness ERUs. This ERU is not characteristic of important winter range because of high elevation and marginal representation of xeric habitats. As the ARI indicates however, bulls fare better here and it is probably because they are known to winter at higher elevations than cows and immature elk classes. Xeric habitats in Selway Headwaters are somewhat beyond the expected fire return interval.

Pettibone and Bear Creeks ERU bull ARI is the lowest of the 12 ERUs and is significantly lower than the average bull ARI for the combined wilderness ERUs. Calf:cow, cow, and total elk classes are in the lower end of the high range ARI in the ERU. The ARI for these classes are higher than the average for the combined wilderness ERUs. Pettibone and Bear Creeks ERU is heavily hunted with reportedly high success rates, which may be the major influence on the dramatically low bull ARI compared to other elk classes. Indian Lake-Horsefly Meadows in the headwaters is an important elk calving area and summer range between winter ranges in East Moose and Pettibone Creeks. An outfitter camp occupies these meadows in summer and fall. Weed encroachment and reduction in early seral forage due to fire exclusion have influenced winter range availability in the ERU.

Running and Goat Creeks ERU has the second lowest bull ARI of the 12 ERUs and is much lower than the average bull ARI for the combined backcountry ERUs. Calf:cow, cow, and total elk classes are in the mid range ARI in Running and Goat Creeks ERU. The disparity in bull ARI may be due to hunting influence. Twenty-one percent of Running and Goat Creeks is xeric habitat characteristic of potential winter range. Xeric habitats in the ERU have very frequent fire regimes and are significantly beyond expected fire return intervals. Weed encroachment is also extensive. Mesic meadows in the uplands provide potential elk calving and summer range. Significance of the use of these meadows for camping and pack stock grazing is unknown.

MULE DEER *(Odocoileus hemionus)*

Status

Status Designation: Federal, not listed; State of Idaho, game species.

The mule deer is found throughout western North America in association with mountains and river breaks habitat.

Winter mule deer counts in the subbasins were conducted by the Idaho Fish and Game Department in 1995 and 1999 and reflect a stable population between the two years. The total population estimate in 1995 was 903 and the 1999 estimate was 902. Within individual ERUs, however, population levels did fluctuate between survey years. Fourteen of the 19 ERUs were surveyed including all wilderness ERUs and Meadow Creek ERU. Mule deer were counted in at least one year in all surveyed ERUs except Otter and Mink. Upper Selway Canyon ERU has the largest winter population, estimated at almost 560 deer in both 1995 and 1999. In Middle Selway Canyon ERU, with the second largest population, 129 deer were estimated in 1995 but only 73 deer were counted there in 1999. The Ditch Creek population declined from 64 deer in 1995 to 46 in 1999. Six other ERUs with smaller populations increased and populations in four ERUs declined between 1995 and 1999.

Ecology

Habitat use of mule deer varies regionally and also by season within a region. In most areas of its range, mule deer are seasonally migratory, moving from high elevations during summer and fall to lower elevations during winter and spring. Mule deer in the subbasins are primarily associated with xeric, steep and rocky shrublands on the Selway river breaks.

Mule deer also use ponderosa pine, Douglas-fir, larch, and subalpine fir forests. They prefer to bed in conifer cover during the day and feed in open shrub-grassland habitats during in the evening and at night. During summer and seasonal migrations, they may range into alpine areas. Mule deer avoid habitats occupied by white-tailed deer.

During winter and spring, mule deer are associated with south-facing slopes at low elevations. Food habits vary seasonally from grasses and forbs during spring and summer to shrubs during fall and winter (Mackie et al. 1982; Pac, 1976).

Mule deer home range size varies from 90 to 600 acres or more, depending on habitat quality. An Idaho study (Brown, 1992) found deer showed high fidelity to summer range, but less to winter range, as the Idaho Department of Fish and Game winter survey data suggest. While population size in the subbasins was stable between 1995 and 1999, population size within individual ERUs fluctuated.

Departures from Historic Conditions and Current Threats

Mule deer were much more plentiful than elk in the Selway country and numbered in the thousands as early as 1900 (Parsell, 1938 in McCulloch, 1953). Large mule deer herds migrated from winter range along the Selway River to summer range on the Montana side of the Bitterroots, and in the reverse direction every fall. Nez Perce Pass, the White Cap Creek-Rock Creek divide, and other locations along the Bitterroot divide were traditional deer migration routes. Although herds are smaller, these migrations reportedly still occur (Ormiston, 2000). Mule deer were also numerous along the Selway above Selway Falls in 1924 (Thomas, 1924 in McCulloch, 1953). Between 1927 and 1936, the mule deer population crashed due to apparent over-use of winter range. The elk population significantly increased after the mule deer decline.

Mule deer habitat availability is largely a reflection of natural disturbance dynamics, notably fire, in the subbasins. Much of the xeric winter range mule deer depend upon is significantly beyond expected fire return intervals. Fire maintains shrubs and early seral habitat that mule deer require for foraging. Fire invigorates shrubs and initiates resprouting, producing additional forage for mule deer. Upper Selway Canyon, the ERU preferred most by wintering mule deer, indicates the most departure from historic fire regimes.

Weed encroachment in xeric, winter range habitats has undoubtedly influenced the availability of native forage for mule deer. Aggressive species like spotted knapweed, sulfur cinquefoil, and cheat grass have invaded subbasin winter range. Yellow starthistle is common in the lower Middle Fork and Clear Creek ERUs and can be expected to advance into the Selway canyon winter range.

Wintering mule deer are vulnerable to the affects resulting from motorized vehicle access. Roads open to snowmobiles on winter range in the lower Selway include Selway Road 223, Fog Mountain Road 319, Indian Hill Road 9720, and Falls Point Road 443. In the upper Selway, Deep Creek Road 468 and Paradise Road 6223 are open to snowmobiles on winter range. These routes are groomed with the exception of Selway Road, Fog Mountain Road, and Indian Hill Road. Use varies on the ungroomed roads depending on snow conditions.

Most hunters prefer to hunt mature bucks, which are therefore more vulnerable to mortality during hunting season than other classes of mule deer. Lack of mature bucks in a herd may disrupt breeding seasons, conception dates, and fawn survival. Younger bucks may breed later over a longer time period in the fall than mature bucks. This results in longer fawning seasons with many fawns born late in the season. Late born fawns spend less time feeding on high quality forage and may enter winter in poorer condition than fawns born earlier.

MESIC HABITATS AND ASSOCIATED SPECIES

Mesic habitats are the most common habitat aggregation and represent 74 percent of the subbasin habitats (Maps 50 and 52). They are less common in the upper Selway and lower Middle Fork Clearwater and lower Clear Creek areas. Key habitat features in the mesic aggregation include riparian zones and streams, mesic shrublands and meadows, and mesic old growth, including western red cedar.

Mesic habitats include habitat type groups (HTGs) 3 to 9. Habitat type groups 3 and 4 are characterized by moderately cool and xeric grand fir and moderately warm and moist grand fir habitats. Species characteristic of this habitat include grand fir, Douglas-fir, lodgepole pine, Engelmann spruce and occasionally ponderosa pine and western larch. Understories range from beargrass and huckleberry to more diverse shrub and forb understories. These HTGs are found at mid elevations on ridges or rolling hills in the south and east parts of the subbasins and on north slopes and lower slopes in areas that are too xeric for western red cedar.

Habitat type groups 5 and 6 consist of moderately cool and moist and moderately cool and wet western red cedar types. In addition to western red cedar, these habitats support grand fir, Douglas-fir and secondarily, western white pine, ponderosa pine, and western larch. Understories range from diverse shrub to fern and herb understories. These HTGs occur in the west part of the subbasins on lower slopes and north aspects and the wet habitats are generally limited to riparian areas along streams and moist lower slopes in the western part of the subbasins.

Habitat type groups 7, 8, and 9 are characterized by cool and moist, cool and wet, and cool and moderately dry subalpine fir habitats. They are dominated by stands of subalpine fir, Engelmann spruce, and lodgepole pine with western larch, whitebark pine, and Douglas-fir less common. The cool and moist subalpine fir is common at upper elevations on north aspects and moist lower slopes. The cool and wet subalpine fir is uncommon and occurs at upper elevations in riparian areas. Cool and moderately dry subalpine fir is very common at upper elevations on ridges and southerly aspects. The following table describes the elements of the mesic habitat aggregation.

Table 4.43: Mesic Habitat Aggregations

Mesic Habitats				
Structure	Early Seral	Mid-seral	Late Seral	Old Growth
Potential Vegetation	HTG 3-9	HTG 3-9	HTG 3-9	HTG 3-9
Size Class	Herbaceous, shrub, seedling, sapling, pole	9-21 in. dbh	$\geq$ 21 in. dbh and not old tree	Old tree

dbh=diameter at breast height

Current Departures from Historic Conditions

Fire exclusion has reduced early seral habitat conditions. Climax meadow and early seral habitats at both low and higher elevations, once maintained by fire, have decreased, resulting in reduced forage for ungulates. Shrublands have also declined. Mesic old growth has been fragmented by timber harvest in the subbasins but is generally better represented across the subbasins than in presettlement times as a result of fire suppression. Patch size diversity has sharply declined and canopy densities have changed in some cases. Timber harvest units have been left with little standing and down dead wood habitat components. Recently burned habitats that provide unique elements like insect infestations, standing and down dead wood components, and early seral forage are absent due to fire exclusion.

Representative Species Associated with Mesic Habitats:

- Carnivores: Gray wolf, lynx, fisher
- Forest birds: Great gray owl, goshawk, brown creeper, black-backed woodpecker
- Riparian birds: Bald eagle, harlequin duck
- Amphibians: Coeur d'Alene salamander, Pacific Giant salamander, tailed frog
- Reptiles: Ring-necked snake
- Ungulates: Shira's moose

GRAY WOLF *(Canis lupus)*

Status

Status Designation: Federal, endangered, experimental-nonessential (U. S. Fish and Wildlife Service) and management indicator species, Nez Perce National Forest (USFS); State of Idaho, not listed.

All wolves in central Idaho are classified as "endangered-experimental-nonessential" under provision 10j of the Endangered Species Act. The gray wolf is designated as a management indicator species on the Nez Perce National Forest.

Wolves were respected and frequent subjects of Nez Perce legends but early settlers viewed them, as do many people today, as competition for game and threats to livestock. Gray wolves historically occurred in the subbasins and throughout Idaho but were largely eliminated through shooting and trapping from all of north-central Idaho by the 1930's (Hansen 1986). Their current range south of Canada includes northwestern Montana, central and northern Idaho, northeastern Minnesota, northern Wisconsin, Michigan's Upper Peninsula, and the Cascade Mountains of Washington near the Canadian border. Since reintroduction was initiated in Idaho in 1995, individual, introduced wolves have been radio tracked to eastern Oregon as well.

By the late 1980s, wolves were moving southward as populations expanded in Canada and they subsequently inhabited northern Montana. Many wolf track reports, sightings, and howling reports throughout the subbasins were documented in the late 1980s and early 1990s following the expansion of the Canadian wolf populations and subsequent occupation of northern Montana.

In 1995 and 1996, the U. S. Fish and Wildlife Service introduced gray wolves into north-central Idaho along the Middle Fork Salmon River in the adjacent Frank Church River of No Return Wilderness Area. As a result, all wolves in central Idaho were classified as "experimental-nonessential" under provision 10j of the Endangered Species Act.

Wolves are successfully reproducing in central Idaho today. Since the reintroduction, there have been several documented sightings of collared wolves in the subbasins during aerial tracking surveys. At least two packs have established in the subbasins.

The subbasins lie within the Central Idaho Wolf Recovery Area established by the USFWS Northern Rocky Mountain Wolf Recovery Plan (1987). Kaminski and Hansen (1984) identified the

Selway-Bitterroot Wilderness Area as one of five areas that is key to the conservation of wolves on the Nez Perce National Forest. Ungulate winter range along the Selway River is believed to be the most important habitat component available to wolves in the Wilderness. East Fork Moose Creek, a tributary of the Selway River, is known as a historically important wolf travel corridor between the Selway and the Bitterroots.

Ecology

Although gray wolves depend on xeric winter range habitat for prey in winter, they are habitat generalists and use mesic habitats extensively.

Key components of wolf habitat include sufficient year round prey, suitable and somewhat secluded areas for raising pups, and sufficient space with minimal exposure to humans (Kaminski and Hansen, 1984).

Wolf homesites include both denning and rendezvous sites. Den sites are typically located on moderately steep, well-drained southerly aspects with a view of surrounding terrain within 400 yards of water. Wolves may dig out or visit whelping dens weeks before the birth of pups. In the Northern Rockies an average of six to seven wolf pups are born between late April and early May. Some dens or denning areas may receive traditional use by a wolf pack over time. Most wolves appear particularly sensitive to human activity near den sites and may abandon them if disturbed.

Rendezvous sites are specific resting and gathering areas occupied by wolf packs during summer and early fall after the whelping den has been abandoned. They are characterized by matted vegetation in a meadow, a system of well-used trails through the adjacent forest and across the meadow, and resting beds adjacent to trees. A wolf pack will usually move from the whelping den, or occasionally a second den, to the first rendezvous site when the pups are six to 10 weeks of age in late May to early June.

The first rendezvous site is often within one to six miles of the whelping den. A succession of rendezvous sites is used by the pack until the pups are mature enough to travel with the adults in September to early October. Rendezvous sites, especially the first one, may receive traditional use by wolf packs. It is at the initial rendezvous site that wolves appear most sensitive to prolonged or substantial human disturbances.

Wolves prey selectively upon the newborn and young of moose, elk, and deer in calving and fawning areas during May and June. Although the actual locations of such areas may vary from year to year, depending on weather and snow conditions, many receive traditional use by ungulates. Ungulates comprise more than 90 percent of wolves' diets during summer and fall in the Rocky Mountains. Mule and white-tailed deer, elk, and moose are the principal prey species. During winter, wolves in the Rockies prey almost exclusively upon deer, elk, and moose. Winter range is typically the limiting factor for ungulate populations according to the Northern Rocky Mountain Wolf Recovery Plan (USFWS, 1987).

The subbasins are primarily wilderness and provide large expanses with relatively little human disturbance. Available prey species include deer, elk, moose, bighorn sheep, and mountain goat. The wide valley bottom of East Moose Creek and numerous mesic meadows provide favored wolf travel ways and denning and rendezvous sites (U. S. Fish and Wildlife Service, 1994).

Departures from Historic Conditions and Current Threats

Threats to wolves in the subbasins include reduced habitat security and increased mortality risks related to roads, trails, and human intrusion into habitats.

Activities near active dens or rendezvous areas are considered potentially most able to affect reproducing wolves. Wolves often favor mesic meadows for homesites. These meadows are also valued for campsites and pack stock grazing in the subbasins.

In the North Fork of the Flathead River drainage, at least 13 of 14 known mortalities were human-caused (Pletscher et al., 1991). An examination of percent mortality by region in Minnesota showed an inverse relationship between human density, road density, and viable wolf populations (Thiel, 1985). Wolves may be intentionally shot or mistakenly shot when confused with coyotes, which can be killed legally.

Timber harvest, fire suppression, weed encroachment, livestock grazing, recreation, motorized use, and other human activities can reduce the quality and availability of suitable habitats for wolves and their prey. Fire exclusion has reduced early seral ungulate prey habitat conditions that were historically maintained by varying fire intensities and intervals. Climax meadow and early seral habitats at both low and higher elevations, once maintained by fire, have decreased, resulting in reduced forage for elk, deer, and other ungulate prey.

CANADA LYNX *(Lynx canadensis)*

Status

Status Designation: Federal, threatened (U. S. Fish and Wildlife Service); State of Idaho, species of special concern.

Lynx range throughout Alaska and Canada, south through the Rocky Mountains, northern Great Lakes, and northern New England. The range of the lynx in the western United States has diminished over the last century, suggesting that lynx may be negatively impacted by development. Because suitable habitats are more fragmented and restricted in extent in the western mountains, lynx may be less tolerant of human activities here than in Canada and Alaska, where refuge habitats are more prevalent. Providing protected areas within optimal lynx habitat in the western mountains may be important for the persistence of lynx populations (Ruggiero, et al. 1994).

Review of historic and current records indicate that lynx sightings are rare but do infrequently occur on the Nez Perce National Forest and in the Selway and Middle Fork subbasins. In 1998, a Forest Service trail crew foreman observed a lynx at Magruder Guard Station in the Selway Headwaters ERU. An unconfirmed lynx sighting was reported in late January 1993, near Lowell, Idaho within the assessment area. In recent years, winter lion hunters have reported lynx tracks in the adjacent Lochsa River canyon (Gilmore, 1999). A lynx sighting near Mount Idaho in the neighboring South Fork Clearwater canyon was reported in August 2000. Another lynx was reported in the Salmon River canyon near Slate Creek in 1998 (Anglen, 1998). In two other separate incidents, lynx were observed in the Salmon River canyon in 1987 (High,1987).

Historic records indicate lynx were trapped and killed for many years within the Moose Creek Ranger District in the Selway-Bitterroot Wilderness. Lynx may have been numerous in Lynx Creek at some point in time. But the only documented count, found in *Moose Creek Ranger District Historical Information Inventory and Review, Nez Perce National Forest* (USFS, 1988), estimates 30 lynx in Moose Creek in 1946.

Ecology

Lynx typically occupy habitats in Idaho occurring at elevations above 4,000 feet. However, lynx observations occur at lower elevations on the Nez Perce National Forest (High, 1987). In northwestern Montana, most relocation for two radio-collared lynx were in young, dense, lodgepole pine. Ninety percent were in stands generated by the 1910 fires, and the rest were in mature Douglas-fir and western larch riparian stringers within the burn (Koehler et al., 1979). Xeric sites where lodgepole pine was dominant contained 88 percent of the locations in the 1910 burn. The other three locations were in mesic sites dominated by subalpine fir and Engelmann spruce.

Lynx utilize Engelmann spruce, subalpine fir, or lodgepole pine habitats that provide a mosaic of forest age classes. They require early successional habitats for foraging and forested habitats for security, cover, and denning. Lynx require cover for stalking and security, and usually do not cross openings wider than 300 feet (Koehler and Brittell, 1990). Early successional habitats or forest age classes of approximately six years or older, occurring in at least 20 to 25 acre patches provide optimum lynx foraging habitat. Foraging habitat can best be evaluated by assessing snowshoe hare habitat. Koehler (1990) found that lynx prey almost exclusively on snowshoe hares.

Snowshoe hares have a home range of 20 to 25 acres and require both forage and thermal cover. The limiting habitat factors for snowshoe hares are winter forage including willows, birch, and conifers and thermal cover. Snowshoe hare thermal and security cover is characterized by conifer stands with greater than 3,000 stems per acre and tree heights of six feet or greater (Koehler and Brittell, 1990). In northwestern Montana, snowshoe hares were most abundant in densely stocked stands of lodgepole pine less than 80 years old (Koehler et al., 1979). To avoid predators and extreme cold, snowshoe hares may select thermal and security cover over foraging habitats (Monthey, 1986).

Lynx are physiologically adapted to disperse their weight on wide paws enabling them to travel on the surface of deep snow, as do snowshoe hares, their primary prey. Because of this adaptation, other predators that compete with them for food are normally isolated from lynx winter habitat.

Lynx denning habitat can be characterized as mature forests with mesic habitat associations on north and northeast aspects. Denning sites require a high density of logs on the ground; the logs need to be one to four feet above the ground (Koehler, 1990). Down logs and stumps are important for denning habitat because they provide cover for kittens. Denning stands are between one and five acres, and are connected by travel corridors through mature forest also provide access to prey habitat.

Potential lynx denning habitat is abundant in mesic habitats in the upper elevations of the subbasins. Lynx are strongly associated with lodgepole pine habitats and the best representation occurs in upper Meadow Creek. The best potential habitat is where patches of old growth lodgepole denning structures are adjacent to early and mid-seral foraging habitat.

Lynx require forested cover to provide security and facilitate hunting success. Lynx usually will not cross openings greater than 300 feet (Koehler and Brittell, 1990). Sufficient cover is provided in stands with 180 trees per acre with a minimum tree height of 6 feet (Koehler, 1990). Favored travel routes are forested areas along ridges and saddles.

When prey is scarce, lynx home range size increases and individuals may become nomadic. The home range of males is larger than that of females. In the western U. S., home range size is usually between nine to 18 square miles. Population density is usually less than 10 lynx per 39 square miles, depending on prey availability. Individuals are usually solitary.

Departures from Historic Conditions and Current Threats

Timber harvest may diminish denning habitat and travel routes along forested ridges and saddles. Timber harvest has fragmented potential lynx denning habitat in the Middle Fork Clearwater, Clear Creek, and O'Hara and Goddard ERUs. Currently, old growth and early seral structures are under-represented and mid-seral structure is more extensive compared to historic conditions as a result of timber harvest and fire exclusion.

Salvage logging and woodcutting in blowdown areas in potential lynx denning habitat directly impacts denning habitat, which requires large diameter, jackstrawed deadfall. Thinning may impact foraging habitat or future denning habitat.

Roads may increase the vulnerability of lynx to hunters and trappers (Bailey et al., 1986; Todd, 1985). Snowmobile travel routes that access high elevations may provide access to lynx habitat to competing predators who follow these snow-compacted routes.

Lynx may be intentionally shot or mistakenly shot when confused with bobcats, which can be killed legally. Lynx have also been trapped in bobcat traps.

Use of explosives for trail construction near den sites may be detrimental to denning lynx.

FISHER (*Martes pennant*)

Status

Status Designation: Federal, candidate (C2) species (U. S. Fish and Wildlife Service) and sensitive species/management indicator species in the Nez Perce National Forest (USFS); State of Idaho, species of special concern and protected nongame species.

The fisher is a Forest Service Northern Region sensitive species and also listed as management indicator species by USFS, as candidate (C2) by USFWS, and a protected nongame species in Idaho. The fisher occurs throughout much of Canada, south through the Rocky Mountains, in the northern Great Lakes Region, and New England.

Fisher populations declined significantly in the early 1900s. The decline is largely attributed to habitat loss through settlement and logging, over-trapping, and predator poisoning, and the extensive fires that burned in north-central Idaho between 1910 and 1934 (Jones, 1991). Fishers were extirpated from Idaho but were successfully reintroduced to three north-central Idaho sites in 1962 and 1963. Western populations remain at low levels.

Several fisher observations are documented in the subbasins. Two reports of fishers on East Moose Creek in August 1992, and fisher tracks observed on snow, also on East Moose Creek, in January 1993, are documented. Three reports of fishers on the north side of the Middle Fork Clearwater River between 1998 and 2000 are also recorded. A fisher family is commonly seen crossing Highway 12 to access the Middle Fork Clearwater River. Fisher tracks on snow were observed in the uplands of the O’Hara and Goddard ERU in 1994 and 1999 (High, 2000).

Ecology

In the west, fishers are usually found in coniferous forests including diverse habitat types and successional stages. Fishers are closely associated with forested riparian areas they use for foraging, resting, and travel. Although fishers use a variety of successional stages, most investigators have identified a preference for mature-old-growth forests. Avoidance of openings may be somewhat dependent on season and available cover. Clearings may be used if continuous shrub cover is available. Most studies suggest that fishers are tolerant of moderate levels of human activity, but populations may be indirectly affected by removal or fragmentation of habitat and increased trapping accessibility.

In a study conducted on the Nez Perce National Forest in the Elk City area, most fisher observations were in mesic grand fir habitat types (Jones, 1991). Grand fir and Engelmann spruce dominated stands the fishers used in summer. Similarly, in winter fishers used grand fir, Engelmann spruce, and lodgepole pine dominated stands. Summer habitat had a relatively high component of moderate to large diameter Engelmann spruce, large diameter Douglas-fir, and pacific yew. Fishers avoided stands with a strong lodgepole or ponderosa pine component. Winter habitat included stands with a relatively high basal area in Douglas-fir and lodgepole pine.

The study area had only a small representation of western red cedar habitats that occur extensively in the lower Selway and Middle Fork subbasins. In the Cabinet Mountains of northwestern Montana, where cedar habitats are more strongly represented, fishers preferred cedar-hemlock and mixed conifer stands (Roy, 1991 and Heinemeyer, 1993).

The physical structure of the forest and the prey associated with forest structures may be the critical features that explain fisher habitat use rather than specific forest types. Structure includes vertical and horizontal complexity created by a diversity of tree sizes and shapes, light gaps, dead and down wood, and layers of overhead cover (Powell et al. in Ruggiero, 1994).

In the Montana study area, fishers also showed preference for low-elevation, low-gradient, north-facing areas near water. Areas greater than ¾ mile from water were avoided. Fishers also avoided high elevations from 3,900 to 5,200 feet and areas of heavy and frequent snowfall; they selected lower elevations from 2,000 to 3,300 feet. Fishers selected areas near perennial streams, rivers, marshes, and lakes. Sixty-five percent of fisher locations were within 656 feet of water, and fishers selected areas greater than ¼ mile from perennial streams.

In Elk City, Idaho, home ranges contained 53 percent mature-old-growth stands on average. In summer, 90 percent of observations were in mature-old growth forest. In winter, 54 percent were in mature-old-growth and 46 percent in young forest (Jones and Garton, 1994). Mature-old growth stands were used extensively for resting, while hunting occurred in a range of successional stages. For resting, fishers preferred stands with canopy cover greater than 60 percent and for hunting they preferred canopy cover greater than 80 percent.

In Idaho, fishers strongly selected wetland forest types, with selection for forested riparian habitats evident at several scales in summer and winter (Jones, 1991). In summer, 50 percent and 75 percent of observations were within 49 and 75 feet of water. Moving across landscapes, fishers commonly used forested riparian areas, where preferred resting habitat and prey may be more available than in surrounding habitats.

Potential fisher habitat is abundant in the subbasins in mesic upland old growth and along low elevation riparian areas associated with old and late forest.

The Elk City study found fisher home ranges to be between 2.3 to 46 square miles. Generally, ranges of adults of the same sex do not overlap. In a Maine study, males moved extensively in late winter and early spring and their ranges shifted between years, while home ranges of females were stable between seasons and years.

Fishers are active both day and night. They are primarily nocturnal in summer and diurnal in winter. When inactive, fishers occupy dens in tree hollows, under logs, in the ground or rocky crevices, and in warmer months, they rest in branches of conifer trees.

In the Elk City study, ungulate carrion, mice and voles, snowshoe hare, plant material, and beaver, in order of significance, were the most common food items in fisher diets.

Most of the known natal and maternal den sites have been discovered in eastern North America. The vast majority of these were located high in living or dead trees. All natal and maternal dens in the west were found in large diameter logs or snags (Powell et al. in Ruggiero, 1994).

Departures from Historic Conditions and Current Threats

Timber harvest and wood cutting activities may remove fisher resting and denning sites in live trees, snags, and downed logs. Logging during denning periods could cause direct mortality if dens are destroyed. Although fragmentation of late successional forests is detrimental to fisher conservation, fisher did evolve with forest openings resulting from fire and windthrow. Fisher habitat is diminished when timber harvest removes overstory canopy from areas larger and more extensive than fire and windthrow would (Powell et al. in Ruggiero, 1994).

Potential fisher habitat in the Middle Fork Clearwater, Clear Creek, and O’Hara and Goddard ERUs has been fragmented by timber harvest. Currently, old growth is under-represented and mid-seral structure foraging habitat is more extensive compared to historic conditions as a result of timber harvest and fire exclusion.

High road densities may increase fishers’ vulnerability to trapping. Although fishers are legally protected in the state of Idaho, they are easily trapped in bobcat, fox, and coyote traps. Trapping mortality is disproportionately higher for males than for females and inadequate numbers of males negatively influence reproductive rates. Low reproductive rates and low-density populations will recover slowly and make small or isolated populations vulnerable to extirpation.

Roads that intercept fishers traveling from upland habitat to riparian areas can be detrimental. Fishers have been observed to abort their Highway 12 crossing attempts to reach the river when vehicles approach. Forest roads that may present barriers to movement to and from riparian habitat are located in the Deep Creek, Upper Selway Canyon, and Clear Creek ERUs.

Fire exclusion detrimentally influences the maintenance of the mosaic of forest habitat that fishers depend on.

NORTHERN GOSHAWK *(Accipiter gentilis)*

Status

Status Designation: Federal, candidate (C2) species (U. S. Fish and Wildlife Service) and sensitive species and management indicator species in the Nez Perce National Forest (USFS); State of Idaho, species of special concern.

The Northern goshawk, federally designated as a candidate species by the U. S. Fish and Wildlife Service, is currently under consideration for listing as threatened or endangered. It is classified as a sensitive species in the Forest Service Northern Region and as a protected species of special concern in the state of Idaho.

Goshawks breed from western and central Alaska, east to northeastern Manitoba, Labrador, and Newfoundland, and south to central California, southeastern Arizona, the eastern foothills of the Rocky Mountains, southern Manitoba, New England, and the Appalachians. Goshawks breed locally in Mexico and winter throughout the breeding range and irregularly south to northern Mexico. Locally, some goshawks from high elevations in montane areas descend to lower elevations into woodlands, riparian areas, and shrublands during winter (Patla et al., 1995).

The casual observer does not often encounter the goshawk, as it occurs at fairly low densities in areas remote from human habitation. Eleven sightings within the subbasins were reported between 1992 and 1998. Two separate sightings were reported in the Upper Selway Canyon ERU at Gardiner Lookout in 1992 and 1993. Two occupied nest observations occurred in the Meadow Creek ERU in 1992. In 1993, a goshawk was reported in the North Selway Face ERU. A goshawk sighting was reported in the Clear Creek ERU in 1993. Two reports of an occupied goshawk nest sighting occurred in the Middle Fork ERU in 1992. These two observations could have been the same nest. Two additional goshawk sightings were reported in the Middle Fork ERU in 1992. Another goshawk sighting in the Middle Fork ERU occurred in 1997. This observation may have been associated with the earlier reports due to proximity of the earlier sightings.

Ecology

General Habitat: Northern goshawks are most commonly found in dense, mature and old-growth stands (Reynolds et al. 1982, Crocker-Bedford and Chaney 1986, McCarthy et al. 1987, Hayward and Escano 1989, Whitford 1991). In northwestern Montana, northern goshawks typically nested in mature and overmature forest with a closed canopy of 75 to 85 percent on moderate slopes of 15 to 35 percent with northerly aspects (Hayward and Escano 1989). Nest sites were often located on lower slope positions, and in one of the older stands in an area. Both water and a large opening were usually within 1/3 mile of nests. The location of mature forest stands near natural openings and riparian areas may be important for foraging goshawks to utilize habitat with high prey densities (Hargis et al., 1994 in Patla et al., 1995).

Potential goshawk habitat in mesic forest is abundant in the subbasins. However, current mesic, old structure in the Middle Fork Clearwater, Clear Creek, and O'Hara and Goddard ERUs has been fragmented by timber harvest. Currently, old growth is under-represented and mid-seral structure foraging habitat is more extensive compared to historic conditions as a result of timber harvest and fire exclusion. A large patch of potential contiguous goshawk habitat occurs on the north face of the Middle Fork Clearwater River in Bridge Creek. In other wilderness ERUs, including Pettibone and Bear, Running and Goat, Moose Creek, Marten, Otter and Mink, Gedney and Three Links, and roadless Meadow Creek, potential goshawk habitat is plentiful in large, contiguous patches.

Use of stands for nesting in the upper Columbia River basin appears to be associated with the structural characteristics of stands rather than particular species composition. The majority of nesting territories in the upper Columbia River basin were found at elevations ranging from 4,000 to 8,000 feet (Patla et al., 1995).

Home Range: Little information is available on goshawk home range size and composition, but the few existing studies indicate goshawks range over large areas, from 1,988 to 9,638 acres, and use a variety of habitats outside the nesting area.

Nesting Habitat: Goshawk territories typically contain a number of alternate nests, from two to nine, that may be clumped in adjacent stands or in widely scattered stands. Goshawks have been found to use the same nesting areas for decades, but often change nest locations in consecutive years. Goshawks may use alternate nest sites as a mechanism to avoid consistent predation by avian and mammalian predators. In northern California, stand clusters less than 49 acres had occupancy rates less than 20 percent, while stand clusters greater than 151 acres had occupancy rates of nearly 100 percent (Patla et al., 1995).

In Glacier National Park, a goshawk nest was located in the spruce-fir zone at 4,500 feet (Parratt, 1959). Whitford (1991) examined 12 nests in the Lewis and Clark National Forest in Montana. All nests were on north aspects and mean canopy closure was 72 percent. Mean live tree diameter was 29 inches and mean live tree age was approximately 200 years.

In northeastern Oregon, Reynolds et al. (1982) studied goshawk habitat. Goshawks there were found to nest on gentle slopes with northwest to northeast aspects in dense, mature conifer stands. Goshawks located a majority of nests in old-growth stands, and used mixed conifer, fir, and pine cover types. Canopy closure averaged 60 percent. About two-thirds of the nests were less than 1/3 mile from water, but based on the locations of the remaining nests, water does not appear to be a requirement. In general, shaded, mild environments and protected sites were used. Moore and Henny (1983) also examined goshawk nest sites in northeastern Oregon. Stands of larger conifers with a mean diameter of 21 inches and with relatively low understory crown volume were used. Douglas-fir and western larch were preferred nest trees, and a majority of nests were located on north or flat aspects.

In northern Arizona, Crocker-Bedford and Chaney (1986) found that dense stands provided better goshawk habitat. Good nest stands had at least 79 percent canopy cover, while marginal stands had at least 60 percent canopy cover. The vast majority of the canopy came from trees greater than 10 inches diameter, and nest stands had much higher densities of large trees than typical stands within the study area. Ponderosa pine stands were more likely to be on north aspects than mixed conifer stands. Crocker-Bedford and Chaney (1986) speculated that dense canopies in mixed conifer stands might be enough to provide a cool microclimate.

Departures from Historic Conditions and Current Threats

Removal of nest trees or reduction in stem density and canopy volume through timber harvest threatens goshawk's nesting habitat. Structure, age, and patch size of the remaining forest habitat may be factors in determining whether goshawks continue to use modified nesting territories over time. Reduction of tree density and canopy cover along streams in forest habitat can destroy nesting areas and reduce or eliminate foraging potential. Timber harvest may reduce habitat for goshawk prey and influence numbers of breeding goshawks and their productivity. Timber harvest and firewood cutting can remove dead, dying, deformed, and diseased trees that are important to goshawk nesting and prey habitat.

Habitat fragmentation may influence migration corridors and dispersal movements of goshawks. Insufficient information about important wintering habitats is available to understand potential impacts.

Opening the structure in nesting habitat may increase predation of goshawks and especially their nestlings by great-horned owls. The creation of more open habitat may lead to replacement of nesting goshawks by red-tailed hawks and great horned owls. Great gray owls also use goshawk's alternate nests.

Fire exclusion can result in vegetation structural changes that lead to reductions in goshawk nesting habitat, prey numbers, and foraging opportunities. Agency ignited fire in spring may impact nesting goshawks. Livestock grazing may alter the structure and composition of cover on the forest floor and in openings resulting in alteration of goshawk prey species' habitat.

Most states issue about 10 to 12 permits a year to falconers for takes at the nest. State wildlife agencies in the west indicated in a survey that use is minimal and is not adversely affecting goshawk numbers. Agency personnel are concerned about lack of data for illegal takes, although they do not view it as a significant problem.

GREAT GRAY OWL (*Strix nebulosa*)

Status

Status Designation: Federal, candidate (C2) species (U. S. Fish and Wildlife Service); State of Idaho, species of special concern.

The great gray owl primarily occurs in dense, northern boreal forests but also finds suitable coniferous habitat south into the northern Rocky and Sierra Mountains and along some central Asiatic mountain chains.

Observations of great gray owls in the subbasins are rare. A researcher living at Running Creek Ranch in the upper Selway canyon between 1988 and 1995 reported resident great gray owls were rarely seen, even in typical habitat, within 25 miles of the ranch, the area surveyed during his stay. In the Middle Fork Clearwater River ERU, a resident reports that a great gray owl population lives on his land and he commonly observes individuals.

Ecology

Great gray owls are associated with mesic, old tree environments. Potential great gray owl habitat in mesic forest types is abundant in the subbasins. However, current mesic, old structure in the Middle Fork Clearwater River, Clear Creek, and O'Hara and Goddard ERUs has been fragmented by timber harvest. Currently, old growth is under-represented and mid-seral structure foraging habitat is more extensive compared to historic conditions as a result of timber harvest and fire exclusion. A large patch of potential contiguous habitat occurs on the north side of the Middle Fork Clearwater River in Bridge Creek. In other wilderness ERUs, including Pettibone and Bear, Running and Goat, Moose Creek, Marten, Otter and Mink, Gedney and Three Links, and roadless Meadow Creek, potential habitat is plentiful in large, contiguous patches.

Few studies addressing the ecology of the great gray owl in the west are available. The study that was conducted in habitats that most closely approximate subbasin environments occurred in northeastern Oregon on the Wallowa Whitman National Forest (Bull and Henjum, 1990). Forests within the study area were entirely coniferous and contained ponderosa pine, Douglas-fir, grand fir, western larch, and lodgepole pine.

Nesting: Great gray owls regularly nested in close proximity to other great gray owls. Great gray owls do not construct their own nests and rely on existing platforms built by goshawks and occasionally red-tailed hawks. Great gray owls also frequently used natural platforms formed by dwarf mistletoe brooms. Fifty-one percent of the nests were stick platforms made by other hawks, 29 percent were artificially constructed wooden platforms, and 20 percent were natural depressions on broken-topped dead trees.

Most stick nests were in large diameter western larch and most nests on broken-topped trees were in large diameter ponderosa pine. Nests monitored in the study were often used more than once. Fifty percent of the nests were found in Douglas-fir-grand fir forest types, 29 percent in lodgepole pine-western larch, 15 percent in ponderosa pine-Douglas-fir, and 7 percent in ponderosa pine. Seventy-four percent of the nests occurred in stands with trees greater than 19.3 inches diameter, 26 percent occurred in stands with trees 11.8 to 19.3 inches diameter, and none occurred in stands of trees less than 11.8 inches diameter.

Sixty to 80 percent of the stands in each study area had been logged but seventy-two percent of the nests were in unlogged stands. Nineteen percent of the nests were in stands with partial removal of the overstory, and 9 percent were within 656 feet of a clearcut. Forty-seven of the 49 nest sites had two or more canopy layers with a canopy closure exceeding 60 percent at most nest sites. Sixty-nine percent of the nests occurred on gentle slopes, 22 percent on flat ground, and 9 percent in draws. Most nests occurred on north slopes.

Broken-topped dead trees, dead branches in large diameter trees, and leaning trees with bark are preferred perch sites near the nest for females and juveniles that leave the nest to defecate and regurgitate pellets.

Forage: The diet of great gray owls primarily consists of small mammals. Foraging habitat is usually characterized by forested stands with an open understory where owls can fly more freely in search of prey. Most of the male owls observed preferred to forage in stands with 11 to 59 percent canopy closure and avoided stands with at least 60 percent canopy closure. Edge habitat was also used, dependent on prey availability. The owls hunted from perches averaging 18 feet above the ground. Prey capture sites were primarily grass dominated. Downed wood was within about 3 feet of the point of capture at most of the sites, presumably providing cover for small mammal prey.

Range: The maximum distance adults traveled from nest sites averaged 8.3 miles and home range size averaged 26 square miles. Distance traveled in winter appears to be related to snow depth. Great gray owls plunge for their prey under snow and are more successful foraging in shallower snow depths. An adult female and a juvenile owl, in different winters, followed logging operations as they moved to different stands. Tree falling and soil disturbance may have displaced many small mammals and made them easy prey.

Departures from Historic Conditions and Current Threats

Timber harvest and firewood cutting have the greatest potential impacts to great gray owl populations. Timber removal and fire wood cutting typically reduce live, diseased, and dead large-diameter trees used for nesting, leaning trees used by juveniles for roosting before they can fly, and dense canopy closures in stands used by juveniles for cover and protection. Structure, age, and patch size of remaining forest habitat may be factors in determining whether great gray owls continue to use modified nesting territories over time. Habitat fragmentation may influence migration and dispersal movements of great gray owls. If perching structures and vegetative and dead wood cover are eliminated in clearcuts, they are rendered unsuitable for foraging.

Opening nesting habitat structure may increase predation on great gray owl eggs and nestlings by ravens and by other raptors. Ravens have been observed monitoring nests and eating eggs of great gray owls.

Livestock grazing may alter the structure and composition of cover on the forest floor and in openings resulting in alteration of great gray owl prey species' habitat.

Fire exclusion can result in vegetation structural changes that lead to reductions in great gray owl nesting habitat, prey numbers, and foraging opportunities. Agency ignited fire in spring may impact nesting great gray owls.

Pocket gophers comprise about a third of the great gray owl diet. Strychnine poisoning of gophers may be potentially harmful to great gray owls, either directly from secondary poisoning or indirectly from loss of prey.

BROWN CREEPER *(Certhia americana)*

Status

Status Designation: Federal, not listed; State of Idaho, protected nongame species.

The brown creeper is primarily found in the western portion of the Forest Service Northern Region in northern Idaho and western, and northwestern Montana. It has no special designation by the Forest Service Northern Region or the Nez Perce National Forest.

Brown creepers breed across portions of Alaska and Canada, south to southern California, the mountains of middle America, west Texas, and portions of the midwestern and eastern United States. It winters throughout the breeding range, except for higher latitudes and elevations, south to Gulf Coast.

The brown creeper was selected as a representative species for mesic habitats in the subbasins because it is strongly associated with old cedar forests that are fairly abundant in the subbasins. Few other species are known to be as strongly associated with the old cedar forest type.

A researcher living at Running Creek Ranch in the upper Selway canyon between 1988 and 1995 reported resident brown creepers were common in typical habitat within 25 miles of the ranch, the area he surveyed during his stay. The only documentation of brown creepers in the subbasins outside wilderness occurred in the Meadow Creek ERU during a landbird monitoring survey in June 1996. Two brown creepers were recorded. Transects in O'Hara and Goddard and Lower Selway Canyon ERUs were also surveyed with no recorded occurrences of brown creepers.

Ecology

The brown creeper is found in forests, woodlands, and swamps. During winter and in migration, it is also found in scrub and parks. Preliminary results of a northern Idaho study indicated the brown creeper was more abundant in continuous old growth than in fragmented or selectively harvested stands.

The brown creeper eats primarily insects and other invertebrates and some nuts and seeds. It forages on the bark of tree trunks and branches. Brown creepers usually nest under bark in trees and sometimes also will nest in cavities. When pursued, the brown creeper spreads its wings and remains motionless on the trunk of a tree (Hejl, S.J. and L.C. Paige, 1993).

Clutch size varies from four to eight eggs, but is commonly five to six eggs. Incubation lasts 14 to 15 days and both parents tend the young that leave the nest at 13 to16 days.

The brown creeper is strongly associated with old cedar-hemlock forests. They have also been detected in lodgepole pine, spruce-fir, mixed conifer, ponderosa pine, and to a minor extent, in Douglas-fir cover types (Hutto, 1995).

Departures from Historic Conditions and Current Threats

Very little information addressing the ecology of the brown creeper was found for this evaluation. Most of the information presented here regarding threats and conservation measures is speculative and based on needs of other species in similar habitats.

Timber harvest probably has the greatest potential impact on brown creeper populations. Timber removal typically reduces dense canopy closures and live, diseased, and dead large-diameter trees used for nesting and foraging. Structure, age, and patch size of the remaining forest habitat may be factors in determining whether brown creepers continue to use modified habitats over time. Fragmentation of contiguous old growth is potentially deleterious to brown creeper populations that are found to occur more frequently in contiguous old growth.

Fire exclusion can result in vegetation structural changes that lead to reductions in brown creeper habitat. Agency ignited fire in spring may impact nesting brown creepers.

BLACK-BACKED WOODPECKER *(Picoides arcticus)*

Status

Status Designation: Federal, candidate (C2) species (U. S. Fish and Wildlife Service) and sensitive species in Northern Region, USFS; State of Idaho, species of special concern and protected nongame species.

The black-backed woodpecker is a resident from western and central Alaska to northern Saskatchewan and central Labrador, and south to southeastern British Columbia, central California, northwestern Wyoming, portions of Great Plains states and Prairie Provinces, and northern New England. This species wanders irregularly south in winter. Black-backed woodpeckers have been documented in the subbasins in the upper Selway in recently burned habitats.

Ecology

The black-backed woodpecker is found in primarily spruce-fir coniferous forests, especially in windfalls and burned areas with standing dead trees. It is found less frequently in mixed forests, and rarely in deciduous woodlands in winter.

Black-backed woodpeckers primarily forage on wood-boring insects, but will also eat spiders, fruits, nuts, and some cambium.

Black-backed woodpeckers excavate new cavities in decaying trees or standing snags each year. Populations can be irruptive in recent burns. Few nests have been located in Idaho. In Oregon, home range size varied from 173 to 845 acres, and there was no intraspecific overlap.

Preferred Montana nest sites and foraging areas are in recently burned areas; use declines within 3 years post-burn (Harris, 1982). In central Oregon, the black-backed woodpeckers used beetle-infested, mature and old-growth mixed forests and lodgepole pine and they avoided logged and young stands (Goggans et al., 1989). Nest tree diameters averaged 9 inches, most in larch in Montana (Harris 1982) and 8.3 inches in a variety of species in Oregon (Bull et al., 1986). Most nests were in trees dead less than 5 years (Bull et al., 1986). Nests were located in dense stands, averaging 117 trees for every 2.5 acres (Harris 1982). In western Montana, larch was a preferred foraging species (Harris 1982). In Oregon, roost sites were in lodgepole pine, in cankers, scars, mistletoe clumps, or directly on the trunk (Goggans et al., 1989).

Departures from Historic Conditions and Current Threats

Threats to black-backed woodpeckers in the subbasins include fire exclusion, salvage of dead trees, and firewood cutting. Historic status of black-backed woodpecker populations in the subbasins is unknown. However, historic habitat has been diminished.

BALD EAGLE *(Haliaeetus leucocephalus)*

Status

Status Designation: Federal, threatened species (U. S. Fish and Wildlife Service) and management indicator species Forest Service Northern Region (USFS); State of Idaho, species of special concern.

The bald eagle breeds from central Alaska, east to northern Saskatchewan, Labrador, and Newfoundland, and south, locally, to northern Mexico, New Mexico, Arizona, Texas Gulf Coast, and Florida. It is a very local breeder in interior North America. Bald eagles generally winter throughout the breeding range except in the far north. They primarily occur near seacoasts, rivers, reservoirs and lakes.

Bald eagles were federally classified as endangered in 1973, but were reclassified to threatened in 1995. The Nez Perce National Forest has designated the bald eagle as a management indicator species. The subbasins are within Bald Eagle Recovery Zone 15, designated by USFWS, which encompasses all of central Idaho. Recovery goals for Zone 15 are to provide secure habitat for at least six bald eagle nesting territories, with long-term occupation of at least four breeding pairs. This goal has been exceeded every year since 1990. From 1979 to 1995, Idaho's nesting bald eagle population increased from 11 to 77 occupied territories. In 1995, 51 pairs from occupied territories successfully fledged an average of 1.2 young per pair.

An annual survey for wintering bald eagles is conducted along the lower Selway River and the Middle Fork Clearwater River in conjunction with the Idaho midwinter bald eagle count and wintering populations appear to be stable.

Ecology

No existing or historic bald eagle nesting activity has been documented in the subbasins, but a nest was discovered within the last two years in the North Fork of the adjacent Clearwater River. Bald eagles are winter residents on the Selway River and the adjacent Middle Fork Clearwater River from October through April. Peak numbers occur between November and February. Bald eagles typically move from the Selway River to the open reaches of the Middle Fork Clearwater River from December to March. The relocation is most likely due to the availability of prey or carrion. Wintering bald eagles also occur in the upper Selway and their movement patterns are unknown. Selection of wintering habitat by bald eagles is determined by availability of prey and carrion, potential for human disturbance, and availability of suitable perching and roosting sites.

Nesting: Bald eagles build stick nests in forks of tall trees, or occasionally on cliffs. In winter, adults often roost communally at night in trees used in successive years. In winter in some areas, adults preferentially roost in conifers, or other sheltered sites, and may associate with waterfowl concentrations, or congregate in areas with abundant dead fish or ungulate carrion.

In selecting nesting habitat, bald eagles usually prefer late-successional forests in close proximity to water and with relative isolation from human disturbance (MBEWG, 1991). In northwestern Montana, all nest sites were within one mile of a lake or reservoir larger than 39.5 acres or a stream greater than fourth order in size (Wright and Escano, 1986), denoting the importance of proximity to an adequate prey base.

Nesting stands and nest trees are selected based on structure. Multi-layered mature to old-growth forests are strongly preferred. Often, more than one nest site is available within selected stands. Nest trees are typically mature or overmature with open crowns and sturdy limbs, and occupy dominant positions within stands. Ponderosa pine, Douglas-fir, and cottonwood trees are most frequently selected in western Montana, probably because their typical growth forms are able to support large nests (MBEWG, 1991). Nest position in relation to associated water bodies is an important factor. In western Montana, all nests were within topographic line-of-sight of water; all were less than 450 feet in elevation above the associated water body; in 90 percent of cases, nests were less than .38 miles in distance from the associated water body (R1 protocols).

Forage: Rivers and open upland areas provide foraging habitat for bald eagles in the subbasins. Perch sites are an important attribute of foraging habitat (Fielder and Starkey, 1986). Proximity to potential prey, isolation from disturbance, good visibility of the surrounding landscape, and accessibility for landing and departure are critical components of preferred perches (Stalmaster, 1987).

Prominent, large trees in close proximity to winter foraging areas characterize perch sites. Roost sites often are wind-sheltered, dominant trees in the Selway River canyon bottom. Bald eagles inhabit areas adjacent to and within close proximity to water sources providing an abundance of prey species, such as waterfowl, anadromous fish, and ungulates on winter ranges, which provide a source of carrion.

Home Range: Home ranges of bald eagles nesting along Cascade Reservoir in west-central Idaho have ranged from 6 to 23 square miles during breeding season, and ranges have typically been half that size at other times.

Departures from Historic Conditions and Current Threats

Bald eagle habitat quality in the subbasins has likely declined in the last century. Before 1911, bald eagles wintering along the Selway River fed on chinook salmon as well as ungulate carrion. Availability of ungulate carrion peaked in the late 1950s, as local elk herds increased (Leege, 1984). In more recent decades, ungulate carrion has likely declined, along with elk and deer numbers, due to increased access, more lenient hunting seasons, increased hunter pressures, and fire suppression resulting in prolonging late successional plant communities (Leege, 1984).

Removal of campground hazard trees and snags along the river's edge can impact bald eagles by reducing preferred available perch sites. Activities such as timber harvest, fire suppression, grazing, and public uses that may impact the productivity or availability of winter ranges by native ungulates, also may indirectly impact bald eagles by reducing carrion food sources. Application of rodent control pesticides can potentially lead to inadvertent poisoning of eagles that prey on rodents.

Reduced habitat security and increased human induced disturbance and mortality risks related to logging activities during winter seasons have also impacted eagles and their habitats. Degradation of aquatic ecosystems affecting fish prey also contribute to bald eagle impacts.

Forest Service authorized helicopter flights, blasting, and other loud noise associated with trail maintenance, within the Selway River canyon during eagle occupancy, can displace or disrupt the feeding, roosting or perching of wintering eagles.

Human disturbance can impact bald eagles during both the nesting and wintering seasons. Eagles may react to people walking, bicycling, driving vehicles or snowmobiles, boaters stopping near nests or passing near feeding sites, use of explosives, shooting, tree harvesting operations, or operation of loud equipment. These activities can disrupt breeding and feeding activities, force eagles to desert a nesting territory, or displace eagles to less desirable habitats. The effects depend on the timing, intensity, and frequency of the disturbance, and the sensitivity of the individual eagles.

Wintering bald eagles may be unduly stressed by human activities if their feeding or normal social behavior is disrupted. Eagles on the ground, whether feeding or standing, are more sensitive to disturbances, and eagles will fly greater distances when flushed from river bars or banks than when flushed from trees.

Generally, eagles are most sensitive to disturbances coming from water rather than land, and disturbances in the open rather than those screened by vegetation. According to the Montana Bald Eagle Working Group, some birds become habituated to human activities while others never do (Paige, 1991). Highway 12, Selway River Road, and Paradise Road are adjacent to rivers where bald eagles winter. Some eagles appear to be habituated to traffic, but significance of potential changes in heart rate and other influences are unknown.

HARLEQUIN DUCK (*Histrionicus histrionicus*)

Status

Status Designation: Federal, candidate (C2) species (U. S. Fish and Wildlife Service) and sensitive species Forest Service Northern, Rocky Mountain, and Pacific Regions (USFS) and the Bureau of Land Management in Idaho and Montana; State of Idaho, species of special concern.

The harlequin duck is designated a species of special concern in Idaho, Montana, and Wyoming. The Northern, Rocky Mountain, and Pacific Regions of the U. S. Forest Service, the Bureau of Land Management in Idaho and Montana, and the state of Oregon classify it as a sensitive species. In Washington, it is designated a priority habitat species. Harlequin ducks are also classified as migratory waterfowl and managed under general waterfowl or sea duck regulations by USFWS (Cassirer et al., 1997).

Harlequin ducks winter in coastal areas and migrate inland to breed along mountain streams. It is the only duck in the northern hemisphere to breed almost exclusively along swiftly flowing mountain streams. Harlequins that breed in the subbasins are within the northern Columbia River basin subprovince of the Pacific population, which includes Idaho north of the Salmon River and northwestern Montana. Harlequins in the Pacific population primarily winter in coastal areas of Alaska, British Columbia, Washington, Oregon, and northern California.

The entire Idaho population is less than 100 birds on about 30 streams in northern Idaho. Eighty-nine percent of known and probable breeding occurrences and 93 percent of known and probable breeding streams in Idaho are on lands managed by the Forest Service.

The draft *Harlequin Duck Habitat Assessment and Conservation Strategy*, (Cassirer et al., 1996) prepared for the Forest Service and the Bureau of Land Management lists the Selway River as a known harlequin duck breeding stream and Bear Creek as a stream with documented sightings but with unknown breeding status. Moose Creek, White Cap Creek, and Meadow Creek are subbasin streams listed as being potential harlequin duck breeding streams because of suitable habitat. In 1989, harlequins on the Selway River and a pair in Bear Creek were reported. Harlequins also occur in the adjacent Lochsa River, a tributary of the Middle Fork Clearwater River, and in the South Fork of the Clearwater River.

Ecology

Harlequin ducks migrate from the coast to breeding areas in Idaho in March, April, and May and return to the coast from June through September. Some Idaho birds migrate to the San Juan Islands in Washington in winter. Migration routes are thought to follow stream corridors. Harlequins have been observed in the subbasins on the Selway River en route to spring breeding sites.

Harlequin ducks in Idaho are strongly associated with swiftly flowing water, and streams with a cobble to boulder substrate that are structurally controlled by bank morphology, specifically reticulate canyons. Stream channels range from braided to straight with an abundance of riffle and rapid habitats in second to fifth order streams. Some use of mountain lakes and lake outlets has been documented in the Canadian Rocky Mountains. Forest overstory is old growth to mature western red cedar, western hemlock or Engelmann spruce-subalpine fir. Most sites have rocks or logs in the stream that can be used by harlequins for loafing sites. Woody debris is often present in the stream. In Idaho, harlequins have been observed at elevations between 2,000 and 4,000 feet. Most sites used by harlequins are over 164 feet from roads with no maintained access or are accessible only by trail or boat.

Nesting and Rearing: Harlequins do not breed until their second year. They maintain a multi year pair bond and pairs exhibit a strong fidelity to breeding streams. Egg laying and incubation generally occur between mid May and the third week in July. Drakes return to the coast when incubation is initiated. Hatching begins in mid June and some broods fledge by the end of August while others remain unable to fly until the end of September. In one study, up to 40 percent of hens abandoned their broods before fledging. Hens return to the coast in August or September and ducklings return in the summer and fall after fledging.

Harlequin duck nests are well hidden, usually located on the ground on islands, stream banks in shrubby vegetation, in cliff cavities, and in tree cavities. Clutch size averages 5.7 eggs. Survival rates to fledging range from 18 to 83 percent. Duckling mortality is associated with high water flows, mammalian and avian predation, and possibly adverse weather and human disturbance.

Brood rearing habitat is in part characterized by vegetative overhang and more instream woody debris. Both of these components, as well as undercut stream banks provide hiding cover and protection from predators. Streams with higher pair densities were smaller, had more woody debris, vegetative overhang and bank undercut, and tended to have more areas with slower flow. Streams with higher pair density also were less accessible by people and had a higher percentage of old growth as opposed to mature overstory.

Forage: Harlequin ducks primarily feed on benthic macroinvertebrates and the distribution of this food source probably is closely associated with harlequin breeding and brood rearing habitat. Stream insect larvae are the primary food on breeding streams, although harlequins will also feed on roe when available.

Departures from Historic Conditions and Current Threats

Stream bank and channel alteration may reduce the quality of harlequin duck habitat by eliminating or reducing food supply. Activities that should be assessed for impacts to riparian habitats include stream channelization, damming, livestock grazing, shrub removal, timber harvest, gravel extraction, logjam removal, dredging, bank rip-rapping, and road construction.

Sedimentation in stream habitat resulting from timber harvest, road and trail construction, livestock grazing, and mining may reduce the density of harlequin macroinvertebrate food supply and reduce the harlequin's ability to find prey. Dewatering feeding and brood rearing areas during the breeding period will render them unavailable to harlequin ducks with potential impacts to productivity.

Harlequin ducks can be displaced by instream river use, particularly on narrow streams. Instream recreational activities like boating and angling may be more disruptive when occurring during the pre-nesting and early brood rearing season from May through July, than when occurring later in the breeding cycle from August through September. Large-scale rafting operations in the breeding period may cause chronic disturbance in heavily used river stretches.

Human activities along the banks, including hiking, angling, and camping, may also displace ducks and indirectly impact reproduction. Adult harlequins are relatively tolerant of low levels of disturbance. Areas chronically disturbed are eventually abandoned. Harlequins sometimes flush in response to approaching boats, depending on the size of the craft, width of the stream, and water levels. All streams in the subbasins where harlequin ducks have been observed and where potential habitat is thought to exist are in wilderness. Potential threats there are primarily related to blasting, boating, angling, campsites, and pack stock grazing. Boaters use the Selway River in great numbers beginning in April and throughout harlequin breeding and brooding periods.

Meadow Creek, designated roadless, is thought to have potential habitat for harlequins: associated threats may include motorized vehicle use on trails and timber harvest. Boating also occurs in Meadow Creek in the spring in high water during harlequin breeding and brooding periods. Boating in the relatively small stream channel would pose a greater threat to harlequin ducks than in larger, less confined streams.

Agency prescribed spring burning in Meadow Creek may disrupt potential breeding harlequins in breeding streams.

Other potential threats to harlequin ducks are associated with their coastal wintering habitat and include logging, marine oil spills, shoreline development, aquaculture, algae harvesting, and hunting.

COEUR D'ALENE SALAMANDER *(Plethedon idahoensi)*

Status

Status Designation: Federal, candidate (C2) species (U. S. Fish and Wildlife Service) and sensitive species Forest Service Northern Regions (USFS) and Bureau of Land Management in Idaho (BLM); State of Idaho, species of special concern.

The Coeur d' Alene salamander is designated a sensitive species by the Forest Service Northern Region and the Bureau of Land Management in Idaho. It is designated a state species of special concern in Idaho and Montana because it is a regional endemic, known only from northern Idaho, northwestern Montana, and southern British Columbia, and because of its specific habitat association with seeps, streams, and waterfalls.

The Coeur d' Alene salamander is one of only four salamander species known to occur in Idaho and Montana, and is the only lungless salamander known from the northern Rocky Mountains. Eighty-five percent of the sites of occurrence for Coeur d' Alene salamanders in the U. S. have been documented in northern Idaho. The Selway River drainage bounds the southern limit of its known range in Idaho.

Fourteen Coeur d' Alene salamander sites are documented along the lower Selway River. Most of these were discovered during surveys between 1986 and 1990. Two were found within the last three years. Few of the earlier recorded sites have since been monitored. Other potential habitat occurs within the subbasins and includes the Moose Creek and Pettibone and Bear Creek ERUs.

Ecology

Coeur d'Alene salamanders, like all plethodontid salamanders, are lungless and respire through their moist skin. They lose water to the environment through evaporation and are therefore restricted to cool, damp environments. They spend most of their life underground and are usually only above ground at night during moist weather in the spring and fall, and sometimes in summer with favorable moisture conditions. They may spend up to 7 months of the year underground in cool, moist interstitial spaces between rocks to avoid desiccation in summer and freezing in winter.

Coeur d' Alene salamanders have been found in three major types of habitats: springs or seeps, waterfall spray zones, and edges of streams. Most known locations are associated with seeps, probably because of the relative ease of surveying roadside seeps. Streams and waterfalls are often less accessible, especially at night when surveys are conducted.

Coeur d' Alene salamander sites usually are associated with coniferous forest but are not restricted to a specific overstory species or aspect. They have been found in areas with overstories of ponderosa pine, Douglas-fir, western larch, western red cedar, and western hemlock at all aspects. Forest cover may be more important at stream sites than at seep sites as average canopy cover at known stream sites was significantly greater than at seep locations. Average slope at sites was steep at 62 percent with elevations between 1,600 and 5,000 feet.

A Coeur d' Alene salamander population discovered along the lower Selway River in 1998 was on a steep, south facing, rocky slope devoid of tree cover but was associated with seeps. Many of the individuals were found under fallen rock at the bottom of the slope in the road ditch where water had accumulated.

Known populations occur with sharply fractured rock formations used for underground refugia and in conjunction with both persistent and intermittent surface water. Suitable habitat may occur in rocky areas far from free water and it is possible to locate salamanders at a wet site in the spring, yet be unable to find any individuals at the same site later in the summer when the site is dry on the surface.

Departures from Historic Conditions and Current Threats

Coeur d' Alene salamanders exist as small, isolated populations with low reproductive rates that are vulnerable to extinction from catastrophic events like fire and floods, and from loss of genetic diversity that could restrict the species' ability to respond to changing environmental conditions. These factors may have significant implications for long-term viability of the species.

There is rising global concern about declining amphibian populations. Amphibians are sensitive bioindicators of environmental change because of their highly permeable skin, trophic positions, and occurrence in fragmented but interconnected populations. The status of salamander populations is one indicator of the overall health of an ecosystem.

Logging, prescribed burns, or road and trail construction near salamander sites in fall and early spring may disturb aboveground breeding activities. Blasting and rock quarrying or removal associated with road, trail, and campsite construction projects could directly kill salamanders and potentially eliminate subterranean habitat. Application of road dust abatement chemicals and herbicides used for weed control could directly impact salamanders as well through contamination of water. Motor vehicle traffic may kill salamanders foraging at roadside seeps (Cassirer et al. 1995).

Alteration of watershed functions may modify or eliminate suitable Coeur d' Alene salamander habitat. Diversion, damming, hydropower development, timber harvest, road construction, and livestock grazing activities should be considered for potential impacts to watershed functions and water and surface temperatures in Coeur d' Alene salamander habitat.

Potential water quality impacts are significant to Coeur d' Alene salamanders and are associated with sedimentation from timber harvest, road and trail construction, livestock grazing, and other soil disturbing activities. Sedimentation can fill interstitial habitat in and adjacent to streams and diminish habitat for Coeur d' Alene salamanders and aquatic insects, their primary food source. Chemical water contamination may occur as a result of herbicide use for weed control, road dust abatement application, fire retardant, and fuel spills or other contaminants.

Fragmentation of forested habitat through timber harvest could reduce or eliminate movement of salamanders between sites and increase fragmentation of populations with potential for localized extinctions.

Introduced, exotic species such as bullfrogs and non-native fish may prey on salamanders, compete for food, and introduce disease.

PACIFIC GIANT SALAMANDER *(Dicamptodon ensatus)*

Status

Status Designation: Federal, candidate (C2) species (U. S. Fish and Wildlife Service); State of Idaho, unprotected nongame species.

The Pacific giant salamander is the world's largest terrestrial salamander and can grow to 13 inches in length. This species is most abundant on the Pacific coast and is disjunct in Idaho and parts of Montana. In Idaho, these salamanders are restricted to the north-central forested areas.

Two Pacific giants were observed in Elbow Creek in the Moose Creek ERU and one dead individual was found in East Fork Moose Creek in 1992. Another Pacific giant was documented in White Cap Creek, also in 1992. All four observations were in wilderness. Other observations in the last 5 years were made in Hamby Creek and O'Hara Creek in the O'Hara and Goddard ERU and in Horse Creek in the Meadow Creek ERU. These more recent observations occurred in the front country.

Ecology

Pacific giant salamanders are generally found in moist coniferous forests in elevations from sea level to 7,100 feet. The transformed adults are secretive and seldom found in the open, but can be found in moist forested areas under logs, rocks, and bark, and near mountain streams or on rocky shores of mountain lakes. Adults feed on terrestrial invertebrates, small snakes, shrews, mice, other salamanders, and sometimes birds. They have been in trees at heights up to 6.5 feet. Adults need a water source for reproduction; often this is the headwaters of a mountain stream, a spring, or mountain lake.

Pacific giant salamander larvae are more frequently encountered than adults and may be locally common. They are usually found under rocks in mountain streams, but are also found in mountain lakes and ponds. The larvae are adapted to living in streams and have short, small gills. Larvae feed on a wide variety of aquatic invertebrates as well as some small vertebrates, including fish, tadpoles, or other larval salamanders. (Nussbaum et al., 1983)

Departures from Historic Conditions and Current Threats

Threats to Pacific giant salamanders are associated with degradation of water quality in reproduction sites and disturbance of adjacent forested areas where metamorphosed terrestrial forms live. Removal or disturbance of rocks, logs, soil, and litter in both the terrestrial and aquatic sites the species inhabits would also be detrimental.

Pacific giant salamanders have low reproductive rates and are more vulnerable to extinction from catastrophic events like fire and floods, and from loss of genetic diversity that could restrict the species' ability to respond to changing environmental conditions. These factors may have significant implications for long-term viability of the species.

Global concern about declining amphibian populations is rising. Amphibians are sensitive bioindicators of environmental change because of their highly permeable skin, trophic positions, and occurrence in fragmented but interconnected populations. The status of salamander populations is one indicator of the overall health of an ecosystem.

Logging, prescribed burns, or road and trail construction near salamander sites in fall and early spring may disturb aboveground breeding activities.

Potential water quality impacts are significant to Pacific giant salamanders and are associated with sedimentation from timber harvest, road and trail construction, livestock grazing, and other soil disturbing activities. Sedimentation can diminish habitat for Pacific giant salamanders and other species they feed on. Chemical water contamination may occur as a result of herbicide use for weed control, road dust abatement application, fire retardant, and fuel spills or other contaminants.

Fragmentation of forested habitat through timber harvest could reduce or eliminate movement of salamanders between sites and increase fragmentation of populations with potential for localized extinctions.

Introduced, exotic species such as bullfrogs and non-native fish may prey on salamanders, compete for food, and introduce disease.

TAILED FROG (*Ascaphus truei*)

Status

Status Designation: Federal, candidate (C2) species (U. S. Fish and Wildlife Service); State of Idaho, not listed.

The tailed frog is endemic to the Pacific Northwest and is found in central and north-central Idaho, western Montana, and northwestern California. The tailed frog is the only northwest species of frogs and toads that is highly specialized for life in cold, clear, mountain streams.

Tailed frogs were documented in the wilderness in 1992 in the Moose Creek ERU; they were found in Monument, Elbow, Trout, and East Moose Creeks. Observations of tailed frogs were recorded from the west fork of Wahoo Creek and Pettibone Creek in Pettibone and Bear ERU in 1992 and 1994. In 1992, a tailed frog was observed in Barefoot Creek in White Cap ERU. A population of tailed frogs occurs in a small, deep, and fishless lake in Moose Creek ERU and is the only tailed frog population known to occur in a subbasin lake.

Ecology

Tailed frogs are found from sea level to over 6,600 feet in elevation, in clear, cold, swift-moving, perennial mountain streams or under streamside debris. They may be found on land during wet weather, near water in humid forests, or in more open habitat. In dry weather they stay on moist streambanks. The adults can forage up to 82 feet from the stream in wet conditions, although this generally occurs at night. Adults feed on a wide variety of insects and other invertebrates.

Tailed frogs are small and usually grow to around 2 inches in length. Adult tailed frogs may not breed until 7 to 8 years of age, or 6 to 8 years after metamorphosis. Tailed frog tadpoles have a unique sucker-like mouth that enables them to adhere to rocks and maintain their position in swift currents. Tadpoles feed primarily on diatoms they scrape off rock surfaces. Substantial amounts of conifer pollen have also been found in the guts of tadpoles (Nussbaum et al., 1983)

Departures from Historic Conditions and Current Threats

Threats to tailed frogs are associated with degradation of water quality in reproduction sites and disturbance of adjacent forested areas where metamorphosed terrestrial forms live. Tailed frogs have been found to disappear from streams within logged areas. Removal or disturbance of rocks, logs, soil, and litter in both the terrestrial and aquatic sites the species inhabits would also be detrimental.

Tailed frogs have low reproductive rates and are more vulnerable to extinction from catastrophic events like fire and floods and from loss of genetic diversity that could restrict the species' ability to respond to changing environmental conditions. These factors may have significant implications for long-term viability of the species.

Global concern is rising about declining amphibian populations. Amphibians are sensitive bioindicators of environmental change because of their highly permeable skin, trophic positions, and occurrence in fragmented but interconnected populations. The status of amphibian populations is one indicator of the overall health of an ecosystem.

Logging, prescribed burns, or road and trail construction near salamander sites in fall and early spring may disturb aboveground breeding activities. Potential water quality impacts are significant to tailed frogs and are associated with sedimentation from timber harvest, road and trail construction, livestock grazing, and other soil disturbing activities. Sedimentation can diminish habitat for tailed frogs and other species they feed on. Chemical water contamination may occur as a result of herbicide use for weed control, road dust abatement application, fire retardant, and fuel spills or other contaminants.

Fragmentation of forested habitat through timber harvest could reduce or eliminate movement of salamanders between sites and increase fragmentation of populations with potential for localized extinctions.

Introduced, exotic species such as bullfrogs and non-native fish may prey on salamanders, compete for food, and introduce disease. For example, a population of tailed frogs occurs in a small, deep, and fishless lake in the Moose Creek ERU; it is the only tailed frog population known to occur in a subbasin lake. Introduction of fish to the lake would threaten the tailed frog population. It is unknown whether other artificially stocked lakes in the subbasins may have sustained tailed frog populations prior to fish introduction.

RING-NECKED SNAKE (*Diadophis punctatus*)

Status

Status Designation: Federal, candidate (C2) species (U. S. Fish and Wildlife Service); State of Idaho, unprotected nongame species of special concern.

Distribution of ring-necked snakes is spotty in the western United States, extending from the Pacific to the Atlantic coast, and from Nova Scotia, Minnesota, Colorado, Idaho, and Washington, south across the U. S. to the Florida Keys and northern Baja California. The Oregon, Washington, and northwestern Idaho subspecies inhabiting the subbasins is *Diadophis punctatus occidentalis*.

In Idaho, ring-necked snakes are found in coastal disjunct areas over much of the state but few records of occurrence exist. In the subbasins, the ring-necked is occasionally found along the Middle Fork Clearwater River and the lower Selway River. The ring-necked is thought to be venomous but not dangerous to humans.

Ecology

Ring-necked snakes are most commonly found in forested areas, but they also occur in open, grassy, or shrubby areas and in relatively open, rocky canyons. They are found under rocks and rotting logs or other debris, and in talus. Ring-necked snakes feed primarily on salamanders and lizards but may also eat insects, frogs, earthworms, and smaller snakes.

Ring-necked snakes are inactive in winter in most areas and communal nesting is common. In Idaho, they probably leave the den in March to May and return in September or October. They are nocturnal and hide underground, in logs, or under surface cover during the day. A Kansas study estimated population density at 283 to 729 per acre and distances between recaptures averaged 262 feet. Home ranges had a maximum dimension of about 459 feet (Nussbaum et al., 1983).

Departures from Historic Conditions and Current Threats

Threats to ring-necked snakes are associated with removal or disturbance of logs, rocks, talus, and litter in the terrestrial sites the species inhabits.

Ring-necked snakes have low reproductive rates and are more vulnerable to impacts from catastrophic events like fire and floods and from loss of genetic diversity that could restrict the species' ability to respond to changing environmental conditions. These factors may have significant implications for long-term viability of the species.

Logging, prescribed burns, road and trail construction, and herbicide use within or near ring-necked sites may impact reproduction activities.

Fragmentation of forested habitat through timber harvest could influence movement of ring-necked snakes between sites and increase fragmentation of populations.

SHIRA'S MOOSE *(Alces alces shiras)*

Status

Status Designation: Federal, management indicator species, Nez Perce National Forest, Forest Service Northern Region (USFS); State of Idaho, hunted species.

Shira's moose is a hunted species in Idaho and is designated a management indicator species on the Nez Perce National Forest. The range of Shira's moose extends from Alaska and Canada, south through the Rocky Mountains, the northern Great Lakes, and northern New England.

Although infrequently seen, moose are widespread in the subbasins. Abundant suitable habitat occurs in the more mesic ERUs including Moose Creek, Pettibone and Bear, Gedney and Three Links, Meadow Creek, O'Hara and Goddard, and upper Clear Creek. Moose also frequent the lower Selway River canyon.

Ecology

Shira's moose prefer mosaics of second-growth forests, openings, lakes, and wetlands. In Idaho, moose prefer shrubby, mixed coniferous and deciduous forests with nearby lakes, marshes and bogs. Moose require water bodies for foraging. They avoid hot summer conditions by utilizing dense shade or bodies of water. Moose also use even-aged pole timber and open areas in summer. Moose favor flat ground and rolling slopes and avoid steep slopes.

In the subbasins, old-growth grand fir-Pacific yew stands are critical winter habitat. Grand fir-Pacific yew habitats occur in the headwaters of the South Fork of Clear Creek and the headwaters of the West Fork of O'Hara Creek, although they have been fragmented by timber harvest. Grand fir-Pacific yew stands also occur across the uplands of the west face of Meadow Creek.

A northwestern Montana study found about 50 percent of fall, winter, and spring moose locations were in old growth. Logged areas were used more in early winter, while dense timber, often in draws and stream bottoms, received more use in mid to late winter. Streamside complexes of willow bottoms and conifers are an important component of winter range (Smith, 1962; Peek, 1974), and proximity to water is notable year-round.

Year-round, moose chose clearcuts and other logged areas of less than 30 acres, and 15 to 30 years old. Although use of unlogged sites was less than expected based on availability, moose were found in these areas more than 50 percent of the time.

Significant increase in the use of stream bottoms and draws in May through October is notable. Stream bottoms, draws, and swamps within stands of mature timber with good canopy closure provide hiding and thermal cover, and are heavily used for summer feeding. These areas, in conjunction with aquatic feeding sites and calving sites, have been identified as key habitat components in the Yaak ecosystem in Montana.

Good calving sites provide dense hiding cover and proximity to water and forage and are usually in mature to old-growth stands greater than 150 acres. Cows with calves have been found to use older, wetter, more thickly vegetated sites than cows without calves.

Moose have been known to strongly select habitats with abundant forage except in hot summer conditions or periods of deep snow, when they retreat to forest stands providing a thermal umbrella. In summer, moose browse on new growth of trees and shrubs and on aquatic vegetation. In winter, conifer and hardwood twigs from menziesia, yew, alder, maple, and willow are the most important food sources.

Moose are active day or night, but are primarily crepuscular. Depending on habitat, a home range may reach several thousand acres. An Idaho study found cow moose to range from 6 to 10 square miles and bulls from 12 to 20 square miles in summer. Winter home range was 5 to 6 square miles. Population densities have been reported from three to five moose per square mile. Moose sometimes herd in winter and snow accumulation may affect populations more than predation. Favorable conditions for moose may produce large annual increases in population size of 20 to 25 percent that can lead to habitat degradation and a subsequent population crash.

Departures from Historic Conditions and Current Threats

Moose habitat availability is largely a reflection of natural disturbance dynamics, notably fire, in the subbasins. Much of the mesic habitat moose depend on is significantly beyond expected fire return intervals. Fire maintains mosaics of early seral structure and old growth that moose require for year-round habitat. Fire invigorates shrubs and initiates resprouting, producing additional forage for moose.

Mature bull moose are preferred by most hunters and are therefore more vulnerable to mortality during hunting season than other classes of moose. Lack of mature bulls in a herd can disrupt breeding seasons, conception dates, and calf survival. Younger bulls may breed later over a longer time period in the fall than mature bulls. This could result in longer calving seasons with many calves born late. Late born calves may spend less time feeding on high quality forage and enter winter in poorer condition

Bull moose are particularly vulnerable to open roads in hunting season. On national forest lands in the subbasins, the highest open road density is 4 to 5 miles per square mile and occurs in upper Clear Creek and extends into lower Clear Creek on private land. The high density area in upper Clear Creek also connects with national forest lands west of Pine Knob that have an open road density of 2 to 3 miles per square mile and adjacent densities up to 2 miles per square mile. Open road densities of 2 to 3 miles per square mile also occur on national forest between Smith Creek and Pete King Creek on the north face of the Middle Fork Clearwater, and west of the mouth of Meadow Creek in association with Slim's Camp Road and Falls Point Road.

Motorized access closures are frequently breached and resources for monitoring and enforcement are inadequate. Access violations increase actual open road density and moose vulnerability. Motorized vehicle use of trail access also occurs throughout the non-wilderness portion of the subbasins. Meadow Creek ERU is considered primarily roadless, but 14 out of 22 trails are open to motorized use.

Wintering moose are also vulnerable to effects from motorized vehicle access. Roads open to snowmobiles in moose winter range occur in all the front country ERUs and in Upper Selway Canyon and Deep Creek ERUs in the wilderness portion of the subbasins. Road 464 is a groomed snowmobile trail on the Selway American River divide; it accesses grand fir-Pacific yew habitat in the West Fork of O'Hara Creek. Although fragmented from timber harvest, the limited grand fir-Pacific yew communities provide critical winter moose habitat.

Climax meadows associated with lakes and other water sources provide important moose habitat. Lake habitats are most represented in White Cap, Pettibone and Bear, Moose Creek, and Gedney and Three Links ERUs. Significant meadow complexes occur in upper Meadow Creek, North Moose, Rhoda Creek, and Goat Creek. These meadows are also valued for campsites and pack stock grazing that can displace moose and reduce forage availability.

Unauthorized salting is a frequent problem in the backcountry that increases moose vulnerability through habituation and may promote artificial distribution patterns.

Alpine Habitats and Associated Species

Alpine habitats are the least common habitat aggregation in the subbasins and represent only 7 percent of the habitats (Maps 50 and 53). They occur on the high elevation divides that separate the Selway River from the Lochsa, Bitterroot, and Salmon Rivers, and on other high elevation ridges within the subbasins. Key habitat features in the alpine aggregation include whitebark pine communities, montane meadows, massive rock formations and talus, and high lakes environments.

Alpine habitats include habitat type groups (HTGs) 10 and 11. They are characterized by cold and moderately dry subalpine fir and cold whitebark pine and subalpine fir. Alpine habitats are dominated by open stands of whitebark pine, lodgepole pine, alpine larch, subalpine fir, and Engelmann spruce. Understories consist of grouse whortleberry and smooth woodrush. Alpine habitats are limited to high elevation ridges and upper slopes and contain the majority of the rock component in the subbasins. The following table describes the elements of the alpine habitat aggregation.

Table 4.44: Alpine Habitat Aggregations

Alpine Habitats				
Structure	Early Seral	Mid-seral	Late Seral	Old Growth
Potential Vegetation	HTG 10-11; 80	HTG 10-11	HTG 3-9	HTG 10-11
Size Class	Herbaceous, shrub, seedling, sapling, pole	9-21 in dbh	$\geq$ 21 in. dbh and not old tree	Old tree

dbh=diameter at breast height

Current Departures from Historic Conditions

Whitebark pine has been significantly diminished and is a key component of grizzly bear habitat. Fire suppression and blister rust disease are the major factors in the decline. Montane park has significantly increased, also due to fire suppression. Native amphibian populations are at risk or obliterated at lakes stocked with introduced fish, especially brook trout. Some roads and trails with motorized vehicle use access alpine habitats and species. Disturbance sensitive species, including mountain goats and wolverines, may be influenced by the concentrated human activity.

Representative Species Associated with Alpine Habitats:

- Carnivores: Grizzly bear, wolverine
- Birds: Clark's nutcracker
- Amphibians: Spotted frog
- Ungulates: Rocky Mountain goats
- Lagomorphs: American pika

GRIZZLY BEAR *(Ursus arctos horribilis)*

Status

Status Designation: Federal, threatened species (U. S. Fish and Wildlife Service) and management indicator species, Nez Perce National Forest, Forest Service Northern Region (USFS); State of Idaho, threatened species.

Current grizzly bear range includes Alaska, northern and western Canada, the Cabinet-Yaak Mountains, the northern Continental Divide ecosystem in Montana, the Selkirk Mountains in Montana and Idaho, the northern Cascades in Washington, and Yellowstone Park in Wyoming, Montana, and Idaho.

Seventy-eight percent of the Selway subbasin is within the Selway-Bitterroot Wilderness Area, which comprises the majority of the proposed Bitterroot Grizzly Bear Recovery Area in the Bitterroot ecosystem, as described in the *Grizzly Bear Recovery In The Bitterroot Ecosystem: Final Environmental Impact Statement* (USFWS, 2000). The Bitterroot ecosystem is one of the largest contiguous blocks of federal land remaining in the lower 48 United States. The core of the ecosystem contains two wilderness areas, the Selway Bitterroot and the Frank Church River of No Return Wildernesses, which make up the largest block of wilderness habitat in the Rocky Mountains south of Canada. Of all remaining unoccupied grizzly bear habitat in the lower 48 states, this area in the Bitterroot Mountains is thought to have the best potential for grizzly bear recovery, primarily due to the extensive wilderness area (USFWS, 2000).

In 1991, a 5-year habitat evaluation concluded that the Bitterroot ecosystem can support a viable grizzly bear population based on biological factors associated with space, isolation, denning, vegetation types, and food (Davis and Butterfield, 1991). Officially, grizzly bears do not permanently occupy any portion of the Nez Perce National Forest or any part of the Selway subbasin. However, evidence of grizzly bear presence was confirmed in Gash Creek, adjacent to the wilderness on the Montana side in 1978. Chuck Jonkel, University of Montana grizzly researcher, confirmed grizzly hair samples collected by a grizzly food habits researcher (Jonkel, 1992). Other credible reports of grizzly sightings and sign by long time Forest Service field employees working in the Selway-Bitterroot Wilderness and local hunters in the last 20 years have not been confirmed.

Ecology

Optimum and Available Habitat: Optimum grizzly habitat is thought to include extensive timbered areas that provide security cover adjacent to or continuous with grassland-herbland, shrubland, or other open-site feeding areas. Daybeds, used for resting between feeding periods, are usually located in relatively open timber stands immediately adjacent to open area feeding sites (Knight, 1977; Craighead and Craighead, 1972).

Grizzly bears are considered to be wilderness dependent because of their large space requirements and need for remote habitats with minimal disturbance. In the subbasins, the almost one million acres of the Selway-Bitterroot Wilderness provide extensive roadless security to grizzly bears. Moose Creek ERU probably provides the largest amount of preferred habitat for grizzlies. Alpine habitats and shrublands adjacent to mature forest are abundant in Moose Creek. The Pettibone and Bear ERU also provides important habitat but is lacking in adjacent shrublands and mature forest. The Gedney and Three Links ERU has extensive shrublands but also lacks mature forest adjacency. White Cap Creek ERU provides substantial alpine denning habitat but is deficient in shrubland forage.

Forage: Grizzly range west of the continental divide in northwestern Montana and northern Idaho is primarily mountainous with maritime climatic influences. Grizzlies rely on diverse habitats for foraging in this region. Important grizzly bear food sources in the Bitterroot ecosystem include whitebark pine nuts, huckleberry fruits, serviceberry, cherry, elderberry, buffalo berry, and mountain ash (USFWS, 2000). Burned areas producing these shrubs are the primary feeding areas. Before and after shrublands produce fruit, grizzly diet is probably dependent upon protein from early grass and herbs and starchy underground plant parts, which occur primarily in non-forested habitat components, including avalanche chutes, sidehill parks, wet meadows, stream bottoms and other moist sites. These components probably entirely replace shrublands as energy sources during years when fruits fail or in areas lacking fleshy fruit-bearing shrubs (USFS and NPS, 1979).

According to Wright (1909), leaves of shooting star (*Dodecatheon*) were highly preferred forage in the Selway Bitterroot area and hoary marmots and Columbian ground squirrels were eaten in abundance by the bears prior to denning up for winter. After the early fish runs and before berry season, Wright noted grizzlies foraged extensively on ants, grubs, and larvae that were dug from logs and stumps and from under rocks. Wright also noted the historic importance of anadromous fish, especially in fall, to grizzlies in the Selway Bitterroot Mountains, where he observed them fishing on numerous occasions in traditional locations and seasons.

Home Range: Grizzlies west of the continental divide appear to use far less space than grizzlies east of the divide in and around Yellowstone Park. Grizzly range west of the divide, including the Selway Bitterroot area, has a moist maritime climate and steep, precipitous terrain. These conditions account for the high ecological and vegetative diversity characteristic of the area resulting in more abundant habitat. Berry scarcity and large pine seed crop fluctuations can be important factors limiting bear density.

Home range is highly variable among areas, seasons, and individuals. A Selkirk study reported adult home ranges of 87 to 175 square miles, with the male’s range generally larger than the female's. The density of the Selkirk population was about one bear per 15 square miles.

Hibernation: In Idaho, hibernation occurs from October through May. Grizzlies typically dig their own dens, usually on steep northern slopes where snow accumulates. Most dens are at higher elevations from 6,724 to 8,200 feet (Servheen and Klaver, 1983).

Departures from Historic Conditions and Current Threats

Historically, grizzlies were common in the subbasins until the early 1900s. Lewis and Clark found grizzlies more often than black bear in their travels along the Clearwater River. Wright’s 1909 accounts of his grizzly hunting expeditions in the west documented numerous grizzly killings and encounters in the Selway Bitterroot area. Accounts include grizzlies killed at Elk Summit in the Moose Creek ERU and grizzlies frequenting a large marsh on a divide between the middle and south forks of the Clearwater River. Based on conservative estimates, Bud Moore (1986) concluded that trappers harvested 25 to 40 grizzlies annually in the Selway Bitterroot Mountains near the turn of the century. By the 1950s grizzly bears were virtually extirpated in the Selway Bitterroot Mountains due to intensive hunting, trapping, predator control programs, and the decline of anadromous fish runs (USFWS, 2000).

Potential threats to grizzly bears in the subbasins include risks of direct human caused mortalities, bear baiting, artificial foods and attractants associated with dispersed camps and campgrounds, outfitter camps, administrative sites, and private wilderness inholdings. Potential indirect impacts affecting grizzly habitat include trail construction and maintenance that provides increased access to grizzly habitat, road conflicts, grazing, and fire suppression that impacts forage, including whitebark pine communities and early seral ungulate habitat.

Historically, whitebark pine was an important nutritional and structural component of grizzly habitat in the Bitterroot ecosystem and occurred across 12 to 15 percent of the landscape. Today, whitebark pines have been reduced to about 20 to 40 percent of their original abundance through fire suppression and blister rust disease. Whitebark pine is expected to decline to about 5 to 10 percent of its original abundance, but is anticipated to respond positively to fire restoration (USFWS, 2000). Anadromous fish were historically important in the diet of Selway Bitterroot grizzly bears until construction of the Lewiston Power Dam in 1927 eliminated the native chinook salmon runs. Although salmon and steelhead were reintroduced, anadromous fish numbers today are significantly diminished compared to historic runs. Mesic shrublands and montane meadows that provide important grizzly food sources have declined with fire suppression in the subbasins.

Roads have a detrimental effect on grizzly bears by increasing human access, resulting in increased vulnerability to bear populations. In the North Fork of the Flathead River in Montana, all 29 known or suspected deaths between 1979 and 1988 were due to legal or illegal hunting and most bears were shot from roads (USFWS, 1993). Once total road densities exceed 2 m/m^2, use by grizzlies is predicted to decline (Mace and Manley, 1993).

Although the lower portion is roaded, most of the subbasins are within the core Bitterroot ecosystem recovery area, which is primarily roadless. However, bears migrating outside the subbasins to the north or east would encounter Highway 12 to the north and Highway 93 to the east. Also, several roads within the subbasins provide access to high elevation grizzly habitat in the core recovery area. These habitats are located at Elk Summit in Moose Creek ERU, Nez Perce Pass in Deep Creek ERU, Fog Mountain in Gedney and Three Links ERU, and Coolwater Ridge in North Selway Face ERU. Within the roaded portion of the subbasins, the highest open road densities are in the Clear Creek ERU. These densities range from 2 to 3 m/m^2 to 4 to 5 $m/m^{2.}$ Open road densities of 2 to 3 m/m^2 also occur in Middle Fork Clearwater ERU on the north face. Some of these roads are closed during fall hunting season, which decreases vulnerability in that season.

Other hunting related threats in the subbasins include black bear hunting and associated bear baiting. Since 1985, 15 protected grizzlies have been mistakenly shot by hunters during spring black bear season in Montana (Associated Press, 2000). Black bear baiting leads to increased vulnerability of grizzly bears that are also attracted to the bait.

Natural or pristine grizzly behavior is usually expressed through a total dependence on natural foods under free-ranging conditions. Normally this means that bears are not adapted to contacts with humans and usually avoid human encounters. However, grizzlies that forage on human food, garbage, or livestock in close proximity to people become habituated to people (Herrero, 1976). This modified behavior increases grizzly-human conflict potential and threatens both human safety and grizzly bear recovery.

WOLVERINE *(Gulo gulo)*

Status

Status Designation: Federal, candidate (C2) species (U. S. Fish and Wildlife Service) and sensitive species, Forest Service Northern Region (USFS); State of Idaho, species of special concern.

Wolverine range extends from Labrador, east to Alaska, and south to mountainous regions of the western United States. In Idaho, wolverine distribution includes mountainous areas from the South Fork of the Boise River, north to the Canadian border (Groves, 1988).

The wolverine is federally designated a candidate species by the U. S. Fish and Wildlife Service and is considered a sensitive species by the Forest Service Northern Region. It is illegal to kill wolverines in the state of Idaho.

Wolverine sightings in the subbasins are rare, but occasionally occur in alpine lake basins in summer and at lower elevations in winter. Wolverines have been reported in the Gedney and Three Links, North Selway Face, Upper Selway Canyon, Meadow Creek, and O’Hara and Goddard ERUs.

Ecology

Wolverine populations that have been or are now on the edge of extirpation exist in the last available habitat that has not been developed, extensively modified, or accessed by humans. The wolverine is a conservation enigma because knowledge is lacking about factors that allow populations to persist in some areas and not in others. Although most wolverine sightings are in high elevation habitats, their occurrence there may be more a function of remoteness and inaccessibility by humans than it is a required habitat attribute (Ruggiero, 1994). But temperature also influenced summer movements to higher elevations according to Hornocker and Hash (1981). Wolverines of both sexes moved to higher, cooler elevations and traveled less during daylight hours. They remained at these high elevations throughout the summer.

Habitat Preferences: In Idaho, wolverines inhabit remote, mountainous areas with little human disturbance. They are considered to be a “wilderness sensitive” species in much of the literature (Hayward and Garton, 1989) because of their dependency on remote habitat with minimal disturbance that is not often found outside wilderness. Hornocker and Hash (1981) studied wolverines in the South Fork of the Flathead River drainage and found that wolverines selected grand fir-subalpine fir cover types throughout the year, but especially in summer. Fifty-six percent of wolverine locations were in grand fir-subalpine fir types when all seasons were averaged.

Wolverines were rarely located in burned-over areas or wet meadows, and dense young timber received the least use. However, seral lodgepole pine and western larch sites were frequently used. Hornocker and Hash (1981) suggested that food availability is the main factor determining movements and range of wolverine in the South Fork drainage. Carrion and prey items were apparently more available in mature or intermediate stands preferred by wolverines, particularly the edge and ecotonal areas around cliffs, slides, blowdowns, basins, swamps, and meadows. Temperature also influenced summer movements. Wolverines of both sexes moved to higher, cooler elevations and traveled less during daylight hours. They remained at these high elevations throughout the summer.

Lower elevations were used more in winter than in summer. Mean winter elevation was 4,497 feet and mean summer elevation was 6,298 feet. Although all aspects were used, eastern and southern exposures were used more consistently. Wolverines used a variety of topographic positions. Slopes were used in 36 percent of the locations, basins in 22 percent, wide river bottoms in 14 percent, and ridge tops in 8 percent.

Wolverines appeared to meander through timber, but traveled in straight lines across large openings. No wolverines were relocated in a clearcut of any size, but tracks were seen to cross clearcuts 15 times. Wolverines were located within 0.62 to 1.86 miles of clearcuts and active roads 12 times. Males were found farther from clearcuts, roads, and burns than females.

No differences in wolverine density, movement, habitat use, or behavior were found between the managed and wilderness portions of the South Fork drainage. Hornocker and Hash (1981) attributed these findings to an effective separation of humans and wolverines due to limited human access in winter and use of higher elevations by wolverines in summer. However, humans caused 15 of 18 known wolverine mortalities between 1972 and 1977.

Home Range: Hornocker and Hash (1981) found that individual wolverines ranged widely. Average yearly ranges were 163 square miles for males and 58 square miles for females. Male wolverines have been found to disperse at sexual maturity for distances up to 115 miles. Because of the large home range requirements of wolverines, scales for wolverine habitat analysis must also be large.

Forage: Wolverines feed on a variety of roots, berries, small mammals, bird eggs, fledglings, and fish. They may attack moose, caribou, and deer hampered by deep snow. Small and medium size rodents and carrion, especially ungulate carcasses, comprise a large percentage of the diet. Carcasses of mule deer and elk were the primary ungulates in the diet of wolverines in Montana (Hornocker and Hash, 1981 in Ruggiero, 1994).

Breeding: Breeding occurs from April through October, but is usually in summer. In Idaho, females use high-elevation basins for natal sites (Copeland, 1996). The proximity of rocky areas, such as talus slopes or boulder fields, for use as dens or rendezvous sites was important for wolverines in Idaho (unpublished data in Copeland, 1993 in Ruggiero, 1994). Natal dens in

Montana were most commonly associated with snow-covered tree roots, log jams, or rocks and boulders (Hash 1987 in Ruggiero, 1994).

Departures from Historic Conditions and Current Threats

Threats to wolverine populations are difficult to determine because of a lack of knowledge about factors that allow populations to persist in some areas and not in others. Wolverines are difficult to detect even when relatively abundant. Since wolverines have large home ranges, sightings may not indicate reproducing populations. Conversely, a lack of sightings does not indicate a lack of presence. This makes effects of management activities difficult to determine.

Barriers to dispersal can affect colonization of vacant habitat. Cumulative impacts of trapping, habitat alteration, timber harvest, and forest access on wolverines is not understood. Impacts to mating pairs and family groups from recreation in alpine areas in summer should be considered.

Human Presence and Activities: Human presence may conflict directly with wolverines. Hornocker and Hash (1981) suggest that human access on snowmobiles or all-terrain vehicles in winter and early spring could cause behavioral disturbance in addition to potential for increased mortality associated with ease of access for fur trappers.

Incidental non-target trapping and hunting mortality is the primary mortality factor for wolverines. The persistence of wolverine populations in Montana despite years of unlimited trapping and hunting has been attributed solely to the presence of designated wilderness and remote, inaccessible habitat (Hornocker and Hash, 1981).

Natural Threats: Predation by large carnivores, especially on kits, may be important. Adult males may kill kits and may kill each other in the breeding season. Starvation may be an important mortality factor for very old and very young wolverines that are unsuccessful at foraging even when food is abundant. Other threats include low reproductive rates and delayed sexual maturity.

CLARK'S NUTCRACKER (*Nucifraga columbiana*)

Status

Status Designation: Federal, not listed; State of Idaho, protected nongame species.

The Clark’s nutcracker is a protected nongame species in Idaho. It is a resident from central British Columbia, southwestern Alberta, western and central Montana, and western and southeastern Wyoming, south through the mountains of central Washington, eastern Oregon, and central and eastern California and Nevada, to northern Baja California. Clark’s nutcracker also occurs in the Rocky Mountains to east-central Arizona and southern New Mexico and may wander irregularly beyond its normal range.

Ecology

Clark's Nutcracker and Whitebark Pine: Clark's nutcracker distribution coincides with whitebark pine in the subbasins. The nutcrackers harvest and store pine nuts by burying them in many small seed caches in mineral soil or duff (Tomback, 1978). Seeds are cached at distances of several feet to 14 miles from harvest sites, but the highest densities of seeds are found near parent trees (Hutchens and Lanner, 1982).

The Clark’s nutcracker disperses more whitebark pine seed than any other organism and is the primary agent of regeneration. The influence on whitebark pine regeneration and the seed caching behavior are important to grizzly bear habitat and diet. In typical open, high elevation stands of whitebark pine, Clark’s nutcracker takes 99 percent of available whitebark pine seed. An individual nutcracker caches many times the amount of seed that it requires, leaving the remaining seeds in the soil to germinate. Many whitebark cone features are the product of its coevolution with Clark’s nutcracker. Cone morphology favors nutcracker collection, and in turn, the nutcracker disseminates the seed.

The nutcrackers begin harvesting and caching whitebark pine seeds around mid August when seeds are ripe. Sometimes large flocks of up to 150 birds have been observed caching seed together. Clark's nutcrackers are attracted to open sites for seed caching and will fly great distances to use them.

They uncover the seeds during winter and spring when other seeds are scarce. Seed uncovered in spring is almost exclusively fed to fledglings. The availability of whitebark pine seed allows the Clark's nutcracker to nest earlier than other passerine birds that must wait for insect populations to occur before nesting. This results in Clark's nutcracker fledglings being more mature by winter and better able to survive.

Forage: Pine seeds are the primary food for both adults and nestlings but individuals will also eat insects, berries, snails, carrion, and sometimes eggs and young of smaller birds. Nearly all winter food and much of the breeding season food is derived from pine seeds collected and stored in fall.

Nesting: Clark's nutcrackers nest primarily between 6,000 feet and 8,500 feet (Mewaldt, 1956). They build cup-shaped nests in trees and both sexes incubate two to six eggs for 17 to 18 days. Young leave the nest at 24 to 28 days.

Departures from Historic Conditions and Current Threats

Threats to Clark's nutcracker include the severe decline in whitebark pine communities in the assessment area due to fire suppression and blister rust disease

SPOTTED FROG (*Rana pretiosa*)

Status

Status Designation: Federal, candidate (C2) species (U. S. Fish and Wildlife Service); State of Idaho, species of special concern and unprotected nongame species.

Ecology

Spotted frog range extends from extreme southeastern Alaska, south through western Alberta to coastal Oregon and Washington, and east to northern Wyoming, northern Utah, and central Nevada.

In Idaho, spotted frogs occur throughout much of the northern part of the state. There are also some isolated populations in southwestern Idaho. Spotted frog populations occur at many of the high alpine lakes in the Selway and Middle Fork subbasins.

Habitat Preferences: Spotted frogs are highly aquatic and are generally found in or near permanent bodies of water such as lakes, ponds, sluggish streams, and marshes. Spotted frogs prefer littoral zones comprised of emergent vegetation including grasses, sedges, and thick algae, but may use sunken, dead, or decaying vegetation as escape cover. During the summer these frogs can be found some distance from breeding sites, but still associated with moist vegetation. During the latter part of the summer, they disperse to permanent water from meadows and transitory ponds. In a complex with four pools in Yellowstone National Park, Wyoming, movement occurred between ponds due to breeding, hibernation, and the drying of other ponds and watercourses at a maximum of 208 yards per day with a maximum of .8 mile (Turner, 1960).

Egg Laying: Egg laying in high elevation lake basins probably occurs within a two week period in late June and early July. In mountain and interior sites, tadpoles are thought to overwinter as larvae, metamorphosing the following spring (Nussbaum, 1983). In higher elevations in Wyoming, spotted frogs grow more slowly and mature at a later age with males maturing at four years and females maturing at six years. Females breed only every two or three years at higher elevations.

Forage: Spotted frogs are opportunistic and eat a wide variety of insects as well as mollusks, crustaceans, and arachnids. Larvae eat algae, organic debris, plant tissue, and minute water-borne organisms.

Departures from Historic Conditions and Current Threats

Stocked fish in many high mountain lakes within the subbasins have negatively affected spotted frogs. In fishless lakes spotted frog populations are generally common to abundant. In lakes stocked with fish, especially brook trout, spotted frog populations are often absent or significantly reduced. Fish prey upon spotted frogs, especially where fish populations are high and other food sources are limited. Stocked fish may also significantly impact insect populations that are important in the diet of spotted frogs.

Threats to spotted frogs also include predation by introduced bullfrogs in lower elevations. Although bullfrogs have been observed within the Clearwater River basin adjacent to the assessment area, none have been documented within the Selway and Middle Fork assessment area.

ROCKY MOUNTAIN GOAT *(Oreamnos americanus)*

Status

Status Designation: Federal, not listed; State of Idaho, game species, some parts of Idaho.

Rocky Mountain goat range extends from southeastern Alaska, south to Washington, western Montana and southern Idaho. The Rocky Mountain goat was introduced in Colorado, Oregon, the Olympic Peninsula of Washington, and South Dakota. Some Idaho populations were introduced outside their historic range. The Rocky Mountain goat is designated a game species in some areas of Idaho, but not in the Selway and Middle Fork Clearwater subbasins.

Extensive spring and winter mountain goat range exists in the subbasins, primarily on the east side of the Selway River. Significant range occurs in the Upper Selway Canyon, White Cap, Pettibone and Bear, and Moose Creek ERUs. The White Cap and Pettibone and Bear Creek ERUs and the Bitterroot and White Cap Creek divide ridges that bound the drainages contain the most significant alpine rock component in the analysis area, which indicates important summer range for mountain goats. Mountain goats have also been observed wintering in Meadow Creek and summering on the ridge divide between Meadow Creek and Running Creek.

Ecology

Mountain goats are considered to be a “wilderness sensitive” species in much of the literature (Hayward and Garton,1989) because of their dependency on remote habitat with minimal disturbance that is not often found outside wilderness. They inhabit the upper elevations of the northern Rocky Mountains in alpine and subalpine habitats on steep, grassy, talus slopes, grassy ledges of cliffs, or alpine meadows. Summer habitat is typically found at higher elevation than winter habitat (Rideout, 1974; Smith, 1976; Singer and Doherty, 1985; Hayden, 1989). Cliffs are especially important habitat components.

Mountain goat winter ranges in the Bitterroots are characterized by steep broken terrain dominated by tiered cliffs with steep slopes, southerly exposures, and wind action contributing to excellent snow-shedding properties (Smith, 1976). Between January and May 94 percent of goat observations were between 4,200 to 6,500 feet, while nearly all summer location observations were above 7,300 feet. Cirques are used heavily in summer, fulfilling all habitat needs in that period by providing abundant lush forage, water, bedding, and escape terrain. Northerly and easterly aspects were used 67 percent of the time in summer; lush sedge-forb mats were available on these exposures. Subalpine fir or alpine larch overstory was present for 60 percent of summer locations.

Mountain goats move in October and November and April and May. In Idaho, they may move up to 10 miles in winter to appropriate habitat. One Idaho band of 10 animals wintered in a 200-acre area. In winter, mountain goats occupy the lowest suitable range on south-facing aspects. Mature females dominate their strong social hierarchy. Adult females and young may form small groups in summer. Males are often solitary or sometimes in male groups, but join female groups in fall. Annual average home range in different areas of Montana was reported at 2.3 to 9 square miles.

Mountain goats graze on grasses and forbs in summer and also browse shrubs and conifers. The winter diet is often variable. They may feed on mosses and lichens, as well as grasses, shrubs, and conifers.

Departures from Historic Conditions and Current Threats

Historic population status of mountain goats in the analysis area is unknown. Limited surveys indicate that mountain goats are declining due to a decrease in the kid population. Factors influencing goat populations apart from natural mortality include quality of habitat and security. Important mountain goat spring-winter range in the upper Selway area is heavily infested with weeds that impact limited winter forage, especially in the White Cap and Pettibone and Bear Creeks ERUs. An extensive artificial salt lick on White Cap Creek located between two goat ranges has potential to impact goats, who are easily habituated to salt, by increasing their vulnerability to predation and mortality by humans. Snow machine access to mountain goat wintering areas in the upper Selway may impact mountain goat security in restricted habitats. Motorized access to alpine summering areas also has potential to influence mountain goats that are sensitive to disturbance and may be displaced. Mountain goats occupy very specific and limited habitats on precipitous terrain to avoid predators; disturbance impacts that cause displacement are potentially significant compared to other species with more general habitat requirements.

AMERICAN PIKA (*Ochotona princeps*)

Status

Status Designation: Federal, not listed; State of Idaho, protected nongame species.

The American pika is a protected nongame species in Idaho. It is distributed discontinuously in mountainous areas from southern British Columbia and southern Alberta, south to southern California, Nevada, southern Utah, and northern New Mexico, and east to Wyoming and Colorado. The pika is most often found in the analysis area associated with talus slopes in alpine environments. Current population status in the area is unknown.

Ecology

Pikas are found from sea level to about 9,840 feet in the northern range, infrequently below 8,200 feet in the south. They are restricted to rocky talus slopes and primarily the talus and meadow interface. Pikas are often found on high alpine slopes at about 8,850 feet and above tree line up to the limit of vegetation. They are also found at lower elevations in rocky areas within forests or near lakes

Pikas feed primarily on grasses and sedges, but also consume flowering plants and shoots of woody vegetation. In late summer and fall, they harvest and store food and defend hay piles built for winter consumption. They may forage in winter in snow tunnels.

Pikas are active all year. They are relatively inactive on warm days and may be inactive at midday in hot weather near the lower elevation limit. Pikas do not dig burrows but may enlarge den or nest sites under rock. They may defend territories of about 480 to 840 square yards. Their home range is about twice that size, but varies seasonally and is the most extensive during spring breeding season. Male and female territories are the same average size. Adjacent home ranges tend to be occupied by opposite sexes. A Colorado study found a population density of 3 to 10 for about 2.5 acres in favorable habitat in mid-August. Density-related social behavior maintains population stability. Young are born between May and September. Females produce one to two litters of two to five young per litter. Juvenile pikas establish territories and hay piles, but do not breed until their second summer. Juveniles tend to stay on natal or adjacent home range. Individuals may live 5 to 7 years. Adult mortality is 37 to 56 percent per year.

Departures from Historic Conditions and Current Threats

The historic population status of pikas in the analysis area is unknown. Potential threats to pikas may be associated with habitat loss, including forage reduction caused by trampling or grazing. Other potential threats include increased predation by raptors, like ospreys, that may be attracted to alpine lakes environments by the presence of large populations of non-native fish in the lakes.

OTHER IMPORTANT SPECIES GROUPS

BATS

The analysis area supports a species diverse population of bats as evidenced by a bat survey at Moose Creek Ranger Station in August of 1998. Seven different species were netted in one night, which was an Idaho record. Species netted include the silver-haired bat (*Lasionycteris noctiuagans*), big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifugus*), Yuma myotis (*Myotis yumanensis*), long-eared myotis (*Myotis evotis*), small footed-myotis (*Myotis ciliolabrum*), and fringed myotis (*Myotis thysanodes*).

FRINGED MYOTIS (*Myotis thysanodes*)

Status

Status Designation: Federal, candidate (C2) species (USFWS); State of Idaho, protected nongame species of special concern.

The fringed myotis occurs with limited distribution in the Forest Service Northern Region. It is found from north-central Idaho and southwestern Montana southward and appears to be near the northern distributional limits of its range. Fringed myotis was netted during a bat survey at Moose Creek Ranger Station in August 1998. The species is commonly found in Hell's Canyon but not found often in other parts of central Idaho.

Ecology

Fringed myotis is found in desert, grassland, and woodland habitats, primarily at middle elevations of about 3,900 to 7,050 feet. It is known to be active from April through September. Fringed myotis roosts in caves, mines, rock crevices, buildings, and other protected sites. In a study in Arizona, Morrell et al. (1994) recorded this species using roost sites in snags. Eighty percent of the snags used were ponderosa pine, and 66 percent of all snags used had loose bark and some intact branches. Chung-MacCoubrey (1996) found maternity roosts of this species in large, hard ponderosa pine snags and live ponderosa with long, vertical cracks or loose bark.

In Montana, Butts (1993a and 1993b) recorded fringed myotis in riparian areas within mature Douglas-fir forest, and ponderosa pine-juniper woodland between about 5,250 and 8,200 feet in elevation. Fringed myotis often forages close to vegetative canopy. Insectivorous, they commonly prey on beetles and moths.

In Idaho, fringed myotis is found with many other species, including long-eared myotis, long-legged myotis, and California myotis. Fringed myotis is known to roost communally, but never closer than 9.8 feet to other bat species. Ecology of this species, particularly winter ecology, is largely unknown.

Departures from Historic Conditions and Current Threats

Historic and present population status of fringed myotis in unknown. Fringed myotis is easily disturbed by human presence. Disturbance by humans would be primarily associated with buildings occupied by people at administrative sites or at private residences within the subbasins where bats are usually unwelcome visitors. Habitat related risks may be associated with loss of snag roost site production in the subbasins due to fire suppression and timber harvest.

NEOTROPICAL MIGRANT LANDBIRDS

Status and Ecology

Neotropical migrant landbirds are birds that migrate to the tropics to winter and return to North America to breed. Of the 241 bird species that breed in Idaho, 119 are neotropical migrants.

Seventy-eight percent of the neotropical migrants are *obligate* migrants meaning that nearly all members of the species migrate to the tropics. The other 42 species are *facultative* migrants, or species in which only some individuals migrate long distances. Most of Idaho's neotropical migrants, particularly the obligates, are passerines, also known as perching or songbirds. This group includes flycatchers, thrushes, and warblers. Most of the neotropical migrant raptors are facultative migrants with individuals commonly seen by Idaho birders in winter.

Most neotropical migrants can be found throughout Idaho. Relatively more species can be found in riparian habitat and forested habitat than in others. Shrubland habitats are also important. Wetlands and agricultural areas contain relatively fewer species. More species nest in tree canopies but ground and shrub nesting locations are also important. Most Idaho migrants feed on insects.

In a landbird survey conducted in 1995 and 1996, more than 45 migrant bird species were recorded in the lower Selway subbasin on Forest Service land. Two of these species, Townsend's warbler and Fox sparrow, are relatively uncommon in Idaho. As a result, no population trend data is available. Townsend's warbler is dependent on continuous forested habitat and the Fox sparrow inhabits riparian woodlands. Both rely on primarily unroaded and undisturbed habitats. The survey documented many occurrences of Townsend's warbler in Meadow Creek and O'Hara and Goddard ERUs. Significant occurrences were also found in the Lower Selway Canyon ERU. Several occurrences of Fox sparrow were also recorded in the Meadow Creek ERU. Fox sparrow has also been observed, although rarely, in the Upper Selway Canyon ERU (Wright, 1988-1995). Vaux's swift, also uncommon in Idaho, has been more commonly observed in the Upper Selway Canyon ERU in expected habitat (Wright, 1988-1995).

Departures from Historic Conditions and Current Threats

Breeding bird surveys conducted in Idaho from 1980 through 1989 and analyzed by USFWS found trends showing 7 species in significant decline. All 7 species are known to occur in the assessment area and include house wren, loggerhead shrike, rufous-sided towhee, Brewer's sparrow, vesper sparrow, white-crowned sparrow, and dark-eyed junco. The house wren and towhee declines appear to be localized and not regional. Both these species frequently nest in riparian habitats.

Most of the analysis area is designated wilderness or roadless and provides optimal habitat for many migrant landbirds, although some potential threats may be important. Factors associated with potential loss of breeding habitat in the analysis area include weed invasions, fire suppression, and habitat conversion and fragmentation. Weed invasions and fire suppression have the most influence in xeric habitats in the analysis area, although reduction in shrub habitat in mesic environments is also an important impact. Conversion and fragmentation of habitats is primarily associated with timber harvest and agriculture practices in the lower subbasins.

CHAPTER 5

DESCRIPTION OF MANAGEMENT THEMES AND ECOLOGICAL REPORTING UNITS

The assessment area is divided into 19 geographic areas or ecological reporting units (ERUs) to help locate terrestrial and aquatic environments, and define how their capabilities and conditions are related to the Selway and Middle Fork Clearwater subbasins. ERUs are watersheds or aggregates of watersheds. ERUs help locate the discussion of ecological processes, effects of past management activities, and present social and biological trends. They provide a focus for future management strategies to achieve sustainable landscape conditions.

This chapter includes descriptions of themes for each of the 19 ecological reporting units (ERUs) within the Selway and Middle Fork Clearwater subbasins. These themes are associated with the following functional areas: aquatics, landscape ecology, wildlife, roads, trails, and recreation. Table 5-1 shows the functional themes for each ERU, and which theme is the dominant one for the area. The themes focus on conserving and restoring processes, species, or values. Following the table, each ERU is described with a location map, statistics, main integrated and compatible themes for the area, and functional themes, findings and recommendations.

THEME DEVELOPMENT

Themes, as used in this document, define the ecological and functional focus for the ecological reporting units (ERUs). In response to the findings described in Chapters 3 and 4, themes were developed for the Selway and Middle Fork Clearwater subbasins and each of the 19 ERUs was assigned an area theme. The functional themes are conceptually similar to those described in the *Interior Columbia River Basin Assessment*, where management emphases were assigned to forest and range clusters in the basin; the Selway and Middle Fork Clearwater themes apply at a finer scale. The functional themes are designed to either conserve or restore landscape elements, functions, and processes.

Generally, a conserve theme is assigned to areas where existing conditions are ecologically sustainable and disturbance regimes are appropriate. A conserve theme does not always imply a hands-off approach to management, and local conditions that vary from the general conserve theme may warrant restoration.

A restore theme is applied where conditions are generally less than desirable and improvement is needed to achieve long-term ecological stability and sustainability. The roads and trails themes respond to the ecological, recreational, or social values in order to support recommended uses. The recreation themes respond to the most significant social and ecological values of the ERU.

The themes provide pathways for achieving a range of desirable and sustainable landscape conditions through time. These themes will help define and develop the purpose and need statement for forest plan revision. In addition, they will assist in establishing an ecological context for future project planning and analyses, and to prioritize and schedule work, including the ecosystem analysis at the watershed scale (EAWS) process (USDA Forest Service, 1995).

Notwithstanding the ERU themes, recommendations, and treatment objectives presented in this chapter, it is important to emphasize that both the Selway and Middle Fork Clearwater subbasins lie within Nez Perce tribal ceded lands. As such, under Article 3 in the Nez Perce Treaty of 1855, tribal members are secured the rights of taking fish and wildlife in all usual and accustomed places, erecting temporary buildings for curing, hunting and gathering, and pasturing cattle and horses upon open and unclaimed land.

Functional Themes

Functional themes were assigned to five specific resource areas (aquatic, landscape ecology, wildlife, roads, trails and recreation) for each of the 19 ERUs (see Table 5.1 and Maps 62 to 68). Meadow Creek ERU was subdivided, and themes were assigned based on different ecological and social conditions within the ERU subdivisions. Some ERUs encompass private, state, tribal or other federal lands. Identified themes apply only to national forest lands, but should be considered in work with other owners.

The various themes were also prioritized between ERUs, according to the importance (significance of the action) and urgency (timing). A higher priority was assigned to those units where the action or theme was considered locally or regionally important and urgent.

Area Themes

Area themes were developed by integrating and prioritizing functional themes (and so are referred to as “integrated area themes” in the individual ERU descriptions). Consideration was given to the magnitude and direction of ecological departures, the ability to affect recovery and restoration, the biophysical capabilities to achieve sustainable conditions, and the need to balance recovery both spatially and functionally across the subbasin.

The integrated area theme describes the primary emphasis for an ERU or ERU subdivision in terms of one or more functional themes. An integrated area theme may emphasize one functional theme, but the other themes are still important, and are very often highly compatible with the area theme. For example, restoring aquatic processes through road reduction, road drainage treatments and other upland sediment source reduction needs to occur concurrently with conserving existing old growth and increasing patch size and connectivity of old growth in O’Hara Creek. In other ERUs, the priority of aquatic restoration may constrain the pace of terrestrial restoration activities. Area themes are displayed in Map 68.

Conflicting Theme Objectives

Most functional themes identified in the subbasins are compatible, however some functional themes for an ERU may not be compatible in all situations. When there is a conflict between the different functional themes (for example landscape ecology and aquatics), the manager is encouraged to fall back to the area theme with the aid of site specific information for overall guidance in the ERU, and to adjust the pace or scope of a restoration activity, or the relative balance between activities. Other considerations include subbasin-wide conditions. In general, aquatic conditions have been more altered in the lower Selway and Middle Fork Clearwater subbasins than terrestrial conditions. Aquatic cumulative effects have reduced the capacity of the main stem of the Middle Fork Clearwater and lower Selway Rivers and their tributaries to sustain healthy populations of native fish. Given this, an overarching theme for the subbasins is aquatic restoration even though some ERU area themes have a terrestrial emphasis.

Functional Theme Descriptions

Aquatic Themes

The aquatic management themes are organized into four general groups: (1) conserve aquatic processes and conserve species integrity; (2) conserve aquatic processes and restore species integrity; (3) restore aquatic processes and conserve species integrity; and (4) restore aquatic processes and restore species integrity. Aquatic processes have been subdivided into three categories to describe, in general terms, those process that should be the focus of restoration efforts. These categories are: watershed, riparian, and instream processes. Aquatic themes are displayed in Map 62.

Conserve Aquatic Processes and Conserve Species Integrity

This theme is recommended for areas believed to have aquatic processes and conditions within the range and frequency of natural processes and conditions. Aquatic function is natural or near natural, with the possible exception of change in fire regime through fire suppression. These areas support habitat that is considered in good or excellent condition. They are also characterized by an existing aquatic species assemblage that supports no or insignificant densities of non-native species. In these areas the genetic integrity of native species has not been compromised by significant introgression (infiltration of the genes of one species into the gene pool of another) by non-native species. In general, active measures are not required to conserve these conditions but could require management of risks associated with other management objectives. Within ERUs with this theme, there may be site-specific problem areas associated with habitat; these areas may require active management to address the problems.

In some ERUs, there may be one or two sixth code HUC (hydrologic unit code) watersheds that do not meet these criteria. A separate functional theme is identified for these local conditions.

Restore Aquatic Processes and Conserve Species Integrity

This theme is recommended for areas where processes and conditions are not within the natural range and/or frequency of natural processes and conditions, but where the aquatic species assemblage and genetic integrity are largely intact. The ERUs where this theme is applied generally include areas where the aquatic processes and conditions are considered “degraded” by human activity or extreme natural events, but are important for the conservation of aquatic species at risk.

Within the ERUs assigned this theme, a change in sediment processes and stream flow regimes due to human impacts has resulted in press disturbances and reduced pulse disturbances. Press disturbances are those due to sediment from roads or channel alteration from mining or grazing and have resulted in long-term chronic changes such as sediment deposition in streams. Pulse disturbances result from fires, floods, and some droughts that are within the range of natural disturbances to which an ecosystem is adapted, are temporary in time, often patchy in space, and natural recovery is usually possible without assistance.

Conserve Aquatic Processes and Restore Species Integrity

This theme is recommended for areas where current processes and conditions are similar to historic processes and conditions, but where the aquatic species assemblage has been significantly affected by introduction of non-native fish. Significant effects include a reduction or elimination of native species, and/or potential widespread introgression of native species from interbreeding with non-native stocked species. These phenomena are primarily limited to westslope cutthroat trout in the Selway subbasin, but bull trout could be affected by introgression with brook trout as well. Watersheds where this theme applies support high or very high habitat potential for at least one at risk fish species. The theme generally is recommended for habitat strongholds, often occurring within designated wilderness.

Restore Aquatic Processes and Restore Species Integrity

This theme is recommended for areas that are not within the natural range of frequency in terms of watershed condition, function, and process, and where the species assemblage and/or genetic integrity have been significantly affected by non-native species. These are areas where the natural regimes (sediment, temperature, water yield, or riparian) have been significantly altered. They are considered “degraded”, either by human activities or extreme natural events. Human activities and /or management emphases have resulted in increased press disturbances and reduced pulse disturbances such as fire and floods and establishment of press disturbances resulting in long-term chronic changes such as sediment deposition in streams. A lack of restoration in these areas is likely to result in further loss of viability for at risk species, given the location of these areas in relation to other watersheds.

The priorities established within each of these general groups are based on the importance of the area for conservation and recovery of at risk aquatic species, key human uses, and degree of departure.

VERY HIGH PRIORITY

Very high priority is assigned to situations or areas that are critically important to the conservation of aquatic species at risk. Habitat potential is high or very high. Not only are these areas important to the Selway and Middle Fork Clearwater subbasins in terms of rebuilding populations, they are also important in providing habitat for some of the few remaining strong fish populations within the context of the upper Columbia River basin. The Selway River was identified as a stronghold subbasin for wild steelhead, westslope cutthroat, and bull trout (*ICRB*), and many ERUs assigned this priority provide the best remaining habitat and strong populations of imperiled fish (fish at risk that may or may not be listed under the Endangered Species Act).

In some cases, departure from the historic condition regarding the species assemblage has occurred, particularly where brook trout are established in mountain lakes and headwater units and have reduced or replaced westslope cutthroat trout. Active measures are required to address extirpation of westslope cutthroat trout and amphibians and to reduce the risk of further encroachment.

In other areas, hydrologic function has been significantly impaired, which is adversely affecting habitat within the watershed and units downstream. Lack of active restoration is likely to result in continued degraded conditions.

Restoration of species integrity in areas assigned very high priority should include a long-term, focused effort that is well integrated with other restoration needs. Actions are generally compatible with other restoration needs. Restoration of aquatic processes in areas assigned this priority should be given preference over other restoration needs where conflicts exist, allowing a measure of watershed recovery before any other efforts are initiated that could slow recovery of watershed condition.

HIGH TO MODERATE PRIORITY

High to moderate priority is assigned to situations or areas with moderate to high potential that are capable of supporting strong to moderate populations of at least one imperiled species. Included also are those watersheds contributing significantly to areas that support at least one at risk species, even if the watershed itself does not support at risk species or habitat with moderate or high potential. Departures from the historic species assemblage may have occurred in some areas, due to brook trout encroachment, or in areas where introgression of westslope cutthroat is suspected. These departures are limited to specific areas, however, and are not considered widespread across the ERU. Restoration of species assemblages with high to moderate priority needs to be a long-term focused effort that is well integrated with the needs of other resources.

Departures from historic hydrologic function and processes may also have occurred in some ERUs with this priority. Hydrologic function has been impaired to a moderate or high degree, and these impacts affect both habitat in the specific watershed and affect or potentially affect downstream areas. Aquatic restoration should be balanced with other restoration needs. Other management actions should not retard recovery of these areas, and they should be integrated with restoration actions that provide for or accelerate restoration.

LANDSCAPE ECOLOGY THEMES

The landscape ecology themes are organized into two groups: (1) restore and (2) conserve; and two areas of focus: (1) ecological processes and (2) species integrity. Since alterations of terrestrial disturbance regimes are widespread over the entire subbasin, no entire ERU has a conserve theme. This is true, even in wilderness areas, because of the pervasive effects of fire suppression**.** Individual areas or vegetation response units (VRUs) may support a conserve theme in some ERUs. Restoration of process and restoration of species integrity are more integrally related than in the aquatic themes. Where species integrity has been damaged, most likely processes of fire, insects, disease, and succession, have also been altered.

Species integrity may be generally intact in most parts of an ERU, but the theme is assigned on the basis of those elements where significant departure has occurred. Those ERUs with significant areas that historically supported whitebark pine or bunchgrass would be assigned a restore theme. The priority is based on the historical importance of that element and the degree of departure. Landscape ecology themes are displayed in Map 63.

Restore Terrestrial Processes

This theme is recommended for areas where natural ranges of composition, structure and process, and consequently, habitat, are outside the historic range, and where continued traditional management threatens the loss of habitats, communities, or populations. The restore process theme generally includes restoration of more natural disturbance regimes, or carefully designed simulations of disturbance, and restoration of successional trajectories and landscape dynamics.

Conserve Terrestrial Processes

The conserve terrestrial processes theme is recommended for areas where current composition, structure, process, and habitats are within the historic range. These units are considered to be in "good condition". Recent natural or managed disturbance processes have been commensurate with historic processes. The conserve terrestrial processes theme assumes that kinds and rates of disturbance appropriate to the setting will be sustained, including fire regimes, successional trajectories, and spatial dynamics of the landscape mosaic.

The conserve theme may also apply to elements that are limited, compared to their historic extent. The appropriate actions in this situation may include conservation of existing remnants and restoration of deficient elements. Only White Creek shows conditions and processes in place sufficient to support this theme at the ERU scale. Certain vegetation response units (VRUs) within an ERU may merit a conserve theme.

Restore Species Integrity

The restore species integrity theme is applied to areas where species integrity has been compromised by introduction of non-native species. In two of the most altered settings, whitebark pine forests and foothills grasslands, both processes and species integrity have been seriously compromised in some ERUs.

Conserve Species Integrity

The conserve species integrity theme is recommended for areas where species integrity of plant or animal communities is high, and the area represents a local stronghold of species otherwise highly affected by introductions of non-native organisms in other ERUs. Generally, species integrity is highly impacted throughout the range of whitebark pine forests (VRUs 1, 2 and 9) or foothills grasslands (VRUs 3 and 12), so few ERUs support this theme. Most other vegetation response units in an ERU may merit a conserve species integrity theme.

The actual character of restoration or conservation will depend highly on the ecosystem being considered, as well as the kind and amount of departure. These are described in more detail in each ERU, and may be addressed by vegetation response unit, elevation zone, or plant community as appropriate.

Priorities are assigned based on the degree of departure and risk of loss.

VERY HIGH PRIORITY

Very high priority is assigned to situations where species or habitats are at great risk of loss from alteration of disturbance regimes or successional pathways. For example, restoration of whitebark pine communities (both process and species integrity) is given a very high priority wherever this community type historically occurred with any significance. Restoration of low elevation bunchgrass communities is often similarly assigned a very high priority because of the impacts of invasion by non-native species throughout the range of occurrence. Conservation of existing cedar old growth is assigned a very high priority because of extensive past harvest and the rarity of this community type. This strategy appears as a restore terrestrial processes theme, because the cedar old growth will require both retention of existing old growth and restoration of old growth patch size and continuity in the landscape.

HIGH PRIORITY

High priority is assigned to situations where habitats or communities have suffered significant changes that may highly impact habitats, successional pathways, or ability to recover from likely disturbance. Restoration of frequent low severity fire in ponderosa pine communities is an example of a high priority. Restoration of whitebark pine is a high priority where historical occurrence was limited, or where recent fire frequency has been closely aligned with historic.

MODERATE PRIORITY

Moderate priority is assigned to situations where plant community composition, structure or process has been altered, but elements known to be highly limited, like old growth, have not been highly affected. All components of species and communities occur, but they are not as well represented as historically. Higher priority needs should be addressed first. The most common moderate priorities are increased uniformity of patch size and stand structure in ERUs where harvest has occurred.

WILDLIFE THEMES

The wildlife themes address two primary criteria: (1) wildlife species integrity, and (2) wildlife security. These two criteria are further defined with recommendations for either restoration or conservation of these elements.

The wildlife species integrity theme addresses the existing status of species relative to their presettlement status. Human caused impacts include the extirpation of some native species, the introduction of non-native species, and population level impacts. Specific examples include: the extirpation of grizzly bears and mountain quail; the introduction of Merriam's turkeys and other non-native upland game birds coupled with pathogen introductions; significant declines in alpine lake amphibian populations as a result of introduced non-native fish; and population declines in lynx due to historic trapping mortality. Significance of impacts to wildlife species integrity is also relative to the difference in standards for human impacts in designated wilderness versus the non-wilderness areas.

Habitat integrity, which is highly dependent on ecological process integrity, is addressed on a landscape scale by the landscape ecology themes. However, there are discrete habitat elements that may be critically important to a specific species in a specific location that cannot be addressed on a landscape scale. These are identified within relevant ERU wildlife narratives.

The wildlife security theme addresses the needs of species that are vulnerable to human disturbance. Significance of vulnerability varies depending on species, life stage, time of year, and location. Species are generally most vulnerable to human disturbance during reproductive periods and in the locations in which these occur. Vulnerability for many species also increases in wintering areas when maintenance of body temperature requires increased energy reserves while food availability decreases.

Motorized use of roads and trails can contribute to wildlife security impacts. These include winter snowmobile use. Salting and baiting can habituate wildlife and increase vulnerability of animals to both hunters and predators.

Habituation of wildlife to refuse and livestock feed at administrative sites, private residential sites, campgrounds, and campsites also contributes to wildlife vulnerability. Some rare species that may resemble legally hunted species are at risk for hunter mortality due to misidentification.

Significance of impacts to wildlife security is also relative to the difference in standards for human impacts in designated wilderness versus the non-wilderness areas. Concentrated human use in alpine environments can impact vulnerable wilderness dependent species, including wolverines and mountain goats.

Many important and limited wildlife habitats are also those that are desirable for human habitation and potential for wildlife security impacts are increased in these areas. These include low elevation, south facing slopes that are snow free for longer periods, riparian habitats, and meadows. Wildlife themes are displayed in Map 64.

RESTORE WILDLIFE SECURITY

The restore wildlife security theme recommends restoration or amelioration of impacts in those ERUs that have important wildlife security threats or that require further investigation to determine significance of potential impacts. The restore theme is applied where impacts to security may threaten specific vulnerable species.

CONSERVE WILDLIFE SECURITY

The conserve wildlife security theme recommends conservation of existing wildlife security to avoid future degradation. In some cases, further investigation may be necessary to confirm wildlife security status. While this designation may apply to most of the ERU, some local conditions may warrant security improvement.

RESTORE WILDLIFE SPECIES INTEGRITY

The restore wildlife species integrity theme recommends restoration or amelioration of impacts in those ERUs that have important wildlife species integrity impacts or that require further investigation to determine significance of potential impacts. The restore theme is applied where impacts to species integrity have resulted in populations being completely lost or significantly reduced from historic levels.

CONSERVE WILDLIFE SPECIES INTEGRITY

The conserve wildlife species integrity theme recommends conservation of existing wildlife species integrity to avoid future degradation. In some cases, further investigation may be necessary to confirm species integrity status. While the conserve designation may be appropriate for most of the ERU, local conditions may warrant restoration.

Priorities are assigned on the basis of degree of threat to species security or integrity.

VERY HIGH PRIORITY

Very high priority is assigned to themes in ERUs where species have the greatest existing or potential threats to species security or species integrity. These include populations that are currently declining associated with ongoing threats or potential threats to species integrity. An example is declining amphibian populations where the presence of predatory brook trout is a continuing threat. Motorized vehicle use on bighorn winter range or elk calving ground where populations are declining, are examples of very high priorities for security restoration.

HIGH PRIORITY

High priority is assigned to themes in ERUs where threats to security and integrity are important, but may be less critical than those with very high priority designations. High priority is assigned to ERUs where important habitat exists, but may not be as significant to populations as habitats in other ERUs. These designations were assigned using knowledge currently available. In many cases, further investigations are warranted to confirm or adjust these evaluations.

ROADS THEMES

Roads are an element in the landscape that pose unique complexities. The effects of roads can be linked to a great many resource areas. The extent and intensity of these effects vary with site-specific factors and with the scale of evaluation. The subbasin scale is useful in providing the overall context for road management.

Road themes are a product of integrating functional themes. They address future road maintenance and development in terms of socioeconomic needs and conserving and restoring biophysical processes, functions, and elements. Trail themes respond to recreational demands and resource sensitivity.

Road densities have been used as effects indices in order to evaluate the effects of roads and road related impacts. The pathways of these effects vary by resource area and, in many resource areas, levels of effect are estimated by broad correlations. An evaluation of actual effects is needed.

Roads also have beneficial effects, providing access for a variety of uses including recreation, vegetation management, fire suppression and commerce. Road system management must reflect an interdisciplinary analysis of resource benefits and consequences. Road management objectives are used to define objectives for a given road, its uses, maintenance schedule and operating life.

ROAD MANAGEMENT CONSIDERATIONS

Effects of roads upon aquatic resources can occur through on-site sedimentation delivered to streams, movement or migration blockages at stream crossings, floodplain and riparian alteration from streamside roads, and slope hydrology effects through subsurface flow interception. The degree to which these impacts occur depends greatly upon site-specific factors such as proximity to streams, soils factors, road uses, and road grades. Proper and timely road maintenance is very important in preserving drainage function and minimizing sedimentation and road failure risks.

Effects of roads on terrestrial resources can take many forms. Roads increase human activity and therefore can affect habitats and disturbance-sensitive species. Roads act as a conduit for noxious weed spread. Roads form barriers to migration and propagation of some plants and animals, as well as causing direct compaction and disturbance of the roadway itself.

Roads can facilitate certain types of wildland and developed recreation, provide access for vegetation management and the administration of the land, and provide access to mineral claims, grazing allotments, and private ownerships. Roads can also induce adverse effects upon such things as scenic resources and unroaded recreation opportunities. Roads also increase the potential for vandalism and poaching. Roads are linked to a great many resource areas and effects pathways.

Recommendations from the *ICRB Science Assessment* suggest reducing the adverse effects of roads. In the Selway and Middle Fork Clearwater subbasins, this is an overarching objective. It is particularly important in the areas covered by this assessment where roads have been developed for timber harvest access. The means to achieve reductions in adverse road effects lies in quality road management that evaluates effects within the ecological context, and prescribes management and treatments to address those effects.

Road themes have been developed to provide road management focus to the ERUs within the subbasin. This provides the ecological context at the subbasin scale. The road themes facilitate integration of the resource themes and are themselves an integration product. They do not resolve all road concerns and conflicts between resource themes and uses. However, if implemented as recommended at the ERU scale, the road themes should reduce the risks to ecological processes while preserving most of the beneficial uses associated with roads. The continual review, evaluation, and documentation of road management objectives at watershed and project level scales are critical. It is important to remember that notwithstanding the ERU road themes, the full range of road treatments available to address adverse road effects applies to all ERUs where roads occur.

This assessment provided an opportunity to review the transportation system at a broader scale than individual project analyses. Opportunities exist to re-pattern the road system to improve the efficiency of the road network, while reducing resource effects.

An important concept associated with road system re-patterning is the ephemeral road system. In an ephemeral road system, the transportation system consists of a core permanent road system that persists through time; the core system is fed by a network of temporary roads that exist for a short-term, specific purpose, typically vegetation management (timber harvest). By managing access under this ephemeral concept, some of the long-lived press disturbances (for example, sedimentation) associated with roads can be avoided.

The ephemeral road system concept is applicable across the subbasin for vegetation treatment needs where commercial timber harvest can be designed for ecological needs. However, its greatest utility is when applied to vegetation response units 1 and 6, and to a lesser extent 4, 5, 7, and 10. Typically, ERUs with the reduce road density theme will employ the ephemeral concept. Roads to be treated to achieve reductions in road density are primarily dirt roads. Transportation planning maps that present possibilities for road reduction and road management under the ephemeral concept are included in the project file. The roads theme definitions applicable in the subbasins are shown below.

Wilderness

The wilderness theme was applied to ERUs where most or all of the unit is within designated wilderness and roads are prohibited by law. Roads may be present in these ERUs that should be managed to maintain important wilderness portals.

Backcountry Access

The backcountry access theme was applied to ERUs where a low level of roads exists in mostly a backcountry environment. Many of these ERUs have large proportions of roadless areas mapped within them and, in fact, a number of the backcountry access roads are included as part of the roadless acreage. These roads are part of the roadless character and values associated with roadless areas. It is important to maintain and manage these roads commensurate with these values.

Maintain Core Road System and Reduce Adverse Effects of Existing Road System

This theme applies to areas where the existing road system (miles and distribution) is at a level where it generally provides sufficient access for the next 10 to15 years (in some subwatersheds the existing road system may be more than is needed). Many of the existing routes will be retained, although this theme does not preclude removal of local roads that through watershed analysis and transportation planning (roads analysis) can be identified as excess to the transportation system. Conversely, this theme recognizes that construction of local roads, primarily temporary, may also be required.

Reconstruction of some road segments may be appropriate to reduce the risks of sedimentation and to address stability hazards. Efforts to adequately document appropriate road management objectives and to develop road maintenance schedules are very important in these ERUs.

Maintain Existing Road System with Possible Future Development

This theme focuses on maintaining the existing road system. This theme applies where additional road development may be needed in the 10 to 15-year time frame to treat vegetation. These roads may be either temporary or permanent and should consider the ephemeral transportation concept.

Defer New Roads

The theme is appropriate where additional road development is not anticipated in a 10 to 15 year time frame. This theme applies to ERUs where aquatic potential and integrity are high and where there are few existing roads. Opportunities to reduce road related effects would rely heavily on quality road maintenance that will likely require site-specific treatments.

Reduce Road Density and Reduce Adverse Effects of Roads Being Retained

This theme is applied to ERUs where fewer roads are needed for the next 10 to 15 years. Road densities can be reduced to reduce risks to both the terrestrial and aquatic resources. Transportation plans should reflect the ephemeral road concept. While some road segments may need to be reconstructed or relocated, the overall goal is a net reduction in road densities over time (up to 50 years according to the *ICRB Science Assessment*). Watershed analysis and transportation planning should be conducted to identify where roads are no longer needed. Reducing surface erosion on permanent roads through appropriate maintenance or stabilization treatments is also a high priority.

Trails Themes

Trails themes emphasize access to public lands by means other than highway vehicles with considerations for safety and protection of trails and other resources. They reflect access information and public preferences, appropriate signing, inventory of trail condition and use, and maintenance and reconstruction. The themes call for implementation of appropriate trail values and specifications within and outside designated wilderness, scenery management objectives (VQO-visual quality objectives), and recreation opportunity spectrum (ROS) experience, setting, and landscape objectives. Trails themes are displayed in Map 67.

Maintain Existing Trail System and Reduce Adverse Effects

This theme applies to areas where the existing trail system generally provides sufficient access for current and foreseen needs. The system of existing trails provides primary travel routes into, within, and out of the ERU; secondary routes typically exist and connect the primary travel routes. Existing routes would largely be retained. However, reconstruction and relocation of some segments may be necessary to address unsafe or adverse resource conditions.

Maintain Existing Trail System and Reduce Adverse Effects of Existing Trail System. Reconfigure Use Patterns

Explore reconfiguring use patterns to address conflicts or to accommodate future demands. In units where this theme applies, the existing trail system generally provides sufficient access. Existing routes would be retained. Reconstruction and relocation of some segments may be necessary to address adverse safety or resource conditions. The existing trail system provides the primary travel routes into, within, and out of the ERU. The distribution of user types within the ERU should be explored to address use demands as well as impacts to other resources (such as wildlife).

Maintain Existing Trail System and Reduce Adverse Effects of Existing Trail System. Reduce Off-Trail Impacts

This theme applies to units where the existing trail system generally provides sufficient access. Existing routes (system trails only) would be retained. Reconstruction and relocation of some segments may be necessary to address adverse safety or resource conditions. The general topography or popular recreation areas encourage travel off developed travel routes. Management of this unit should emphasize access management, trail user education and trail and site rehabilitation.

Inventory Trails to Determine Reduction in Mileage and Reduce Adverse Effects of Retained Trails

Trail density and adverse effects can be reduced in this theme. The existing trail system includes an adequate core travel system that provides access into, within and out of the ERU. Some trails may exist in this unit that have similar destination points or parallel core travel routes. Transportation planning should be conducted to identify which trails should be retained within the landscape. Reconstruction and relocation of some segments may be necessary to address adverse safety or resource conditions. Trail inventories are not complete at this time, and determination of reduction in trail miles will be done on a case-by-case basis, as information becomes available.

Recreation Themes

The recreation themes are organized into two general groups: (1) restore and (2) conserve. The themes focus on three sets of standards for measuring resources, scenery, and social conditions: (1) the recreation opportunity spectrum (ROS); (2) the visual quality objectives (VQO) or scenery management system (SMS); and (3) the opportunity classes (OC) within the Selway-Bitterroot Wilderness as defined in the *Selway-Bitterroot Wilderness General Management Direction*. (See Appendix G for ROS, VQO and OC descriptions.)

Recreation opportunity spectrum and visual quality objectives have been delineated for the subbasins through the forest plan and project level planning processes. Opportunity classes were delineated for the Selway-Bitterroot Wilderness through a wilderness planning (limits of acceptable change) process. In ERUs that contain designated Selway-Bitterroot Wilderness, four wilderness opportunity classes further define the primitive ROS characterization. The opportunity class descriptions provide managers with a framework for managing toward the desired future condition of the Selway-Bitterroot Wilderness by outlining desired resource, social, and managerial settings. Forest Service offices that manage the Selway-Bitterroot Wilderness have detailed maps of opportunity classes available.

The restore and conserve wilderness values themes apply to wilderness within primitive recreation opportunity spectrum classes.

Conserve Wilderness Values Consistent with Defined Wilderness Opportunity Class

This theme applies where existing ecological and social conditions within the ERU are generally consistent with those described in the *Selway Bitterroot General Management Direction* for the identified opportunity classes. Human use has not significantly interrupted natural processes and appropriate recreational experience needs are met. Further inventory and monitoring may be necessary to determine existing conditions.

Restore Wilderness Values Consistent with Defined Wilderness Opportunity Class

This theme applies where ecological or social conditions present within the ERU are not consistent with opportunity class standards as defined within the *Selway Bitterroot General Management Direction*. Management should focus on minimizing human impacts and restoring natural processes within the unit. Further inventory and monitoring may be necessary to determine existing conditions.

Restore Recreation Opportunity Spectrum Setting and Experiences

This theme is applied to area where landscape and social conditions do not meet specifications outlined in the recreation opportunity spectrum table for setting, experience, and activity.

CONSERVE RECREATION OPPORTUNITY SPECTRUM SETTING AND EXPERIENCES

This theme is recommended in areas where the criteria for setting, experience, and activity is currently being met, but social and ecological threats exist that could compromise landscape character.

SPECIAL AREA THEMES

Most area themes are a reflection of the functional theme deemed most important within the ERU. In many of the ERUs located in wilderness or conversely in areas of relatively high human use, there was no single overriding area theme. In these areas, social and ecological considerations should merit equal consideration. Integration of themes occurred in wilderness areas where the theme includes both social and ecological components and in some travel corridors where scenic integrity is of overriding concern.

RESTORE WILDERNESS VALUES

This area theme usually applies to those ERUs that are designated wilderness. The theme includes social and ecological components.

Wilderness is a unique composite resource with inseparable parts. The central focus of management must be on the interrelationships of the whole. The dynamics of the ecosystem and resulting process of successional changes should proceed without disruptions or distortion by human activity. An integrated wilderness management strategy, rather than isolated strategies for each functional area, must deal simultaneously with the interrelationship among all components of the wilderness. The strategy must include an ongoing process by which the baseline character of the ecosystems can be defined and monitored to ensure that the impact of human use, in all its forms is not disruptive to the integrity of natural processes.

Wilderness values are not primarily recreational, but include human use of physical and biological resources.

This area theme identifies the need to address important threats to wilderness: (1) distortion of natural processes, primarily due to lack of fire; (2) pollution to air and water, and introduction and spread of exotic species; (3) misuse and impacts by people through recreation (though use occurs on only about 2 percent of the wilderness land base); and (4) lack of scientific monitoring (Cook and Borrie, 1995).

CONSERVE SCENIC INTEGRITY

Scenic integrity is used to describe an existing situation, standard for management, or desired future condition. This integrated theme was applied to travel corridors along the Wild and Scenic River where scenic integrity is an overriding concern in conjunction with ecologically and socially acceptable vegetation management. It indicates the degree of intactness and wholeness of the landscape character. Integrity could also be used to define the wholeness or condition of the ecosystem, but it is assumed that will be part of the overall integrated ecosystem management process.

A landscape goal of high scenic integrity should also be one of high ecosystem integrity. One does not necessarily assure the other, but basic understanding of landscape ecology establishes the environmental context for aesthetics and scenery. Ecological systems contain three changing and interrelated dimensions: physical, biological and social. All three relate to the aesthetics of ecosystems. (See Appendix G for a summary of the integrity level descriptions.)

This integrated theme is applied to those areas where scenic quality meets the criteria for landscape character as displayed in VQO (visual quality objectives) Map 62 and defined in the scenic integrity summary table. The VQO index is in the process of being converted to the scenery management system (SMS). The two systems are similar, but the SMS measures scenic integrity as the array of environmental features that make a place naturally complete. VQO refers to the visibility of management activities on the land solely, while the SMS includes consideration for ecosystem integrity. Appendix G contains the VQO terminology as well as that used in SMS.

SUMMARY OF THEMES BY ERU

The following table displays the functional and area theme for each ERU.

Table 5.1: Summary of Themes for Each ERU

ERU	Aquatic Theme	Landscape Ecology Theme	Wildlife Theme	Roads Theme	Recreation and Trails Theme	Area Theme
Middle Fork Clearwater River	Restore process/ conserve species. MODERATE	Restore processes/restore species. HIGH	Restore security/conserve species. HIGH	Maintain core road system and reduce adverse effects.	Conserve ROS. Maintain existing trail system and reduce adverse effects. Reconfigure use patterns.	Conserve scenic integrity.
Clear Creek	Restore process/ conserve species. VERY HIGH	Restore processes/restore species. HIGH	Restore security/conserve species. VERY HIGH	Reduce adverse effects and reduce road density.	Conserve ROS. Maintain existing trail system and reduce adverse effects. Reconfigure use patterns.	Aquatic: restore processes/ conserve species.
Lower Selway Canyon	Restore processes/ conserve species. MODERATE	Restore processes/restore species. HIGH	Restore security/conserve species. VERY HIGH	Maintain core road system.	Conserve ROS. Maintain existing trail system and reduce adverse effects. Reconfigure use patterns.	Conserve scenic integrity.
North Selway Face	Restore processes/ conserve species. HIGH	Restore processes/conserve species. HIGH	Restore security/conserve species. VERY HIGH	Maintain backcountry access.	Conserve ROS. Maintain existing trail system and reduce adverse effects. Reconfigure use patterns.	Wildlife: restore security.

ERU	Aquatic Theme	Landscape Ecology Theme	Wildlife Theme	Roads Theme	Recreation and Trails Theme	Area Theme
O'Hara and Goddard Creeks	Restore processes/ restore species. VERY HIGH	Restore processes/conserve species. HIGH	Restore security/conserve species. VERY HIGH	Reduce road density and reduce adverse effects.	Conserve ROS. Maintain existing trail system and reduce adverse effects. Reconfigure use patterns.	Aquatic: restore processes/ restore species.
Middle Selway Canyon	Conserve processes/ conserve species. HIGH	Restore processes/restore species. VERY HIGH	Conserve security/conserve species. HIGH	Maintain backcountry access.	Restore OC. Conserve ROS Maintain existing trail system and reduce adverse effects. Reconfigure use patterns.	Landscape ecology: restore species.
Gedney and Three Links Creeks	Conserve processes/restore species. VERY HIGH	Restore processes/restore species. HIGH	Conserve security/restore species. VERY HIGH	Maintain backcountry access.	Restore OC - HIGH. Conserve ROS. Maintain existing trail system and reduce adverse effects. Reduce off-trail impacts.	Restore wilderness values.
Moose Creek	Conserve processes/ restore species. VERY HIGH	Restore processes/restore species. HIGH	Restore security/restore species. VERY HIGH	Wilderness	Restore OC. Maintain existing trail system and reduce adverse effects. Reduce off-trail impacts.	Restore aquatic and terrestrial biotic integrity.

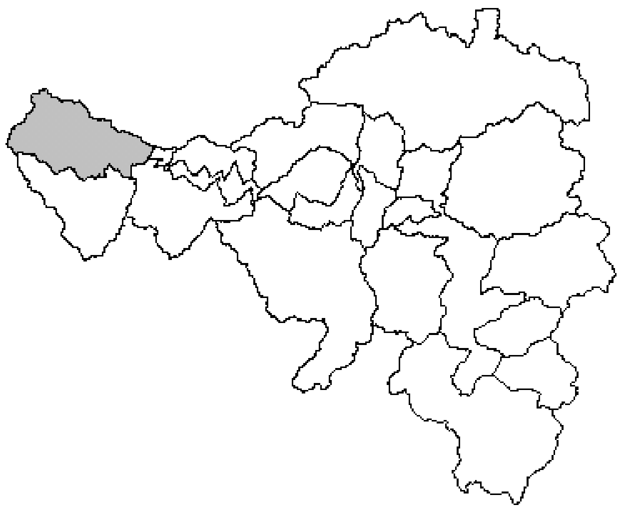
ERU	Aquatic Theme	Landscape Ecology Theme	Wildlife Theme	Roads Theme	Recreation and Trails Theme	Area Theme
Upper Meadow Creek	Restore processes/ conserve species. VERY HIGH	Restore processes/restore species. HIGH	Conserve security/restore species. VERY HIGH	Defer new roads.	Restore wilderness values. Conserve ROS. Maintain existing trail system and reduce adverse effects. Reconfigure use patterns.	Aquatic: Restore processes/ conserve species.
Lower Meadow Creek	Conserve processes/ conserve species. VERY HIGH	Restore processes/ conserve species. HIGH		Maintain backcountry access.		Landscape ecology: Restore processes.
Otter and Mink Creeks	Conserve processes/ conserve species. HIGH	Restore processes/restore species. HIGH	Conserve security/restore species. HIGH	Wilderness	Restore wilderness values OC. Conserve ROS.	Restore wilderness values.
Marten Creek	Conserve processes/ conserve species. HIGH	Restore processes/restore species. HIGH	Conserve security/conserve species. HIGH	Wilderness	Conserve and restore wilderness values OC. Maintain existing trail system and reduce adverse effects. Reduce off-trail Impacts.	Restore wilderness values.
Ditch Creek	Conserve processes/ conserve species. HIGH	Restore processes/ restore species. VERY HIGH	Conserve security/conserve species. HIGH	Wilderness	Conserve and restore wilderness values OC. Maintain existing trail system and reduce adverse effects. Reduce off-trail impacts.	Landscape ecology: Restore processes.

ERU	Aquatic Theme	Landscape Ecology Theme	Wildlife Theme	Roads Theme	Recreation and Trails Theme	Area Theme
Upper Selway Canyon	Conserve processes/ conserve species. VERY HIGH	Restore processes/restore species. VERY HIGH	Restore security/restore species. VERY HIGH	Maintain backcountry access.	Restore OC. Conserve ROS. Maintain existing trail system and reduce adverse effects. Reduce off-trail impacts.	Restore wilderness values.
Running and Goat Creeks	Restore processes/ restore species. MODERATE	Restore processes/restore species. VERY HIGH	Restore security/restore species. VERY HIGH	Maintain backcountry access. Defer new roads.	Restore OC. Conserve ROS. Maintain existing trail system and reduce adverse effects. Reduce off-trail impacts.	Restore wilderness values. Restore terrestrial processes and species.
Pettibone and Bear Creeks	Conserve processes/ restore species. VERY HIGH	Restore processes/restore species. MODERATE	Conserve security/restore species. VERY HIGH	Wilderness	Restore OC. Maintain existing trail system and reduce adverse effects. Reduce off-trail impacts.	Aquatic: Conserve processes/ restore species.
White Cap Creek	Conserve processes/ conserve species. VERY HIGH	Restore processes/ restore species. VERY HIGH	Restore security/ conserve species. VERY HIGH	Maintain backcountry access.	Restore OC. Conserve ROS. Maintain existing trail system and reduce adverse effects. Reduce off-trail impacts.	Restore wilderness values.

ERU	Aquatic Theme	Landscape Ecology Theme	Wildlife Theme	Roads Theme	Recreation and Trails Theme	Area Theme
Indian Creek	Conserve processes/ conserve species. VERY HIGH	Restore processes/ restore species. VERY HIGH	Restore security/ conserve species. VERY HIGH	Maintain backcountry access.	Restore OC. Maintain existing trail system and reduce adverse effects. Reduce off-trail impacts.	Restore wilderness values.
Deep Creek	Restore processes/ conserve species. HIGH	Restore processes/ restore species. VERY HIGH	Restore security /conserve species. VERY HIGH	Maintain backcountry access.	Restore OC. Conserve ROS. Maintain existing trail system and reduce adverse effects. Reduce off-trail impacts.	Restore wilderness values.
Selway Headwaters	Conserve processes/ conserve species. VERY HIGH	Restore process/restore species. HIGH	Restore security/conserve species. VERY HIGH	Maintain backcountry access.	Restore OC. Conserve and restore ROS. Maintain existing trail system and reduce adverse effects. Reduce off-trail impacts.	Restore wilderness values.

ROS (recreation opportunity spectrum)
OC (opportunity class)
SPNM (semi-primitive non-motorized
SPM (semi-primitive motorized)
RN (roaded natural)

MIDDLE FORK CLEARWATER RIVER



Area Theme: Conserve scenic integrity.
Size: 74,718 acres.
Location: Confluence of Lochsa and Selway Rivers at Lowell, ID to confluence of Middle Fork and South Fork Clearwater Rivers at Kooskia, ID.
Land Classification: Unclassified, wild and scenic river, and roadless.
Land Administration: USFS (Nez Perce and Clearwater NF), BLM, state, tribal and private.
Primary Watersheds: Maggie, Swan, Smith, Tinker, Tahoe, Lodge and Decker Creeks.
LANDMARKS: LOWELL, SYRINGA, AND KOOSKIA, ID; THREE DEVILS AND WILD GOOSE CAMPGROUNDS.

OVERVIEW

Human activity is the dominant influence in the Middle Fork Clearwater River ecological reporting unit (ERU), one of the two most densely populated and roaded ERUs in the subbasin. Scenic integrity is important to recreationists, tourists, and private landowners along the Middle Fork Clearwater River, which is a designated wild and scenic river. Throughout the ERU, timber harvest, agricultural development, diverse recreation, roads, subdivisions, grazing and tourism have altered natural landscape ecology, aquatic processes and wildlife species integrity, habitat and security. Fire suppression has impacted natural vegetation and influenced significant changes in natural sediment regimes and wildlife habitat effectiveness. Exotic wildlife and plant species have been introduced, and susceptibility to more extensive weed invasion is high. Mesic habitats dominate the ERU, and low elevation riparian areas provide valuable wildlife habitat year round.

There has been a moderate to high departure from historic aquatic disturbance regimes and a large change in the natural sediment regimes related to human disturbance. Human disturbances including timber harvest, road construction, agriculture and fire suppression have resulted in increased sediment and alteration of stream channels, especially at the mouth of streams. Large pulse disturbances caused by historic fires and floods have been replaced by permanent, sediment-producing features on the landscape, such as roads. The Middle Fork Clearwater River provides important late rearing and winter rearing habitat for fish in addition to functioning as a migration corridor.

A significant percentage of land is under state or private ownership and outside Forest Service management areas where landscape information is not available.

The Middle Fork Clearwater ERU is highly accessible and valued for diverse recreational and tourist opportunities. Private landowners value the unique opportunities offered by the wild and scenic corridor. While recreationists and landowners are sensitive to scenic values, private land development and increased visitor use are potential threats to those values and to ecological integrity.

INTEGRATED AREA THEME

CONSERVE SCENIC INTEGRITY

Scenic integrity indicates the degree of intactness and wholeness of the landscape character. It includes the physical, biological, and social dimensions of a landscape. The Wild and Scenic River Act further defines the intent to "protect the aesthetic, scenic, historic, archaeological and scientific features" in the Middle Fork Clearwater Recreational River Corridor.

Wholeness of the landscape character is threatened by human activity associated with the 304 miles of private and public roads that serve the people and communities in the northwest part of the Middle Fork ERU and U. S. Highway 12 along the Middle Fork Clearwater River, a thoroughfare for interstate tourist travel and truck transport.

Ninety-four residences under easement exist along the river and construction of an additional 83 single-family residences is allowed. The trend among private landowners is to subdivide and to dedicate their property to residential use, or commercial use within the confines of the Wild and Scenic Rivers Act. The diversity of land management entities (federal, state, tribal, and private) provides an organizational challenge for ecologically based and consistent land management practices.

The potential for more intense human influence exists considering the amount of privately owned lands, increased population growth, and tourist activity that some predict will be especially associated with the Lewis and Clark Bicentennial event. Conservation of scenic integrity and natural settings, designated semi-primitive motorized and roaded, experience, and activity characterization, will require a vegetation management approach that is ecologically appropriate and socially acceptable in the Middle Fork Clearwater Recreational Wild and Scenic River Corridor. It will be necessary to actively engage cooperation and collaboration with other federal, state and tribal agencies and with private landowners to develop strategies to limit adverse effects to riparian areas and to conserve the wild character of the wild and scenic corridor. As transition is made to the scenery management system, management of landscape dynamics will not only include visual quality, but also will become more ecologically based, focusing on biological, physical, and social interrelationships.

COMPATIBLE THEMES

RESTORE LANDSCAPE ECOLOGY PROCESSES AND RESTORE SPECIES INTEGRITY

Conserving existing late seral and old forest and recovering late seral patch size in late seral forests that are affected by harvest is a very high priority. At low elevations, dominance of bluebunch wheatgrass has shifted to dominance by cheatgrass, yellow starthistle, and other non-native species. Inventory and treatment of existing populations while maintaining weed-free areas is a very high priority. Natural ecological processes and visual diversity would be restored to express the intactness and wholeness of the landscape character.

RESTORE WILDLIFE SECURITY AND CONSERVE WILDLIFE SPECIES

Fragmentation, open road density, and ineffective road closures threaten wildlife security and habitat effectiveness. Increasing snowmobile activity could impact wintering ungulates and carnivores. Introduced upland game birds and human activity may impact native species. Conservation of native species and restoring wildlife security supports the area theme by sustaining the diversity of native species that contribute to ecosystem integrity.

RESTORE AQUATIC PROCESSES

Restoration of terrestrial pulse disturbance regimes and reduction of managed press disturbance regimes including road and harvest related sediment, water yield changes, and flood plain encroachment, both within the corridor and in tributary watersheds would contribute to aquatic habitat recovery. This would support the area theme of ecosystem integrity included in the scenery management system and would sustain the quality and diversity of recreation opportunities.

MAINTAIN A CORE ROAD SYSTEM AND REDUCE ADVERSE EFFECTS THROUGHOUT

Maintaining a core road system to accommodate visitor use and decommissioning excess roads would provide access for visitor use and protect aquatic and terrestrial resources. High potential for motorized recreation opportunities exists, but construction of additional roads does not support the area theme.

THEME INTERACTIONS

Fire restoration may require post and pre treatment of weeds to prevent spread.

Development of motorized use opportunities could threaten wildlife security.

Visitor and private landowner awareness and involvement with the theme can be encouraged.

Recreation and visitor use can be balanced with ecological integrity.

Vegetation treatments such as prescribed fire and timber harvest could conflict with the area theme.

INTEGRATED AREA RECOMMENDATIONS

- Facilitate collaboration and cooperation among the several government agencies and private owners that operate within the ERU to develop strategies to limit adverse effects to riparian areas and associated species and to conserve the scenic integrity and wild character of the Middle Fork Clearwater River corridor and tributaries as well as surrounding lands.
- Develop fire education programs. Work with home, business and landowners toward an awareness and understanding of accumulation of fires fuel hazards and to mitigate the potential for serious threats to private property and health of the land.
- Restore fire where necessary in vegetation response units (VRUs) 3 and 8. Some mechanical fuel treatment may be required in some areas prior to prescribed fire use.
- Develop information and interpretation opportunities. Consider the potential for impacts of visitors associated with the Lewis and Clark Bicentennial event with attention to sustaining ecological integrity, sense of place, historic and scenic values.
- Share resources and work toward a cooperative agreement with the Clearwater National Forest to update road management objectives that address resource needs, with adequate consideration of recreation and administrative access.

FUNCTIONAL FINDINGS AND RECOMMENDATIONS

AQUATIC

Theme: Restore aquatic processes and conserve species integrity. Moderate priority.

Aquatic Findings

The Middle Fork Clearwater River is a definitive feature of the ERU. The river is highly to moderately confined with a moderate gradient. Habitat potential is very high for steelhead/redband trout, spring chinook salmon, westslope cutthroat trout, and bull trout.

Watersheds in this ERU, composed mostly of metamorphic materials with some Columbia River basalt, are generally comprised of steep to moderate gradient channels that are highly confined in

V-shaped valley bottoms. Many streams in the ERU have been subject to rain-on-snow events, resulting in mass wasting events that shaped the channels and defined the habitat. Habitat potential for most streams in the ERU is moderate or low due to small stream size and steep gradient, and many are fishless.

Low and mid elevation basalt plateaus are present in this ERU. They do not occur elsewhere in the Middle Fork Clearwater or Selway subbasins, except for some areas within the Clear Creek ERU. Rain-on-snow events and winter floods are related to the strong effect of the coastal maritime climate. The Middle Fork Clearwater River serves as a key migration corridor for aquatic species and provides both summer and winter rearing habitat.

Existing aquatic disturbance regimes are different from the historic condition. Road construction, timber harvest, livestock grazing, hay cultivation, and other human disturbances, combined with fire suppression, have all served to change disturbance regimes from a pulse, short-term disturbance scenario to a sustained, chronic, long-term disturbance scenario. These changes have affected both the water yield and sediment regimes that existed historically, resulting in changes to instream habitat.

Existing aquatic species assemblages are similar to the historic assemblage, with two exceptions. Smallmouth bass, a non-native centrarchid, is currently present in the Middle Fork Clearwater River. Fall chinook salmon are currently not present in the ERU. Anecdotal information suggests that the river may historically have supported spawning and rearing by large, ocean-type chinook.

Aquatic Recommendations

- Increase road, headwater, riparian and erosion inventories with the objective to locate sediment and mass wasting sources.
- Increase road decommissioning and rehabilitate roads that are long-term sediment and mass wasting risks and no longer needed for forest management.
- Develop a cooperative agreement with the Clearwater National Forest to share resources to decrease road density.
- Work collaboratively with the state of Idaho to develop a watershed improvement and management plan for Suttler Creek.
- Conduct creel surveys, in cooperation with the Idaho Department of Fish and Game, to determine if the level of take of westslope cutthroat trout under current state fishing regulations is significant.
- Implement harvest regulations to protect migratory adult westslope cutthroat trout, if necessary.
- Continue monitoring summer river temperature.

Landscape Ecology

Theme: Restore terrestrial processes and restore species. High priority.

Landscape Ecology Findings

The dominant character of the Middle Fork Clearwater River ERU is a forested canyon with xeric (relatively dry) and mesic (relatively moist) forests, private development in private and state ownership, and uplands with highly altered forests dominated by fragmented mesic forests under national forest management. Overall integrity of the landscape composition is moderate, integrity of ecological process and landscape pattern is low, and integrity of species is moderate.

Moist forest uplands are limited in the subbasin and occur in the upper portion of this ERU. Early seral size classes are more extensive than typical of presettlement conditions. Mature forests and old growth are less extensive and more highly fragmented than historic conditions, due to the numerous clearcuts in most subwatersheds. The frequency of timber harvest disturbance within most subwatersheds has probably been higher than historical fire disturbance, and the pattern and composition resulting from harvest do not simulate natural disturbance processes. Harvest units are almost all clearcuts, snags and down wood have been substantially reduced, large fire-tolerant pine, larch or Douglas-fir have not been retained except in very recent years, and complete slash burning has reduced down wood further than most natural fires.

In the canyons, early seral stages (seedling and sapling) are more highly represented than historically, probably because of extensive harvest in recent years. Harvest on private and state lands has been extensive in the Harris Ridge area, where forest has been converted to agricultural land and pasture. The construction of Highway 12 and residential development in the river corridor has probably impacted coastal disjunct plant communities, especially at stream crossings. However, most coastal habitat occurs on the south side of the Middle Fork Clearwater River where fewer disturbances have occurred. Western white pine, never a dominant species, has virtually disappeared because of blister rust. Uniform sized clearcuts have reduced variability in patch size. In the drier canyons, vegetation conditions suggest fuel accumulations above presettlement ranges. Ignition frequency is not known on the state and private lands, but the juxtaposition of potentially high fuel loads and residential development are cause for concern. Susceptibility to weed invasion is high. Bluebunch wheatgrass has been replaced by cheatgrass, yellow starthistle, and other non-native grasses and forbs on many dry slopes.

Landscape Ecology Recommendations

In vegetation response unit (VRU) 17:

- Conserve and restore mesic old growth; this is a very high priority.
- Consider small, mixed severity disturbance regimes to retain some component of early seral species; this may be compatible in areas adjacent to old growth blocks on the basis of a watershed analysis.

In vegetation response units (VRUs) 3 and 12:

- Conserve weed-free areas and treat weeds; this is a very high priority.
- Collaborate with other agencies and private owners in inventory, treatment, and restoration opportunities for native grassland communities.
- Develop sources of plant materials and seed.

In vegetation response unit (VRU) 3:

- Restore frequent low and mixed severity disturbance regimes; this is a high priority and may require pre- and post treatment of weeds.
- Emphasize reducing stand density, maintaining old pine or larch, and reducing the proportion of grand fir and Douglas-fir.

In vegetation response unit (VRU) 8:

- Restore infrequent, mixed and lethal severity disturbance regimes; this is a moderate priority.
- Emphasize extending regeneration periods to allow for shrub and hardwood communities in early seral stages, increasing representation of down wood and snags, more variability in disturbance patch size, more variability in residual stand density, and more variability in completeness of slash disposal.
- Inventory coastal disjunct habitat and populations to identify populations vulnerable to harvest, fire or watershed response to disturbance. Restore western white pine as a minor seral component.

WILDLIFE

Theme: Restore wildlife security and conserve wildlife species integrity. High priority.

Wildlife Findings

The Middle Fork Clearwater River provides significant riverine and riparian habitat important to many terrestrial species including fishers, bald eagles, ospreys, and moose. Associated coastal disjunct habitat also occurs here. Disjunct species include Coeur d'Alene salamander and Pacific ring-necked snake. Mesic habitats dominate the Middle Fork Clearwater River ERU and most are in early seral structure. Mesic mixed conifer, mesic shrub, and cedar forest habitats are representative of the mesic communities. Fishers and goshawks occur in the mesic older forest types.

Ponderosa pine and Douglas-fir are the primary forest types in association with grasslands in the xeric habitats. Most are in early seral structure. The Middle Fork Clearwater contains significant elk wintering areas. The xeric late seral habitat indicates potential for flammulated owl and white-headed woodpecker habitat. Rare elements include talus slides and basalt cliffs that provide habitat for raptors and other species. A notable combination of xeric old growth adjacent to a large patch of mesic old growth occurs between Three Devils Creek and Smith Creek, indicating important habitat diversity.

Old growth ponderosa pine habitat has declined as a result of past intensive harvest and fire exclusion, with potential impacts to flammulated owls and white-headed woodpeckers. Mesic old growth has also been substantially reduced and is highly fragmented by timber harvest. As a result, early seral structure has increased. Patch size diversity has sharply declined and canopy densities have changed in some cases. The clearcut timber harvest units have been left with little standing and down dead wood habitat components. Recently burned habitats that provide unique elements like insect infestations, standing and down dead wood components, and early seral forage are absent due to fire exclusion. Forested habitat on Harris Ridge has largely been converted to agricultural land.

Availability of historic winter range for elk and deer in lower Middle Fork Clearwater has significantly declined since settlement due to weed encroachment and conversion and fragmentation of native habitats associated with agricultural, residential and road development in the area. A wintering area on state land below Woodrat Mountain has the highest open road density in the entire Selway and Middle Fork Clearwater assessment area.

Riparian habitat has been influenced by agricultural practices and residential development and by roads and highways that parallel the major streams. Motorized traffic on Highway 12 intercepts fishers and other species traveling between the uplands and the Middle Fork Clearwater River. All county roads and Forest Service Roads 286 and 470 are open to snowmobiles in winter. There is potential for impacting wintering ungulates and carnivores, including lynx.

Native mountain quail are rare. Lack of fire, conversion of shrub galleries by agricultural practices, and introduced upland game bird species and disease contribute to impacts. Introduced Merriam's turkeys are thriving and the significance of their impacts to native populations of gallinaceous birds or other species is unknown.

Wildlife Recommendations

- Restore or conserve old growth integrity and natural processes in xeric and mesic habitats. Allow more natural tree regeneration periods to facilitate the natural succession of shrub and hardwood communities important for wildlife habitat, including lynx and snowshoe hare habitat, and migratory land birds. Retain more standing and down wood to provide for important denning, nesting, and foraging habitat needs.
- Consider forming a local wildlife conservation district to address the reduction and fragmentation of winter range that is increasing due to residential and

agricultural development, including weed encroachment. Investigate status of impacts to raptors from power lines without protection modifications. Work with federal wild and scenic river administrators to address conservation of important wildlife habitat attributes on easement properties, such as bald eagle winter perching and roosting habitat. Additional dwellings, residents, and traffic will increase impacts to wildlife security in the river corridor. Consider federal acquisition of these vacant properties as they become available.

- Cooperatively address amelioration of impacts from Highway 12 to fishers and other vulnerable wildlife species. Assess forest road closure breaches and resolve problems. Explore opportunities to reduce road densities, where feasible, on national forest lands. Recommend to the State of Idaho that it reduce state land road densities to conform to state wildlife objectives. Investigate winter snowmobile use and related impacts to wintering ungulates, carnivores, and other vulnerable wildlife species.
- Develop inventory and monitoring strategies for carnivores including lynx and fishers, coastal disjunct associated terrestrial species, neotropical migrants, and old growth dependent avian species including goshawks, white-headed woodpeckers, flammulated owls, and great gray owls. Investigate mountain quail status.

ROADS

Theme: Maintain a core road system and reduce adverse effects throughout.

Roads Findings

The Middle Fork Clearwater River ERU contains approximately 304 miles of existing road for an overall road density of 2.61 mi/mi^2. State, county, highway district, Clearwater National Forest, Nez Perce National Forest, and private entities administer roads in the ERU. Approximately 120 miles or 40 percent are Forest Service roads. The private and public roads serve properties, residences, and communities throughout the western half of the ERU as well as along the Middle Fork Clearwater River. State Highway 12 is a main arterial through the ERU.

Main National Forest roads include Road 101 on the north side of the Middle Fork Clearwater River and portions of Road 286, Tahoe, Road 653, Lodge Point, and Road 470, Swiftwater Road on the south side of the river.

Due to the proximity of this ERU to population centers, the road system provides a high potential for motorized recreation opportunities. Currently, 24 percent of the roads in this ERU are evaluated as having seasonal and vehicle use restrictions placed upon them. These miles are typically on Forest Service roads, as information on other lands and ownership is not available.

The Forest Service roads were mostly constructed to provide timber harvest access, although several of these routes, as noted above, have become important for recreation and administrative purposes. Consequently, the road system is composed of a variety of roads ranging from gravel surface multipurpose arterials and collectors to local, overgrown, dirt roads. Furthermore, some of the standards and techniques relative to logging and harvest access have changed, resulting in either an excess of roads in localized areas or unwanted roads in specific areas. Preliminary transportation analysis has been performed (on the Nez Perce National Forest lands) based upon harvest access needs and area transportation plans (ATPs). These efforts indicate that approximately 19 miles of road in the Middle Fork Clearwater River ERU are excess to the transportation system needs. Several roads tributary to Road 286 have been decommissioned in recent years.

Roads Recommendations

- Further refine transportation planning efforts for the Forest Service road system in the ERU. This analysis should be conducted as part of watershed analysis and should incorporate the requirements of roads analysis. The intent of the analysis should move toward updated detailed road management objectives and should include adequate consideration of recreation and administrative access needs as well as resource needs.
- Further refine the evaluation of roads that may be candidates for decommissioning or obliteration.

RECREATION AND TRAILS

Recreation theme: Conserve recreation opportunity spectrum (roaded natural and semi-primitive non-motorized experience, activity and setting.)

Trails theme: Maintain existing trail system and reduce adverse effects of existing trail system. Reconfigure use patterns to address conflicts or to accommodate future demands.

Recreation and Trails Findings

About one-third of the ERU is within national forest boundaries, the remaining land base is privately owned, state, or Bureau of Land Management land. The Kooskia National Fish Hatchery (U. S. Fish and Wildlife Service) is located near Kooskia. Land use has historically been agricultural, based on ranching and timber harvest, but the community profile has been gradually shifting to commercial uses and residences for professionals. The trend among private landowners is to subdivide their property for residential and commercial use.

The Middle Fork Clearwater River is designated as a National Recreation River, and lands one-fourth mile each side of the river and visible from the river are managed under the jurisdiction of the Wild and Scenic Rivers Act (1968). The Lewis and Clark Route, fish, Clearwater elk herd, Selway-Bitterroot Wilderness, and clear, free-flowing rivers appeal to the public. Driving for pleasure, picnicking, and camping are popular. Anglers travel from considerable distances to fish for cutthroat and steelhead trout. Many visitors and local residents enjoy summer floating, boating and swimming. The wild rivers are becoming increasingly popular for recreation and for residences. Some sources suggest that as many as four million people could visit the area in observation of the Lewis and Clark bicentennial from 2001 to 2006. Some predict that those who pass through the area and see it for the first time will be attracted to the natural beauty and relative remoteness enough to buy property and to move into the scenic, peaceful valleys.

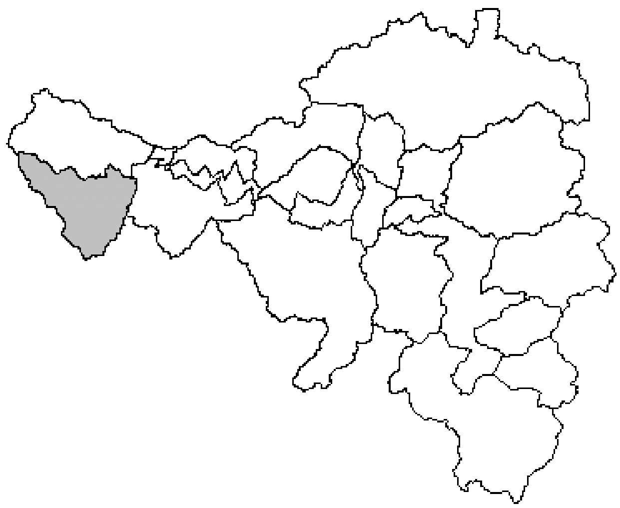
There is great potential for interpreting natural and historical attractions, especially associated with the bicentennial of the Lewis and Clark expedition.

Recreation and Trails Recommendations

- Facilitate collaboration and cooperation among the several government agencies and private owners that operate within the ERU to address access issues.
- Work with the State of Idaho, Idaho Fish and Game, the U. S. Fish and Wildlife Service, the Bureau of Land Management and private land and business owners to develop strategies to limit adverse effects to riparian areas, and conserve the scenic integrity and wild character of the Clearwater River corridor and tributaries as well as surrounding lands.
- Work with home and landowners toward an awareness and understanding of accumulation of fire fuel hazards and to mitigate the potential for serious threats to private property and health of the land.
- Consider accommodation for and impacts of visitors associated with the Lewis and Clark Bicentennial with consideration to sustaining ecological integrity and

sense of place, historic, and scenic values. Utilize the opportunity for education and interpretation with local residents and visitors.

CLEAR CREEK



Area Theme: Restore aquatic processes and conserve aquatic species integrity.
Size: 65,081 acres.
Location: Tributary to Middle Fork Clearwater River at Kooskia, ID.
Land Classification: Undesignated and roadless.
Land Administration: USFS, BLM, state, tribal and private.
Primary Watersheds: Clear Creek, Leitch, Brown Springs, Big Cedar, Solo and Kay Creeks.
Landmarks: Kooskia National Fish Hatchery, Lookout Butte, Corral Hill Lookout, China Point, Potato Hill, Crane Hill and Lytle Cow Camp.

OVERVIEW

The Clear Creek ecological reporting unit (ERU) is located near Kooskia, Idaho and is important from a wide range of social and resource perspectives. It supports high potential for aquatic species. Clear Creek is a large watershed, and significant tributary streams include Leitch Creek, Middle Fork Clear Creek, Big Cedar Creek, Solo Creek, South Fork Clear Creek, and Kay Creek. Timber harvest, residential and agricultural development, roads, fire suppression, and grazing have altered natural landscapes, aquatic processes, and wildlife species integrity, habitat and security.

Lower Clear Creek is mostly private land containing several subdivisions. A flood event in the lower Clear Creek watershed in June 1964 resulted in erosion in the upper stream channel with gravel and cobble deposits responsible for aggradation and formation of a large alluvial fan at the mouth of Clear Creek. Encroachment and human activities within the riparian zone have resulted in loss of large deciduous riparian vegetation. Clear Creek was channelized in the lower reaches to control flooding.

The principle management needs in this watershed are aquatic restoration on Clear Creek and the main tributaries, vegetation restoration, and conservation of the roaded recreation experience to a degree that does not prevent or significantly postpone the achievement of the aquatic objective and impose adverse impacts to wildlife security.

Fire suppression has reduced the incidence of large fires in the past 60 years. Large fires historically affected hydrologic regimes and erosional processes, but now human activities such as road building, timber management, recreation, and home development cause the primary changes in watershed condition.

Steelhead/redband trout and mountain whitefish dominate the aquatic species assemblage in the lower reaches of Clear Creek and its tributaries. Westslope cutthroat trout is the dominant species in the upper reaches of the mainstem and tributaries. The species assemblage is probably similar to the historic assemblage in most of the watershed, although abundance of anadromous and adult fluvial fish is less.

In the upper elevations in Clear Creek, mature forests appear to be much more highly fragmented and substantially reduced from historic conditions, due to the numerous dispersed clearcuts in the subwatersheds. Grand fir and Pacific yew old growth is a rare element important to wildlife and has been heavily impacted by timber harvest. Heavy timber harvest has resulted in early seral forest structures with low to moderate canopy density. The pattern and composition resulting from harvest do not simulate natural disturbance patterns. Snags and down wood that provide important wildlife habitat have been substantially reduced. Most of the upper subwatersheds are within their typical fire return interval. In the dry canyons in Clear Creek, large old ponderosa pines have been replaced by more shade tolerant species. Areas dominated by native bunchgrass communities that historically provided important winter range have shifted to dominance by cheatgrass, yellow starthistle, and other non-native grasses and forbs. Fire return intervals in the dryer canyons are 2 to 5 times outside their range.

INTEGRATED AREA THEME

RESTORE AQUATIC PROCESSES AND CONSERVE SPECIES INTEGRITY

Main Clear Creek and its tributaries provide unique aquatic resource values within the Middle Fork Clearwater subbasin and is a central component to recovery of at risk aquatic species. Clear Creek has high potential for steelhead/redband trout, spring chinook salmon, westslope cutthroat trout, and moderate potential for bull trout. All four species occur in the watershed. Restoration of the aquatic conditions and processes in the mainstem and tributaries is a very high management priority.

There has been a high departure from historic hydrologic regimes and sediment processes due to press disturbances such as timber harvest, road construction, subdivisions, agricultural activities, and recreational developments. There has also been a departure from historic disturbance regimes due to fire suppression. This has resulted in a change in sediment process and stream flow regimes to related fires and floods. Historically, there was rapid recovery of sediment peaks after fire and flood (pulse disturbances). With press disturbances, sediment peaks recover more slowly, with sediment levels above the natural base level.

COMPATIBLE THEMES

RESTORE TERRESTRIAL SPECIES INTEGRITY

Departures from the historic condition have occurred in the ERU. Large-scale impacts include large areas of clearcut timber harvest in the uplands, high road densities, and recreational developments and subdivisions in the lower watershed. Weed populations, especially yellow starthistle, are encroaching on the lower elevation breaklands and open forests. Controlling yellow starthistle and restoration of native bunchgrass supports the area theme. Restoring or simulating natural fire patterns is recommended to provide for restoration of ponderosa pine in the lower watershed. Restoring late seral and old growth mesic forest will help restore Pacific yew.

RESTORE TERRESTRIAL PROCESSES

Conservation of remaining old growth patches and allocation of mid and late seral patches in the upper subwatersheds for future old growth, in combination with restoration of disturbance regimes compatible with natural fire regimes, will help restore late seral forest and old growth. Weed populations are encroaching upon open forest and grasslands. Control of weed populations and restoration of native species in heavily impacted areas supports the area theme. Restoration of very frequent and frequent low and mixed severity terrestrial disturbance regimes in low elevation dry and moderately moist forests will also help restore natural erosional cycles and hydrologic processes.

Conserve Roaded Natural Recreation Experience

The roaded recreation theme conserves roaded, natural semi-primitive, motorized and non-primitive recreation and this theme supports the area theme when it does not conflict with the direction to restore aquatic processes and restore aquatic condition.

Reduce Road Density and Adverse Effects

The Clear Creek ERU has approximately 300 miles of road with a road density of 3 mi/mi^2 miles per square mile. During preliminary transportation planning, 86 miles of excess roads were identified. Instream and near stream activities have affected channel morphology, cover, and habitat connectivity and complexity. Channelization of streams to accommodate roads has increased in-channel erosion and aggradations at the stream mouth. Decommissioning roads that encroach on streams and reduction of the effects of press disturbances directly support the restore aquatic processes theme.

Restore Wildlife Security

High open road and trail densities affect wildlife security throughout the watershed. Motorized use is also high and is expected to increase. Restoration of late seral and old growth forests will benefit wildlife security and habitat. Reduction of open road density by road decommissioning, road closures, control of motorized use on trails and restriction of snowmobile travel all support the aquatic restoration theme and improve wildlife security.

Theme Interactions

Conserving the roaded recreation experience may not enhance the restoration of aquatic processes or species integrity and wildlife security.

Integrated Area Recommendations

- Schedule the Clear Creek watershed assessment as a high priority within the subbasin so the opportunities for aquatic restoration are identified and scheduled.
- Further define and evaluate transportation planning needs during the watershed analysis process, so that opportunities for road decommissioning, and maintenance for sediment reduction, especially in stream zones can be evaluated.
- Evaluate open road density as part of the process due to security concerns for wildlife habitat.
- Plan for motorized recreation during the watershed analysis transportation process and accommodate the public needs for roaded recreation when compatible with aquatic restoration and wildlife security needs.
- Work with private landowners to restore riparian vegetation and the stream channel in main Clear Creek.
- Continue cooperation with the U. S. Fish and Wildlife Service on passage of non-target fish through the hatchery near the mouth of Clear Creek, and establishment of a naturalized spawning population of spring chinook salmon in Clear Creek.
- Monitor reaches below Kay Creek to determine if brook trout are expanding their range in the watershed.
- Restore and conserve late seral and old growth forests in mesic and xeric habitats.
- Restore more natural disturbance regimes through the design of timber harvest and prescribed fire.

- Inventory and conserve bunchgrass communities. Collect and propagate native grassland species to use in restoration.
- Inventory noxious weeds and work with private landowners, Nez Perce Tribe, Idaho County, and the State of Idaho to control weeds.

FUNCTIONAL FINDINGS AND RECOMMENDATIONS

AQUATIC

Theme: Restore aquatic processes and conserve species integrity. Very high priority.

Aquatic Findings

Watersheds in the Clear Creek ERU, which are composed primarily of Columbia River basalt and metamorphic geologic materials, are characterized by mid elevation basalt plateaus, steep breaklands, and low relief hills. Streams are generally moderate to high gradient and flow through V-shaped or trough shaped valley bottoms. Debris avalanches and debris torrents are common on steep slopes, resulting in channel scouring and debris recruitment in breakland streams. Mainstem Clear Creek supports high habitat potential for steelhead/redband trout, spring chinook salmon, westslope cutthroat trout, and moderate potential for bull trout.

Stream flow regimes are dominated by snowmelt runoff at higher elevations, but spring rain-on-snow and summer thunderstorms can result in significant hydrologic responses at low to mid elevations. These natural processes largely shape instream habitat, which is variable, depending on stream order, gradient, and confinement. In lower elevations, riparian vegetation is critical to maintaining channel stability.

The existing hydrologic regime and instream habitat are significantly different than the historic condition. Channel braiding and aggradation of larger substrate materials in mainstem Clear Creek are symptomatic of both upland and instream changes in watershed condition. These changes are probably the result of a combination of timber harvest, land development, road construction in streamside areas, livestock grazing, agriculture, and removal of large woody debris from the streams. These activities have resulted in a change in the historic sediment and water yield regimes and an overall simplification of instream habitat. The most notable changes are reduction of large wood in the channel and loss of pool habitat.

Existing species assemblage is similar to the historic assemblage, except that abundance of all species is less, and non-native brook trout are present in one Clear Creek tributary. Abundance of fluvial bull trout and westslope cutthroat trout is particularly low. Upstream migration of fish is impeded by a fish-collection weir operated by the U. S. Fish and Wildlife Service in conjunction with a hatchery that propagates spring chinook salmon.

Aquatic Recommendations

Restore aquatic processes:

- Reduce road density, especially near streamside zones, or where the road crosses areas of high stream density.
- Establish erosion control where roads remain in riparian zones.
- Restore vegetation in streamside zones where timber harvest, road construction, and grazing have reduced shade.
- Develop partnerships with private landowners to restore riparian vegetation and channel integrity on private lands, and restore fire within the restrictions of a large area of urban interface and popular dispersed recreational use.
- Evaluate Leitch Creek and implement channel rehabilitation, and complete a watershed analysis in Clear Creek.

- Develop prescribed fire plans in this watershed, considering portions of the watershed are in poor condition and fires may need to be spaced over time throughout the watershed to prevent short-term impacts to watershed condition.

Conserve species integrity:

- Continue cooperation with U. S. Fish and Wildlife Service personnel on passage of non-target fish through the hatchery weir near the mouth of Clear Creek.
- Establish a naturalized spawning population of spring chinook salmon in Clear Creek.
- Complete comprehensive fisheries and habitat surveys.
- Develop and initiate a long-term monitoring program to determine trend in habitat condition, and monitor reaches below Kay Creek to determine if brook trout are expanding their range in this watershed.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore species. High priority.

Landscape Ecology Findings

The dominant character of the Clear Creek ERU is moist upland forest, which has been highly fragmented, and fragmented forest and agricultural lands in the canyons near the mouth. Development has highly altered forest conditions and processes at low elevations, and timber harvest has moderately altered conditions and processes in the headwaters. The overall integrity of landscape composition, ecological process and landscape pattern is low. Integrity of species is moderate; exotics are well established on agricultural lands, residential developments, and along roadways at low elevations.

Upper elevations in Clear Creek consist of moist forests. Large trees are less well represented due to past timber harvest. Early seral size classes (seedling, sapling, and pole) are more extensive than typical of presettlement conditions. Canopy density appears to have shifted to greater representation of low canopy conditions, probably due to more seedling and sapling stands, but perhaps due to increased mortality from root disease. Mature and old growth forests have been highly fragmented by timber harvest. The frequency of harvest disturbance within most subwatersheds has probably been higher than historical fire disturbance, and the pattern and composition resulting from harvest do not simulate natural disturbance processes. Harvest units are almost all clearcuts; snags and down wood have been substantially reduced, large fire-tolerant pine, larch or Douglas-fir have not been retained except in very recent years, and complete slash burning has reduced down wood further than most natural fires. The greatest departures appear to be in landscape pattern and old growth loss, due to harvest.

In the lower elevation moist canyons, timber harvest has been limited on national forest lands, but extensive on other ownerships. Agricultural and residential development along the bottom of Clear Creek has significantly affected habitat for coastal disjunct plant species by direct eradication of habitat, alteration of hydrologic, light and temperature regimes, and introduction of non-native species. Western white pine, never a dominant species, has virtually disappeared. Seedling, sapling, pole, and early seral shrublands have increased, compared to typical presettlement ranges. Departures from historic condition in moist canyon forests include composition, species integrity, and reduced variability of patch size, due to harvest and development.

In the drier canyons and uplands, ponderosa pines have declined due to harvest and succession, and more shade-tolerant Douglas-firs have increased. Canopy density appears to have shifted to more high canopy closure in unharvested areas of mesic and dry forests, compared to presettlement conditions. Agricultural and residential development has fragmented areas of mixed conifer and xeric forests. Most areas are generally one to two intervals outside the presettlement fire interval. Departures from fire intervals are unknown for the private lands, but likely to be two to five intervals outside their range. Bunchgrass areas have shifted from dominance of bluebunch wheatgrass to dominance by cheatgrass, yellow starthistle, and other non-native grasses and forbs. Departures from historic conditions in dry canyon forests and grasslands are found in composition, species integrity, and fuels.

Landscape Ecology Recommendations

In vegetation response units (VRUs) 7, 10 and 17:

- Conserve and restore mesic old growth; this is a very high priority. Small, mixed severity disturbance regimes to retain some component of early seral species may be compatible in areas adjacent to old growth blocks on the basis of a watershed analysis. Use watershed analysis to allocate and plan for old growth restoration.

In vegetation response units (VRUs) 3 and 12:

- Restore bunchgrass communities through conservation of weed-free areas, treatment of weeds, and reestablishment of native grasses and forbs; this is a very high priority.
- Work collaboratively with other agencies and private owners in inventory, treatment, and restoration opportunities for native grassland communities.
- Develop sources of plant materials and seed.

In vegetation response unit (VRU) 3:

- Restore frequent low and mixed severity disturbance regimes; this is a high priority. Use of timber harvest and prescribed fire may require pre- and post treatment of weeds.
- Emphasize reducing stand density, maintaining old pine or larch, and reducing the proportion of grand fir and Douglas-fir.
- In vegetation response unit (VRU) 8:
- Conserve infrequent, mixed and lethal severity disturbance regimes; this is a moderate priority.
- Emphasize extending regeneration periods to allow for shrub and hardwood communities in early seral stages, increasing representation of down wood and snags, and increasing variability in disturbance patch size, residual stand density, and completeness of slash disposal.
- Inventory coastal disjunct habitat and populations to identify populations vulnerable to, or requiring disturbance.
- Restore western white pine as a minor seral component.

WILDLIFE

Theme: Restore wildlife security and conserve wildlife species integrity. Very high priority.

Wildlife Findings

Mesic habitats dominate the Clear Creek ERU and are represented by grand fir and cedar forests. Some of the grand fir habitats are associated with Pacific yew, a rare element, and are highly preferred by moose and also provide potential lynx denning habitat. Potential coastal disjunct habitat is located in lower Clear Creek and Leitch Creek. The uplands in the Clear Creek ERU indicate significant habitat potential for neotropical migrant species. Occurrences of wolves, goshawks, mountain quail, and fishers are documented in the ERU.

Xeric habitats are a minor component of the Clear Creek ERU and are concentrated on the non-federal lands. Most of the xeric habitats are in early seral structure and bunchgrass was strongly represented historically. These habitats provide important winter range for ungulates and carnivores. The xeric forest cover type is ponderosa pine and Douglas-fir. There is little to no xeric old growth remaining in the Clear Creek ERU. The xeric late seral habitat indicates potential for flammulated owl habitat. Rare elements include talus slides and basalt cliffs that provide habitat for raptors and other species.

Ponderosa pine habitat has declined due to fire exclusion and timber harvest, potentially impacting flammulated owls and white-headed woodpeckers. Mesic old growth in upper Clear Creek has been substantially reduced and is highly fragmented by timber harvest. These habitats include the grand fir and Pacific yew component, which is rare in the subbasin. The clearcut harvest units have been left with little standing and down dead wood habitat components. Recently burned habitats that provide unique elements like insect infestations, standing and down dead wood, and early seral forage are absent. These departures have probably impacted native bird species diversity in the area including white-headed woodpecker and flammulated owl populations. Weed encroachment has impacted native bunchgrass wintering habitats significantly.

Settlement and land conversion have increased encroachment and fragmentation of winter range in the non-federal portion of the ERU. The annual rate of increase for elk over the last 10 years is declining in Clear Creek. The elk summer range habitat effectiveness in the Clear Creek ERU is substantially below objective due to open road density. Impacts from road access and use on spring elk calving in lower elevations is unknown. Snowmobile use in upper Clear Creek may impact wintering ungulates and carnivores. Riparian habitat and its accessibility to wildlife have been influenced by agricultural practices and by the roads that parallel the major streams.

Native mountain quail are rare. Fire suppression, conversion of shrub galleries by agricultural practices, and introduction of non-native upland game birds and disease contribute to impacts. Introduced Merriam's turkeys are thriving, and the significance of their impacts to native populations of gallinaceous birds or other species are unknown.

Wildlife Recommendations

- Restore or conserve old growth integrity and natural processes in xeric and mesic habitats. Conserve rare grand fir and Pacific yew habitats. Retain more standing and down wood to provide for important denning, nesting, and foraging habitat needs.
- Address the reduction and fragmentation of winter range that is increasing due to residential and agricultural development, including weed encroachment.
- Investigate status of impacts to raptors from power lines without protection modifications.
- Assess forest road closure breaches and resolve problems.
- Explore opportunities to reduce road densities, where feasible, on national forest lands.
- Investigate winter snowmobile use and related impacts to wintering ungulates, lynx, and other vulnerable wildlife species.
- Develop inventory and monitoring strategies for carnivores including lynx and fishers, coastal disjunct associated terrestrial species, neotropical migrants, and old growth dependent avian species including goshawks, white-headed woodpeckers, flammulated owls, and great gray owls. Investigate mountain quail status.

ROADS

Theme: Reduce adverse effects throughout with an emphasis on reducing overall densities

Roads Findings

The Clear Creek ERU contains approximately 300 miles of roads for an overall road density of 2.95 mi/mi^2. Approximately 180 miles or 60 percent are Forest Service roads, while the remaining are private or public roads mostly in the lower third of the drainage.

The private and public roads serve properties, residences, and communities throughout the lower portions of the drainage. Some of the communities served include the towns of Big Cedar, Clearwater, and Kooskia. Access is also provided to the Kooskia National Fish Hatchery.

Some of the main roads accessing national forest lands include: Road 286, Tahoe; Road 1106, Sears Creek; and Road 650, West Fork Clear Creek. Portions of Road 286 that provides connection to the head of Newsome Creek, currently are closed to highway vehicle travel in the fall, spring, and winter months to provide for wildlife security, particularly big game. The gates associated with this restriction have a history of being vandalized and damaged, usually during the fall hunting periods. Several refinements in gate locations have been made in recent years to minimize the likelihood of damage occurring, but concerns with the restriction devices and the ability to maintain them remains. Portions of roads Road 650, and Road 1106 have recently been reconstructed with aggregate surfacing and improved drainage. They provide dispersed driving opportunities as well as access to trailheads that in turn provide access to areas of the Clear Creek roadless area Road 1844. A single purpose, gravel surface timber collector ties the Ten Mile Flats area to Lytle Cow Camp at the head of Newsome drainage. This route is closed to all motorized use yearlong.

Due to the proximity of this ERU to population centers, the road system provides a high potential for motorized recreation opportunities. Currently, 43 percent of the roads in the ERU are evaluated as having seasonal and vehicle use restrictions placed upon them. Virtually all of these roads are within lands administered by the Forest Service.

The Forest Service roads were mostly constructed to provide access to timber, although several of these routes, as noted above, have become important for recreation and administrative purposes. Consequently, the road system is composed of a variety of roads ranging from gravel surface multipurpose arterials and collectors to local, overgrown, native surface roads. Furthermore, some of the standards and techniques relative to logging and harvest access have changed resulting in either an excess of roads in localized areas or unwanted roads in specific areas. Preliminary transportation analysis has been performed based upon harvest access needs and area transportation plans (ATPs). The analysis indicates approximately 86 miles of road in the Clear Creek drainage are excess to the transportation system needs. Several roads in Pine Knob Creek have recently been decommissioned.

Roads Recommendations

- Further refine transportation planning efforts in the Clear Creek ERU. Conduct this analysis as part of watershed analysis and incorporate the requirements of roads analysis. Update detailed road management objectives and include adequate consideration of recreation and administrative access needs as well as resource needs. Refine the evaluation of roads that may be candidates for decommissioning or obliteration.
- Evaluate travel management on Road 286; potential exists for this to become a through travel route throughout the year. Consider reducing the travel restrictions on this route commensurate with possible road reductions elsewhere in this ERU.

RECREATION AND TRAILS

Recreation theme: Conserve roaded natural and semi-primitive non-motorized experience, activity and setting as described in the recreation opportunity spectrum (ROS).

Trails theme: Maintain existing trail system and reduce adverse effects to existing trail system. Explore reconfiguring use patterns to address trail conflicts or to accommodate future demands.

Recreation and Trails Findings

National forest land comprises about one-half of the Clear Creek ERU. The remainder of the land within the ERU is privately or state owned.

The area is popular for year-round motorized use, hunting and gathering, and pressure for greater access and use is increasing. A groomed snowmobile trail follows the eastern and northeastern boundary of the ERU, and an ungroomed route exists to the southwest along a loop on Roads 1106 and 650. Portions of the routes border designated semi-primitive, non-motorized use areas of the ERU and snow machines sometimes leave the designated routes to explore areas closed to motorized traffic. The Elk City Wagon Road from Harpster to Elk City (along the southwestern boundary of the ERU attracts motorists and horse groups who enjoy retracing the one-hundred year old mining and mail supply route. Solo Creek and Kay Creek offer opportunities for access by disabled persons who wish to hunt.

There is an opportunity to increase OHV and other motorized use in this ERU where some 300 miles of roads exist. Breaching and damaging Forest Service gates is an ongoing problem.

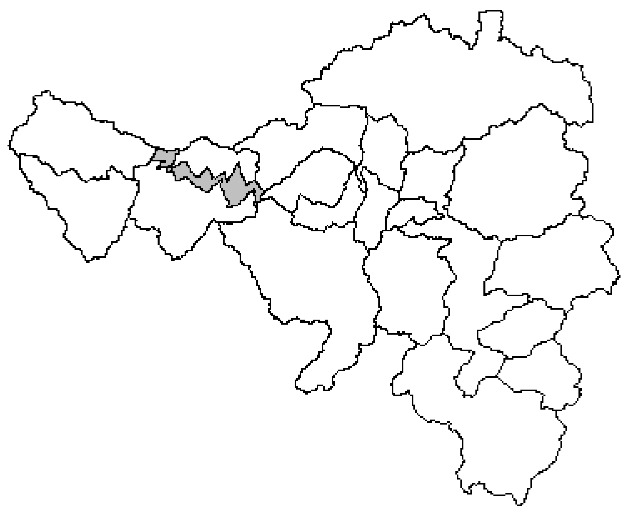
Residential development within the ERU continues to increase.

Recreation and Trail sRecommendations

- Communicate with snowmobile, motorcycle, and other off-road or all terrain vehicle groups to facilitate education and self-monitoring.
- Consider reconfiguration of road and trail use to accommodate increasing motorized use within limits of sustaining ecological integrity.
- Communicate and cooperate with private landowners concerning noxious weeds, fire use, erosion, wildlife, fisheries, and scenic integrity.

Clear Creek

LOWER SELWAY CANYON



Area Theme: Conserve scenic integrity.
Size: 19,427 acres.
Location: Selway River corridor from confluence with Lochsa River to the mouth of Meadow Creek.
Land Classification: Undesignated, wild and scenic river, and roadless.
Land Administration: USFS, state, and private.
Primary Watersheds: Roar, Cache, Daye, and SOB Creek.
Landmarks: Lowell, ID, Fenn and Selway Falls Ranger Stations, Johnson Bar, O'Hara, Boyd, and Glover Campgrounds.

OVERVIEW

The Lower Selway Canyon ecological reporting unit (ERU) is a popular recreation corridor along the wild and scenic Selway River and the route to a main portal of the Selway-Bitterroot Wilderness. Driving, camping, swimming and other water sports, wildlife watching, hunting and fishing are all popular. Scenic integrity is important to these users. Semi-primitive motorized recreation use occurs north of the river, and semi-primitive non-motorized use occurs on the south side of the river.

The Fenn Ranger Station, associated Forest Service administrative facilities, and Forest Service employee residences are situated along a two-mile stretch of the Selway River near Goddard Bar. The Nez Perce Tribe is constructing a fish hatchery on the north bank of the Selway River, across the road from the Forest Service administrative buildings at Cedar Flats.

Habitat potential in the Selway River is high for all salmonid and non-salmonid fish species. A notable feature of this ERU is Selway Falls, which is a very steep cascade reach, located about 18 miles from the mouth of the Selway River. This feature may impede upstream migration of fish during some flow levels.

Hydrologic processes have been affected by fire suppression that has interrupted pulse disturbance regimes. Road construction and development along the river and in tributary watersheds have introduced press disturbances of sediment, flood plain encroachment, and introduced barriers to fish access.

Forests are dominated by closed canopy, mixed conifer communities. Low elevation forests have been affected by past fire suppression, and noxious weeds and invasive annual plants are established along trails and roads. Moist low elevation forests and riparian areas support habitat for coastal disjunct plant species. Mesic habitats dominate the ERU in upper elevations, and lower elevations provide extremely important winter range and riparian habitat. Human activity and development have altered natural disturbance dynamics and influenced wildlife habitat and security.

The Lower Selway Canyon combines high accessibility, diverse recreation opportunities and highly valued river canyon and forest scenery. Private development and increased visitor use pose some risk to ecological and scenic values in this ERU.

INTEGRATED AREA THEME

CONSERVE SCENIC INTEGRITY

The Selway River is a designated wild and scenic river. The Wild and Scenic Rivers Act states, "Emphasis shall be given to protecting its esthetic, scenic, historic, archaeological and scientific features." Potential threats to those features include: potential construction of 22 single-family residences (39 exist) along the Selway; development by private landowners; installation and operation of a fish hatchery to be managed by the Nez Perce Tribe; activities associated with timber harvest, and increased and more diversified recreational activity, particularly motorized and off-road vehicles. Conservation of scenic integrity may require increased visitor contacts and occasional law enforcement. Since no forests remain changeless, it will be necessary to develop vegetation management plans that are both ecologically appropriate and socially acceptable in the Selway River corridor. Interpretative programs would help increase awareness of the role of natural processes in maintaining ecological and visual diversity.

Conservation of scenic integrity should be consistent with the visual quality objectives of the area and the recreation opportunity spectrum experience --- the setting and activities of the roaded, natural category along the Selway River Road, the semi-primitive, motorized category north of the Selway River, and the semi-primitive, non-motorized category south of the river.

Scenery quality standards along the river corridor are high (retention) where the setting appears to be unaltered. Otherwise, within the ERU the standards are moderate (partial retention) or slightly altered and low (modification) or moderately altered. Moving to the scenery management system would better support maintenance of more ecologically based natural landscape dynamics.

COMPATIBLE THEMES

RESTORE AQUATIC PROCESSES

Restoration of terrestrial pulse disturbance regimes and reduction of managed press disturbance regimes including road and harvest related sediment, water yield changes, and flood plain encroachment, both within the corridor and in tributary watersheds, would contribute to aquatic habitat recovery. Recovery of aquatic values will sustain the quality of recreation experience that is the basis for the area theme.

RESTORE TERRESTRIAL PROCESSES

Restoration of frequent, low and mixed severity disturbance regimes is a high priority for the low elevation dry forests. Restoration of less frequent, mixed severity disturbance regimes is a moderate priority in the more moist cedar and grand fir forests. Restoration of disturbance would address declines of fire-tolerant ponderosa pine, snags, hardwoods, and early seral communities, and reduce frequency of dense stands. Maintenance of south slopes in shrub fields in perpetuity by repeated burning for big game browse is not recommended, because of the continued soil nutrient degradation. Inventory and assessment of coastal disjunct habitats for restoration needs is part of this theme. Restoring the full array of terrestrial habitats will best sustain the diversity of recreational opportunities reflected in the area theme.

RESTORE TERRESTRIAL SPECIES INTEGRITY

Treatments to reduce weed populations and support reestablishment of native grasses and forbs are a high priority near roads and trails. Control of invasive plants in coastal disjunct habitats is also important. Collection and propagation of native seed material is recommended to establish stable adapted plant cover.

Restore Wildlife Security

Limiting development in the ERU is important to conserve important wildlife wintering and riverine habitat. Cooperate with private landowners to conserve bald eagle habitat attributes.

Restoration of wildlife security through increased management is also important in this ERU. This supports the area theme by sustaining the diversity of species that contributes to ecosystem integrity and preservation of the scenic character.

Maintain Core Road System

Maintaining the Selway River Road to accommodate visitor use and protect aquatic and terrestrial resources will support the area theme. Construction of additional roads in the canyon is generally unsuited to the area theme, the wild and scenic river designation, slope stability concerns, and the concentration of rare coastal disjunct habitat in the river bottom.

Theme Interactions

Conserving scenic integrity while restoring terrestrial and aquatic processes will require substantial investment in design of the restoration activities, and strong visitor involvement to increase awareness of the key role of such disturbances in sustaining ecological integrity.

Restoring frequent low severity disturbance regimes in low elevation dry forests may enhance the spread of weed populations. Weed population monitoring and control activities should emphasize susceptible habitats along roads and trails, and areas affected by recent fire.

Continued increases in recreational motorized vehicle use in areas of wintering wildlife may increase risk to vulnerable species. Monitoring and development of an access management plan and associated enforcement is needed.

Integrated Area Recommendations

- Develop education and interpretive programs to increase visitor and local residents' awareness of the dynamics of natural processes.
- Strictly interpret the Wild and Scenic Rivers Act, in relation to the recreation opportunity spectrum setting, experience, and activity characterizations, and to scenery management standards.
- Work with private landowners who lack scenic easements to increase sensitivity to wild and scenic river values in their development and building plans, and help address fire risk factors on private lands.
- Develop management plans to use prescribed fire, where possible, with consideration for recreation and public property-owner concerns, or use a combination of mechanical and fire treatments to reduce stand density and fuels, favor ponderosa pine, and produce some early seral habitat, including shrubs, hardwoods and snags. Align disturbance frequency and severity with presettlement disturbance regimes, as much as feasible.
- Continue to address aquatic resource concerns in maintenance and improvement of the Selway River Road, including reducing encroachment, improving fish passage in culverts, reducing surface and mass erosion, providing appropriate drainage and providing a maintainable travel way.
- Cooperate with private landowners to address weed infestations, nurture interest in native plant communities, and provide advice on native plant community restoration when interest exists.
- Restore wildlife security through access management and limit additional development in the canyon.

Functional Findings and Recommendations

Aquatics

Theme: Restore aquatic processes and conserve species integrity. Moderate priority.

Aquatic Findings

Steep gradient streams generally characterize watersheds in the Lower Selway Canyon ERU, which are derived largely from metamorphic materials, with substrate dominated by large gravels, cobbles, boulders, and bedrock. Most tributaries to the Selway River are first or second order, supporting habitat with low or no potential for fish. Habitat potential in the Selway River is very high. Winter rain-on-snow events result in high winter stream flow peaks intermittently. This ERU is within the maritime climate and within the rain-on-snow zone. Floods are a part of the natural hydrologic regime.

The Selway River functions as a key migration corridor for aquatic species as well as providing important winter and summer rearing habitat. Spawning by spring chinook salmon has been documented in the river in the past decade. Spawning in the river by other species has not been documented. In general, access into tributaries is impeded by steep gradient and small stream size.

Existing aquatic disturbance regimes are somewhat different than the historic condition. Construction of streamside roads, particularly the Selway River Road, has probably resulted in increased sediment delivery. Historic floodplain processes have changed along the Selway River due to the road. The road has moderately affected riparian function, and in some cases, fish passage into fish bearing tributaries is impeded, due to culverts where roads cross streams. A notable feature in this ERU is Selway Falls; a fishway was constructed around the falls in the 1960s to facilitate fish passage.

The existing species assemblage is similar to the historic assemblage, except that abundance may be less, particularly for anadromous fish. Also, anecdotal information suggests that this section of the river historically supported summer or fall chinook salmon spawning and rearing, which occurred below Selway Falls.

Aquatic Recommendations

Restore aquatic processes:

- Restore natural disturbance regimes or designed simulations within the ERU.
- Conserve pulse disturbances related to fire and floods.
- Reduce the effect of press disturbances such as chronic sediment from roads, road locations on landslide prone soils, and encroachment on the floodplain.
- Improve drainage and replace culverts at Boyd Creek and Cache Creek to improve fish passage.
- Replace other culverts that do not meet the 100-year flood specifications.
- Gravel the Selway River Road and add a surfactant that is not toxic to fish to decrease the dust erosion, which is another source of sediment.
- Work with the local highway district maintaining Road 223 to reduce the load of fine sediment carried from ditch lines though the culverts to the river.

Conserve species integrity:

- Include the restoration actions described above.
- Maintain and repair the Selway Falls fishway (in cooperation with the Idaho Department of Fish and Game).
- Monitor known spring chinook spawning areas to determine level of use, annually.

- Coordinate with the Idaho Department of Fish and Game and the Nez Perce Tribe to reintroduce fall or summer chinook to the mainstem Selway River below Selway Falls.
- Capture and identify unknown non-salmonid fishes in the river.
- Develop interpretation opportunities for forest visitors about fisheries conservation.
- Increase law enforcement presence to address potential illegal harvest of fish in both the river and tributaries.
- Continue mainstem river temperature monitoring.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore species integrity. High priority.

Landscape Ecology Findings

The dominant character of this ERU is a forested canyon with xeric and moist forests and apparent continuous forest canopy. Overall integrity of landscape composition and pattern is moderate, integrity of species is generally high, except for white pine and weeds, and integrity of process is low.

In the moist canyon and upland forests, hardwoods like birch have declined with fire suppression and advancing succession. Medium tree sizes are much more highly represented than historically, while recent burns and mesic shrublands are less well represented, because of fire exclusion. Patches of medium and large tree forests have begun to coalesce into blocks larger than typical of presettlement conditions. Canopy density has shifted significantly from moderate to high. Old growth is generally within presettlement ranges in mesic types but the repeat burns of 1910 and 1934 eliminated some of the open ponderosa pines. Harvest in the headwaters of SOB Creek has fragmented the mesic old growth that occurred there. Susceptibility to weed invasion is high, and knapweed and other weeds are well established along many trails and on lower slopes near the Selway River Road.

Within the Lower Selway Canyon, 10 to 20 percent of the area contains vegetation indicators of fuel accumulations potentially higher than typical of presettlement conditions on south aspects. Ignition frequency is also higher in some of these areas than other portions of the assessment area. Portions of the low elevation canyons are one to two intervals outside their presettlement fire interval.

Landscape Ecology Recommendations

In vegetation response unit (VRU) 3:

- Restore frequent and very frequent low severity and mixed severity disturbance regimes; this is a high priority in Lower Selway Canyon including the mixed conifer cover type.
- Consider aerial harvest systems or prescribed fire.
- Limit new road construction in the Lower Selway Canyon due to prevalence of landslide risk and aesthetic sensitivity.
- Sustain lower stand densities in the mixed conifer cover types with low and mixed severity disturbance regimes.
- Maintain representation of ponderosa pine as a seral component.
- Continue to provide some early seral herbaceous, snag, hardwood, and shrub habitat using mixed severity disturbance regimes.
- Provide establishment sites for recruitment of shade intolerant tree species including pine and larch.

- Reduce the risk of high severity fire in the high elevation North Selway Face with low and mixed severity fire in this ERU.
- Inventory weed populations. Treat to reduce weed abundance and increase reestablishment of native grasses and forbs; this is a very high priority in localized areas.
- Do not maintain south slopes in shrub fields in perpetuity, unless a field fire history study indicates that these particular settings promoted such frequent lethal fires.

In vegetation response unit (VRU) 8:

- Restore frequent to infrequent mixed and lethal severity terrestrial disturbance regimes; this is a moderate priority in Lower Selway Canyon, including the mesic mixed conifer cover type.
- Consider mixed and lethal severity fire in combination with mechanical treatments if needed, to help reduce stand densities, provide some early seral herbaceous, snag, shrub, and hardwood habitat and provide some establishment sites for shade intolerant tree species including western white pine and larch.
- Promote the reestablishment and persistence of hardwoods and western white pine.
- Conserve mesic conifer old growth in moist draws and lower slopes, and restore higher proportions of mesic old growth in VRUS 10 and 17; this is also a high priority and should be considered in transportation planning.
- Inventory coastal disjunct populations and habitat for occurrence and sensitivity to stand replacing fire or logging disturbance; this is also a high priority to gain information for management planning.

WILDLIFE

Theme: Restore wildlife security and conserve wildlife species integrity. Very high priority.

Wildlife Findings

The Selway River and the lower reaches of its tributaries provide significant riverine habitats in Lower Selway Canyon. These habitats are important to many terrestrial species including bald eagles, fishers, ospreys, harlequin ducks, and moose. The ERU is dominated by mesic habitats that are predominantly in mid-seral structure. Significant representations of late seral and old growth also occur. Mixed conifers and shrubs are the primary cover types with bands of western red cedar occurring adjacent to the Selway River. Species that may occupy old growth mesic habitats in this ERU include lynx, fisher, pine marten, pileated woodpecker, great gray owl, boreal owl, and goshawk. A high species diversity of neotropical migrant birds is documented in the ERU. The Coeur d'Alene salamander is a rare coastal disjunct species that inhabits unique rock and water interfaces along the Selway River.

Xeric habitats occupy a small portion of the ERU on the north side of the canyon at low elevations. Ponderosa pine and Douglas-fir dominate the xeric forest types in association with foothills grasslands. Bands of western red cedar occur adjacent to the river. Old growth, late seral, and mid-seral structures are almost equally represented. Flammulated owls, dependent on xeric old growth, have been documented in the ERU. The xeric habitats provide important elk winter range. The winter elk population in this ERU is increasing more than other non-wilderness populations in the subbasin. These habitats also support a wintering mule deer population.

Mesic shrubs, important for ungulate browse and migrant bird habitat, have declined due to fire suppression and subsequent forest succession. Canopy densities have increased from moderate to high. Mesic old growth in the headwaters of SOB Creek is fragmented due to timber harvest. Xeric mid-seral structures have increased. Recently burned areas important to wildlife habitat, and early seral habitats are also less common than expected. Weed infestations are extensive in the canyon and have reduced native grass forage availability on winter range.

The Selway River corridor is important wildlife habitat, especially in winter. Interface between humans and wildlife is common in the ERU. Many private residences, campsites, and a Forest Service administrative site occur in the canyon. Potential increase in residential development is significant according to the number of approved, vacant homesites. The Selway River Road is extensively used in summer for recreation and administrative access needs. The river corridor is accessible to traffic yearlong. Traffic and visitors are significantly increasing each year. Expansion of development in the area could significantly influence availability of the river corridor to wildlife. Winter snowmobile use occurs on Selway River Road, Coolwater Road, and Swiftwater Road and may influence security of ungulates and predators on winter range. Coeur d'Alene salamander populations may be impacted by frequent removal of rock in the ditches and along the side slopes of the Selway River Road. Introduced Merriam's turkey populations are expanding and their impacts on native species are unknown.

Wildlife Recommendations

- Restore disturbance regimes that better emulate presettlement fire regimes and reduce weeds.
- Retain more standing and down wood following timber harvest.
- Review potential impacts of motorized use on Selway River Road, Coolwater Road, and Swiftwater Road to wintering wildlife and to species vulnerable to disturbance in calving and breeding areas.
- Monitor motorized traffic in the corridor, including winter use. Develop an access management plan for this area to address wildlife security issues.
- Develop a conservation strategy to address Coeur d'Alene salamanders and their habitat in the corridor.
- Work with federal wild and scenic river administrators to address conservation of important wildlife habitat attributes on easement properties, such as bald eagle winter perching and roosting habitat.
- Consider federal acquisition of vacant properties as they become available. Additional dwellings, residents, and traffic will impact wildlife habitat availability and security in the river corridor.
- Develop inventory and monitoring strategies for white-headed woodpeckers and flammulated owls in old growth ponderosa pine and for neotropical migrants in conjunction with the 1995 baseline study.

ROADS

Roads Theme: Maintain core road system.

Roads Findings

The Lower Selway Canyon ERU contains 37.45 miles of road for a road density of 1.23 mi/mi^2. Much of this road length is comprised of Selway River Road 223, with sections of Swiftwater Road 470, and local access roads also included in the total. Selway River Road is an arterial, or main travel route. It is managed by the highway district from its junction with State Highway 12 upstream to the mouth of O'Hara Creek, a distance of 6.9 miles. This section has a bituminous (asphalt) surface. From O'Hara Creek upstream to its termination at Racetrack Campground, this gravel-surfaced road is managed by the Forest Service.

Selway River Road is primarily a stream grade road following along the north side of the Selway River for its entire length. It provides access to: private residences along the lower reaches of the river; the Fenn Ranger Station, a Forest Service administration site; campgrounds along the river corridor; additional Forest Service roads and road systems; and access to wilderness and roadless areas. Due to typically flat grades, some portions of the road have in the past suffered from poor drainage resulting in soft spots on the roadway. The road surface also has typically tended to "washboard" on the gravel portions requiring frequent road maintenance surface blading. Currently, a project is in place to address some of these concerns. Specifically, the roadway subgrade has been treated with a rotary milling machine, and localized application of gravel is occurring to improve the maintainability of the roadway surface.

Traffic counts were conducted at two points along the Selway River Road during the period 1984 to 1994. The first count near the beginning of the road collected data between1984 to 1991; these data show use ranging from 190 to 268 vehicles per day. The second count near Gedney Creek collected data for four seasons (1991 to 1994); the data shows use ranged from 62 to 69 vehicles per day. Preliminary review of the data does not seem to indicate any particular trends as to whether traffic is increasing or decreasing. It does appear however, that traffic volumes decrease substantially as distance up river increases with the traffic in the area of Gedney Creek about 28 percent of the volume found at the start of the road.

Roads Recommendations

- Manage and maintain Selway River Road as a forest arterial.
- Maintain suitable and appropriate access for developed recreation sites along the Selway corridor.
- Provide for proper drainage along Selway River Road, considering resource impacts.

RECREATION AND TRAILS

Recreation theme: Conserve recreation opportunity spectrum (ROS) class.

Trails theme: Maintain existing trail system and reduce adverse effects to existing trail system. Explore reconfiguring use patterns to address trail conflicts or to accommodate future demands.

Recreation and Trails Findings

Eleven developed or dispersed campsites are located along the Selway River Wild and Scenic River Corridor, downstream from Gedney Creek to Johnson Bar. Approximately 0.25 miles on either side of the river and anything that can be seen from the river is subject to stipulations of the Wild and Scenic Rivers Act. The Act states, "Emphasis shall be given to protecting its aesthetic, scenic, historic, archaeological, and scientific features."

From the confluence at Lowell, upstream to O'Hara Creek, easements allow for 61 single-family residences along the Selway River. Thirty-nine have been built, and approximately 22 single-family residences remain to be constructed.

Of the developed campsites, O'Hara Bar Campground is improved for trailers and a fee is charged. Potable water and garbage service are available there. Other sites are included in a two-year renovation program, beginning in 2000. Plans include removal of hazard trees, reconstruction of access to campsites between Selway River Road and the river, installation and improvement of toilets, handicapped accessibility, site hardening and enlarging, and other improvements. Neither reservations nor fees are required at the roadside sites, with the exception of reservations at Johnson Bar from May to September. A river recreation ranger patrols Selway River Road, collects camping fees at O'Hara, and assists visitors.

The lower Selway canyon is a hub of recreational activity. Motorists enjoy scenic drives; anglers, floaters, hikers, car and trailer campers begin using the area in very early spring. Campgrounds are popular sites for group and family gatherings, swimming, and other water related activities. The river corridor offers an ideal setting for wildlife watching, photography, and educational field trips. Hunters are present year-round during appropriate open seasons. A small fishing pond near the Fenn Ranger Station provides readily accessible fishing opportunities for all age groups. It is stocked regularly by the Idaho Department of Fish and Game and attracts from 800 to 1,000 visitors annually. All campsites are heavily used during the summer and hunting season. Vandalism to sites and signs along the river corridor is increasing.

On the river below Selway Falls permits are not required for floating or other water recreation activities, including motorized watercraft. Three river outfitters provide float trips on the lower reaches. There are indications that groups of jet boat users are planning to recreate on that portion of the river in the near future, which could influence a trend toward more motorized boating activity.

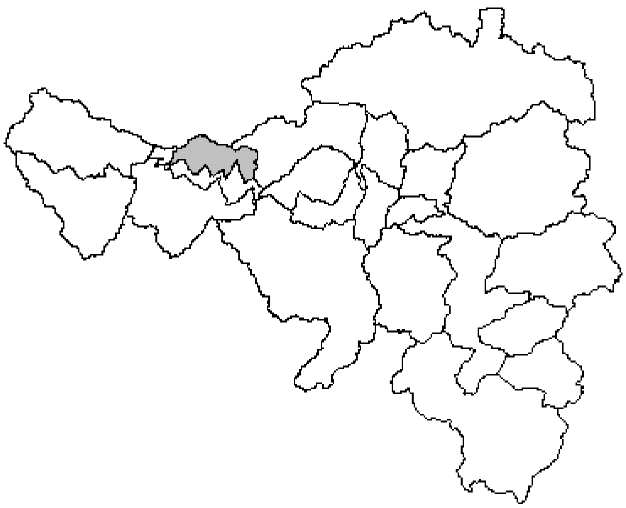
Although Selway River Road is not directly located on the Lewis and Clark Bicentennial Trail, it is expected that overflow traffic or individuals wishing to simulate that adventure will impact the area. It is uncertain to what extent that could become an issue, but there is an opportunity for education and interpretation.

Recreation and Trails Recommendations

- Increase efforts to monitor campsites, count traffic, and contact visitors.
- Increase law enforcement personnel available to assist river corridor rangers.
- Develop education and interpretation programs to increase visitor awareness of the dynamics of natural processes, land stewardship, historic and cultural influences, and the Forest Service role in management of public lands.
- Conserve the visual quality objective.
- Maintain the recreation opportunity spectrum experience setting, and activities of roaded natural, semi-primitive motorized and semi-primitive non-motorized categories.
- Study motorized boat use in the context of the recreation opportunity spectrum and recreation river status (see Wild and Scenic Rivers Act). Explore to what extent water recreation might be dispersed from sites where motorboat use has been recently restricted.

Lower Selway Canyon

NORTH SELWAY FACE



Area Theme: Restore wildlife security, conserve species.
Size: 22,502 acres.
Location: North side of Selway River between confluences with Lochsa River and Glover Creek.
Land Classification: Undesignated and roadless.
Land Administration: USFS and private.
Primary Watersheds: Johnson, Boyd, Glover, and Slide Creeks.
Landmarks: Coolwater Ridge Lookout, Round Top Mountain, and Glover Ridge.

OVERVIEW

North Selway Face ecological reporting unit (ERU) is the largely roadless area north of the lower Selway River, known for its shrub fields, elk herds, and backcountry recreation. Coolwater Ridge and Glover Ridge were once grazed by large herds of livestock. Today Coolwater Ridge Road is an important portal to the Selway-Bitterroot Wilderness and to traditional sites important to the Nez Perce people. Semi-primitive motorized recreation is very popular. It is widespread on and off trails and poses substantial risk to wildlife sensitive to such disturbance.

The extensive shrub fields, low elevation south aspects, and gentle ridges provide an important mosaic of winter, summer, and calving habitat for elk and deer. Bull elk have declined sharply and total elk population appears to have declined slightly from historic highs. Habitat for other species sensitive to disturbance, including lynx, mountain goats, and wolverines, occurs in this ERU. Increasing recreational use of motorized vehicles and hunting camps may pose a risk to these species in many areas of this ERU.

The high proportion of shrub cover is probably not a great departure from historic conditions, because the terrain favors fires sweeping upslope from the canyon. However, the frequency, season, and size of prescribed fires are departures from presettlement fire regimes. Livestock grazing and off-road vehicle use have affected alpine plant communities. Whitebark pine decline is probably due both to blister rust and fire suppression. Knapweed is well established along many trails and lower slopes.

Streams in this ERU provide habitat for steelhead/redband and westslope cutthroat trout. Habitat potential for these species is moderate. Steep stream gradients and large substrate materials limit spawning habitat. Road building has slightly altered sediment regimes. Debris removal after the 1964 floods and repeated prescribed burning may have altered debris and channel processes.

Coolwater Road has been a popular route to the high country for many years, but its condition has deteriorated, so that travel is now limited to high-clearance, four-wheel drive vehicles. Loop trails from the river to the ridge are popular with horse riders, motorcyclists, and ATV users. The trail system has been extensively studied for reconfiguration to reduce conflicts among recreationists, threats to elk calving security, and livestock users, but these conflicts have not been resolved.

Integrated Area Theme

Restore Wildlife Security

Value for ungulates and their predators during the calving season, and winter and summer range, is very high. Value of the high elevation ridges for security dependent fur-bearers like lynx and wolverines is also high, and the habitat is well connected to wilderness that provides a stronghold for these species. Off-road vehicle and motorcycle use is widespread during spring, summer, and fall, and the level of use is increasing. Boyd-Glover Recreation Trail # 704 is open yearlong and increased use may pose a risk to elk calving in the area. Bear hunting with bait, antler gathering, and hunting camps also result in increased disturbance to sensitive species.

Strategies to implement this theme include adjustment of the patterns of recreational use to protect wildlife in critical areas or during periods of high sensitivity to disturbance**.**

Compatible Themes

Restore Aquatic Processes and Conserve Species

Restoring natural erosion processes from periodic fire and climatic events will maintain channel forming processes and woody debris recruitment. Treatment of sediment sources and stream stabilization activities will also support the restoration of terrestrial disturbance processes that sustain diversity of wildlife habitats in the ERU.

Restore Terrestrial Processes and Conserve Species

Restoration of fire regimes in frequency, size, severity and season, will help restore patterns of habitat production. This will help sustain diversity of wildlife habitats in this ERU. Treatment of local weed populations is needed to reduce likelihood of weed expansion in burned areas, and reduction of forage quality and soil productivity.

Maintain Backcountry Access

Maintenance of Coolwater Ridge Road, while keeping it a low-impact travel way with seasonal closures, will help minimize security risks to sensitive wildlife.

Maintain Existing Trail System and Reduce Adverse Effects of Existing Trail System

Reconfiguring the trail system to reduce effects to wildlife will directly support the unit theme.

Theme Interactions

Conservation of semi-primitive motorized use will require some adjustments to address issues of wildlife security. Public demand for increased motor vehicle access to the area is high, and will require careful location and adjustment of seasonal use and kinds of use.

Using prescribed fire in low elevation forests may enhance the spread of weed populations. Weed population monitoring and control activities should emphasize susceptible habitats, including trails and areas affected by prescribed or natural fire.

Integrated Area Recommendations

- Review motorized use and effects of motor vehicle use on wildlife, especially on Boyd-Glover Trail # 704 and Coolwater Ridge Road. Evaluate potential impacts to vulnerable species from camp locations and salting and baiting practices. Consider area closures to protect wildlife in vulnerable areas and seasons. Provide more field presence through partnerships and interagency cooperation to deter unauthorized activities. Develop an education program to reduce taking of non-target species.

- Conserve low severity frequent prescribed fire in low elevation areas. Work toward restoring more suitable frequency and season of prescribed fire use. Treat weeds and reestablish native grasses and forbs where they have been eliminated. Restore mixed and lethal prescribed fire regimes at mid and high elevations. Inventory whitebark pine and use information on its status and trend to develop prescribed fire use plans or propagation activities.
- Treat sediment sources and inventory and implement needed channel stabilization measures.
- Reconfigure trail use patterns to address wildlife security concerns. Also consider reconfiguration of trail use to accommodate motorized travel separate from stock travel. Implement erosion control on trails, wherever needed.

FUNCTIONAL FINDINGS AND RECOMMENDATIONS

AQUATICS

Theme: Restore aquatic function and conserve species integrity. High priority.

Aquatic Findings

Watersheds in North Selway Face ERU are characterized by granitic mountain uplands at high elevations, and moist metamorphic breaklands on the steep slopes that break to the Selway River. Stream channels are mostly steep and often have boulder and bedrock cascades and waterfalls. The North Selway Face ERU is within the coastal maritime climate, and debris torrents associated with rain-on-snow events and winter rainstorms occur in a range of 15 to 20 years. Habitat potential is moderate for steelhead/redband and westslope cutthroat trout in larger tributaries, and is low or nonexistent in the smaller tributaries. Cold-water refuge areas, located at the mouths of many tributaries are important for fish when the Selway River reaches warm temperatures in the summer.

The fire history in the North Selway Face ERU shows large fires followed by debris torrents. Large debris torrents were recorded in 1934 after fire, and large debris torrents occurred after a winter rain-on-snow event in 1964. Nineteen Mile Creek had the largest debris torrent, which created a large debris fan far out into the Selway River. These events, related to fire and winter storms resulted in recruitment of woody debris, provided large pulses of sediment, formed debris jams instream, and had a large influence on channel formation.

Existing aquatic disturbance regimes and processes show low to moderate departure from the historic condition. The largest change is due to loss of natural pulse disturbances from fire, which influences stream flow regimes and erosional processes. Sediment regimes have changed due to road building, prescribed fire, timber harvest, and construction of terraces in the headwaters. Stream channels have been altered on the lower reaches of streams by debris removal after floods.

The existing species assemblage in this ERU is similar to the historic assemblage, although overall numbers of fish may be less. Habitat in the mainstem Selway River is affected by the tributaries, which also provide cool water refuge in the river. A historical change affecting fish passage to tributaries occurs at Boyd and Cache Creek, where culverts impede fish passage.

Aquatic Recommendations

Restore aquatic processes:

- Restore fire patterns in the upper elevations of the ERU through prescribed fires that are responsible for large pulse disturbances in the watersheds.

- Conserve the natural erosion processes that are related to pulse events such as floods, where debris torrents provide a role in channel forming processes, provide pulses of sediment to the Selway River, and are a source of large wood in the streams.
- Inventory Coolwater Road for surface erosion on steep grades, at drainage structures and along the ridge. Develop a plan for erosion control and rehabilitation of erosion associated with the road, using an integrated analysis.
- Maintain the road to Andy's Hump, and convert the road into an off-road vehicle, stock, and hiking trail to the end of the road at Round Top Mountain.
- Continue to manage Coolwater Road, as other Civilian Conservation Corps roads, to limit large recreational vehicles, stock trucks, and horse trailers; this minimizes rutting and decreases surface erosion. Maintain the road closures during the wet season.
- Continue the erosion inventory started in1999 in the ERU; this includes salt licks, abandoned trails, gullies that originate on Coolwater Road, erosion on terraces, and trails caused by cross country off-road vehicle travel on Coolwater Ridge.
- Inventory the lower reaches of the watershed for long-term effects from timber harvest and debris removal projects that occurred in the 1960s.
- Continue restoration at the remount site on Coolwater Ridge. Inventory the reaches of Glover, Boyd, and Rackliff Creeks where logging and removal of debris jams have altered the channel.
- Plan restoration opportunities to stabilize streams such as adding large wood, similar to Nineteenmile Creek, if streams lack large wood.

Conserve species integrity:

- Replace culverts at Boyd and Cache Creeks; this should be a high priority for improving fish access into these streams.
- Maintain or improve stream temperature in tributaries to conserve current thermal regimes. Implement the above aquatic process restoration actions to contribute significantly to conservation of species integrity.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and conserve species. High priority.

Landscape Ecology Findings

The dominant character of this ERU is a mosaic of shrub fields, open to closed mesic forests in draws, and open subalpine forest on high ridges. Overall integrity of composition, process, pattern, and species is moderate.

In moist and dry forests in the canyons, pole and medium tree sizes are more highly represented and large trees are poorly represented, probably due to severe repeat burns. Old growth is generally within presettlement ranges in mesic types, but repeat burns have eliminated some of the open ponderosa pines. Fires have repeatedly created or rejuvenated the large shrub fields that occur at mid elevations. The frequency of prescribed fire has been higher than natural, and may have retarded succession across more of the landscape than a natural fire regime. Susceptibility to weed invasion is generally moderate, but knapweed is well established along many trails and on lower slopes. Departures from fire regime are generally slight at low elevations.

Mid and upper elevation areas experienced heavy sheep grazing that reduced plant cover and resulted in substantial erosion. Some montane park has been converted to blue grass and some overgrazed ridges still support abundant fleeceweed, but conversion to non-native plant communities has otherwise been slight. Prescribed fire for wildlife habitat improvement has been frequent since the 1960s. Whitebark pine has seriously declined. Large trees are poorly represented, while there are extensive areas in cold shrub, pole and medium tree stages, and spruce and fir old growth may be rather at the low end of historic range, because the setting favors more frequent, severe fire. Few areas are outside their typical fire return interval, and vegetation indicators do not suggest fuel accumulations higher than typical of presettlement conditions.

Landscape Ecology Recommendations

In vegetation response unit (VRU) 3:

- Conserve frequent and very frequent low severity and mixed severity prescribed fire regimes; this is a high priority in lower elevation portions of North Selway Face ERU including the mixed conifer cover type.
- Consider low and mixed severity prescribed fire to sustain lower stand densities in the mixed conifer cover type, and to maintain representation of ponderosa pine as a seral component.
- Consider mixed severity prescribed fire to continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch.
- Consider low and mixed severity prescribed fire in the low elevations to reduce the risk of high severity fire in the high elevation portion of the ERU; however, fire will result in likely expansion of existing weed populations.
- Inventory weed populations. Treat to reduce weed abundance and increase reestablishment of native grasses and forbs in localized areas.
- Do not maintain south slopes in shrub fields in perpetuity, unless a field fire history study indicates that these particular settings promoted such frequent lethal fires.

In vegetation response unit (VRU) 8:

- Restore frequent to infrequent mixed and lethal severity terrestrial disturbance regimes; this is a moderate priority in the ERU, including the mesic mixed conifer cover type.
- Consider mixed and lethal severity prescribed fire that contributes to reduced stand densities, provides some early seral herbaceous, snag, and shrub habitat and provides some establishment sites for shade intolerant tree species including pine and larch; there is some potential for hardwoods in this VRU and fire would promote their reestablishment and persistence.
- Conserve mesic conifer old growth in moist draws and lower slopes; consider in fire use planning.
- Inventory coastal disjunct populations and habitat for occurrence and susceptibility to stand replacing fire to gain information for fire use planning.

In portions of vegetation response units (VRUs) 2 and 9:

- Restore mixed and lethal severity prescribed fire regimes in order to maintain disturbance dynamics in high elevation forests; succession in VRU 10 appears to have been retarded by fire to the extent that fire restoration is not a priority at this time.
- Consider mixed and lethal prescribed fire that would contribute to the restoration of lodgepole pine and whitebark pine by reducing encroachment of subalpine fir and spruce, and would provide sites for regeneration of lodgepole and whitebark pine. Provide for regeneration so selection for rust resistance can occur, which is critical to the persistence of whitebark pine.

- Consider prescribed fire to promote the reestablishment or persistence of hardwoods like aspen.
- Consider prescribed fire to maintain recruitment of montane park, early seral shrub, and seedling and sapling communities.
- Inventory and assess the extent and status of whitebark pine and use that information to evaluate risk and benefits of possible fire scenarios from management or naturally ignited fire. Consider as elements in the whitebark pine inventory: community composition, size class, evidence of blister rust and mountain pine beetle activity and tree mortality, encroachment by other tree species, fuels and susceptibility to stand replacement, and opportunities for maintenance of whitebark pine in low or mixed severity fire and need for stand replacement fire to provide additional sites for natural regeneration.

WILDLIFE

Theme: Restore wildlife security and conserve wildlife species integrity. Very high priority.

Wildlife Findings

North Selway Face ERU is almost entirely comprised of mesic habitats. Forest types in the mesic habitats include mixed mesic conifer, western red cedar, spruce-fir, lodgepole pine, and mesic shrub. Most of the mesic habitats are in early seral structure, with mid-seral and old growth less well represented. These mesic forests exhibit suitable habitat for lynx and fishers. One of the largest patches of mesic old growth in the Selway canyon occurs as a contiguous block across lower Twenty-five Mile Creek and Cache Creek. Mesic shrublands are well represented as a result of early large fires. Mesic meadows contribute significant elk calving habitat and are characteristic of wolf home sites. Reports of wolves in the area are documented. Glover Ridge may be the most important elk calving ground in the Selway and the adjacent Lochsa subbasins.

Xeric habitats are a minor component of the ERU. Douglas-fir and ponderosa pine is the primary forest type with half in early seral structure. Mid-seral, old growth, and late seral structure comprise the other half of the xeric habitats. Extensive weed infestations occupy the lowest elevations and impact native forage on winter range. Bull elk that winter in this ERU are declining sharply.

The alpine habitat component is minor in North Selway Face ERU. Alpine habitats are located on the Lochsa-Selway divide at Andy’s Hump. Forest types in the alpine habitats include spruce-fir, lodgepole pine, cold shrub, and some whitebark pine. The alpine environments provide habitat for wolverines and mountain goats.

Frequent prescribed fire ignitions may be artificially perpetuating early seral structure. Typical prescribed burning in spring does not replicate the benefits to forage of natural fire ignitions in the dry season. Spring is also a critical period for breeding, nesting, and denning and fire during this time may impact wildlife. Boyd-Glover National Recreation Trail is open yearlong to motorized use and accesses the Glover Ridge calving habitat. The trail is used in spring for bear hunting and antler gathering. The potential for increased motorized use in the area is significant. Potential impacts to elk calving in spring should be evaluated. The Coolwater Road is open yearlong and accesses the alpine habitats at Andy’s Hump. Disturbance sensitive species, including mountain goats and wolverines, may be influenced by motorized activity. Whitebark pine, a critical component of grizzly bear habitat, has declined due to fire suppression and blister rust disease.

Wildlife Recommendations

- Restore fire in alpine habitats. Use prescribed fire less frequently and on a larger, more natural scale in lower elevations. Avoid spring burning when possible to avoid impacts to nesting and breeding wildlife and to gain forage benefits of drier season burning. Reduce weed populations to restore grasslands.

- Review existing trail and road systems, including Coolwater Road and Boyd-Glover National Recreation Trail, associated with species populations vulnerable to disturbance, especially in calving areas, on winter range, and in alpine elevations. Consider motorized closures in spring to protect elk calving on Glover Ridge. Evaluate threats to wintering populations from snowmobile activity. Evaluate potential impacts to vulnerable species from camp locations and salting and baiting practices.
- Initiate inventories for fishers, lynx and snowshoe hares in appropriate habitats. Evaluate and monitor status of mesic old growth dependent species, including great gray owls, in the significant block of contiguous habitat in the Twenty-five Mile and Cache Creeks area.

ROADS

Theme: Maintain backcountry access.

Roads Findings

There are approximately 10.1 miles of roads in this ERU for a road density of 0.29 mi/mi^2. These miles are principally composed of Coolwater Ridge Road 317, with incidental segments of Selway River Road 223 as it crosses the mouths of tributaries.

Coolwater Ridge Road 317 has been surveyed as part of the national deferred maintenance effort. There is an appreciable amount of backlog maintenance needed to properly manage and maintain this level II route (maintain for high clearance vehicles) in accord with the Nez Perce Forest Plan. Much of this need exists on the last three miles of the road between Coolwater and Round Top Mountain. Travel way rutting and surface drainage problems occur throughout this section.

Management of some roads in the North Selway Face ERU may be affected by the proposed rules regarding roadless area conservation. Therefore, review of the status of these roads as defined in the summary of the proposed rules is appropriate.

Roads that existed prior to mapping the roadless area include portions of Coolwater Ridge Road 317. Road 317 exists both in the North Selway Face ERU as well as on portions of the Clearwater National Forest along the Lochsa River. The portions of Road 317 on the Clearwater National Forest have not been included in the roadless area mapping, while those portions on the Nez Perce National Forest have been included in the roadless area mapping (Rackliff-Gedney roadless area # 1841). The affected road mileage on the Nez Perce National Forest is approximately 9.5 miles.

Roads outside inventoried roadless areas include portions of Selway River Road 223 as it crosses the mouths of tributaries.

Roads Recommendations

- Manage Road 317 for access to its traditional terminus at Round Top Mountain; this will require corrections to drainage and travel way problems, especially along the last three miles.

RECREATION AND TRAILS

Recreation theme: Conserve recreation opportunity spectrum class (semi-primitive, motorized experience, activity, and setting).

Trails theme: Maintain existing trail system and reduce adverse effects of existing trail system. Explore reconfiguring use patterns to address trail conflicts or to accommodate future demands.

Recreation and Trails Findings

Selway River Road 223 bounds the ERU on the south and Coolwater Road 317 bounds the north. Historically, there has been much human and agency activity in the area. Forest Service operations were based from a lookout on Coolwater Ridge and a remount station at Round Top Mountain; Coolwater and Glover Ridge were grazing lands for many head of cattle and sheep. Historically, the area has been of special importance to the Nez Perce people.

Today, the Coolwater Road continues to provide access to the lookout and radio installations and an outfitter base camp. Considerable activity associated with private hunting occurs along the entire length of the road and it is significant as an access to the Selway-Bitterroot Wilderness. In the past, numerous motorists enjoyed scenic drives to the high ridges and outings for picnicking and berry picking during the summer months, but the road condition has continued to deteriorate and travel is limited to high clearance, 4-wheel drive vehicles.

There is much public interest in repairing the Coolwater Road and restoring access to horse trailers and passenger vehicles. People suggest this road provides an opportunity for scenic drives and access by individuals who cannot hike or ride into the backcountry. Motorcyclists advocate adding loop routes and more motorized access. OHV activity on the road is popular year-round. There is considerable pressure by the motorized community and potential for much development within, and especially on the boundaries of this ERU.

Motorcyclists and OHV enthusiasts as well as stock users enjoy camping along the Selway River and making loop trips to the ridges above. Seven trails connect Coolwater Ridge with Selway River Road 223 and dispersed campsites. Four of those trails are presently maintained (CCC, Rackliff and East Boyd-Glover # 703 and # 704) and utilized by motorized, foot and stock traffic. Trail # 702 (Rackliff) is under reconstruction in order to accommodate motorcycle travel. East Boyd-Glover National Historic Trails # 703 and # 704 are open to motor vehicles and are popular with motorcyclists. Trail # 708 to Gedney Mountain is not maintained after the first five miles to discourage travel into prime elk-calving grounds near the West Fork of Gedney Creek. An extensive study of access to the north Selway face was conducted in 1994. That study investigated the reconfiguration of the trail system that connects the river with Coolwater, Round Top, and Glover ridges. A forest interdisciplinary team and representatives from the public considered requests for motorized use (motorcycles and OHVs), concerns of livestock users, and prime elk calving habitat. No alternatives were chosen and trail configuration and use remains as stated above.

Year-round hunting activities occur, based from campsites along Selway River Road 223.

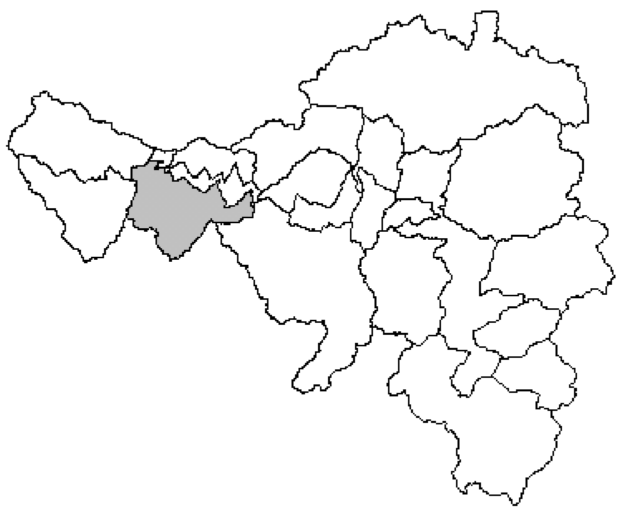
Recreation and Trails Recommendations

- Reconfigure trail use patterns appropriate to compatibility with wildlife.
- Analyze potential for increased use and effects of motorized recreation on vegetation and erosion, and consider restricting motorized use on East Boyd-Glover National Recreation Trail.
- Consider transferring motorized use from National Recreational Trail # 704 to Rackcliff Trail # 702, or consider closure at times critical to elk security, since Trail # 704 is located near areas where elk populations are concentrated at certain times of the year.

- Consider reconfiguration of trail use (not additional to the trail system) to accommodate motorized travel separate from stock travel.
- Monitor those trails that are not maintained for erosion or resource damage and take appropriate action to correct problems as they occur. Conduct a collaborative access management analysis of Coolwater Road to determine how it influences recreational activities and impacts.

North Selway Face

O'HARA AND GODDARD CREEKS



Area Theme: Restore aquatic processes and restore species integrity.
Size: 64,322 acres.
Location: South side of Selway River between confluence with Lochsa River and Falls Creek.
Land Classification: Undesignated, wild and scenic river, research natural area, and roadless.
Land Administration: USFS and private.
Primary Watersheds: Swiftwater, Goddard, O'Hara, Island and Falls Creeks.
Landmarks: O'Hara Campground, Hamby Saddle, West Fork Point, Iron Mountain, Stillman Point, Peterson Point and SOB Point.

OVERVIEW

Aquatic habitat potential in O'Hara Creek is high for steelhead trout and westslope cutthroat trout, and moderate for spring chinook salmon. Habitat potential in other streams in the ERU is variable. Restoration of the aquatic conditions and processes in mainstem O'Hara and the tributaries is a very high priority. Most of the streams within this ERU are impacted by human activities that include road use, timber harvest, prescribed fire, recreational use, and some livestock grazing. Changes from historic conditions due to human activities include: losses of riparian zone width and steamside shade, accumulation of sediment in slow reaches and pools, change in channel morphology, and decreased habitat potential for aquatic species.

Forests are dominated by grand fir, Douglas-fir and western red cedar. Mesic wildlife habitats dominate the ERU. The high representation of shrublands provides habitat for a large diversity of migrant birds. This ERU lies within the coastal, maritime climate. The O'Hara Creek Research Natural Area is one of the largest RNA's in the nation, and is a good example of the coastal disjunct plant environment that is rare in the forest. Mature forests are more highly fragmented than historically, due to clearcuts. Large blocks of mesic old growth in West Fork O'Hara Creek have been particularly fragmented. Loss of fire has reduced winter range habitat important to ungulates. Old ponderosa pine and early seral habitats are less well represented due to fire suppression.

Large fires in this ERU occurred in 1889 and 1919; smaller fires occurred in 1910. Fire suppression in the past 60 years, combined with other human activities has affected the compositions and dynamics of habitats and associated wildlife species. The pattern and composition resulting from harvest do not simulate patterns resulting from natural disturbance processes. This has resulted in loss of large down wood and fire resistant species such as Douglas-fir, ponderosa pine, and western larch. Grand fir and Pacific yew habitats important to moose have been significantly reduced. Whitebark pine is reduced or nonexistent near Iron Mountain due to fire suppression.

Every category of the recreation opportunity spectrum is represented in this ERU. Roads are used for scenic drives and some hiking trails exist, but are poorly maintained. Dispersed recreation and camping are popular in this area due to motorized access for OHVs and cars. Snowmobile use is expected to increase and may impact upland species such as lynx.

Integrated Area Theme

Restore Aquatic Processes and Restore Species Integrity

Restore Aquatic Processes

There has been a departure from historic hydrologic regimes and sediment processes due to press disturbances such as timber harvest, road construction and prescribed burning. There has been a departure from historic pulse disturbance regimes due to fire suppression. This has resulted in a change in sediment and hydrologic regimes. Historically, there was a rapid recovery of sediment peaks after fire and flood (pulse disturbances) to almost a natural base level within a few years. With press disturbances, recovery from sediment peaks is slower, and sediment is deposited on stream margins, pool, and slow stream reaches. Increases in water yield after fire is an important component in channel formation, movement of large wood in the stream system and formation of fish habitat. Water yield after timber harvest increases and remains elevated with frequent entries. This is a departure from the natural hydrologic regime.

Restore Species Integrity

The Selway subbasin is a stronghold for steelhead trout. Within the subbasin, O'Hara and Goddard Creeks support important spawning and rearing habitats. Habitat potential for aquatic species is variable, ranging from high in O'Hara Creek for steelhead trout and westslope cutthroat trout to low in some of the small, steep breakland face watersheds. Brook trout have been introduced into O'Hara Creek and are established in West Fork O'Hara and Hamby Creeks. Fishing pressure in lower O'Hara Creek may affect steelhead/redband trout and westslope cutthroat trout.

Compatible Themes

Restore Terrestrial Processes

The vegetative landscape pattern and composition resulting from harvest do not simulate natural disturbance patterns. Sustaining remaining old growth in mesic and xeric habitats will help restore patch size and decrease fragmentation in wildlife habitat. Restoring infrequent mixed and lethal severity disturbance regimes in upper O'Hara Creek, combined with sustaining old growth will support the area theme, and help promote lodgepole and whitebark pine. Return of natural fire patterns in low elevation, dry and moderately moist forests to frequent and very frequent, low and mixed severity regimes, will help promote lower density Douglas-fir and ponderosa pine forests. Reduction of weed populations would increase the likelihood of sustaining natural fire and erosion cycles.

Conserve Roaded Modified, Roaded Natural, and Primitive Non-Motorized Recreation

The roaded recreation theme helps maintain a mix of recreation opportunities in the ERU. This roaded recreation theme supports the area theme when it does not conflict with the direction to restore aquatic processes and restore aquatic conditions.

Reduce Road Densities and Adverse Road Effects

The roads theme, with an emphasis on reducing road density, supports the area theme. Slope hydrologic processes and riparian functions will be improved with reduction of roads that bisect slopes and intercept water movement, and reduction of roads that encroach on streams.

Sustaining a well-planned and maintained transportation system reduces adverse effects from roads, and supports the area theme. The road theme helps promote a more efficient and well-maintained transportation system and supports both the roaded recreation and aquatic restoration theme, except where aquatic restoration becomes the priority.

RESTORE WILDLIFE SECURITY

Reducing the open road density will increase wildlife security and support the area theme.

THEME INTERACTIONS

Conserving the roaded recreation experience may not enhance the restoration of processes or species integrity when roads produce adverse effects.

INTEGRATED AREA RECOMMENDATIONS

- Restore and conserve old growth in xeric and mesic habitats. Restore fire and natural disturbances to help maintain ponderosa pine, to restore whitebark pine, and to maintain some component of seral species. Restore fire to help restore hydrologic and erosional processes.
- Place a high priority on the O'Hara and Goddard watershed analysis process to facilitate refinement of the transportation plan.
- Identify road-decommissioning opportunities, decrease open road density for wildlife security and to supply roaded recreation without long-term impacts to aquatic restoration objectives. Evaluate winter snowmobile use impacts to wildlife.
- Restore riparian vegetation where roads and timber harvest have encroached on riparian areas. This includes planting trees and shrubs for shade in the lower 3 miles of O'Hara Creek, planting shrubs and trees on restored stream crossings on decommissioned roads and landings, and planting shrubs and trees along streams in clearcuts.
- Assess the long-term effect of frequent slides and instability of Road 651 on O'Hara and Hamby Creeks. Develop a comprehensive stabilization plan for Road 651. The emphasis should be stabilizing slides on cutslopes and fillslopes, planting cutslopes and fillslopes, and increasing drainage and graveling in eroded sections. Use native species to stabilize unvegetated areas where weeds easily establish.
- Develop a monitoring plan for O'Hara Creek to assess trends in habitat condition, and investigate the feasibility of removing brook trout from East and West Fork O'Hara Creeks and Hamby Fork.
- Inventory coastal disjunct habitat types to identify populations vulnerable to harvest, fire or watershed response to disturbance or road failures or maintenance.
- Conserve weed free areas, reduce existing infestations, and prevent new ones through inventory and collaboration with forest users along transportation routes where weeds are the greatest threat.
- Develop a plan to inventory and monitor the status of priority terrestrial and aquatic species within the watershed using partnerships and collaborative processes with other agencies, tribes and the public.

FUNCTIONAL FINDINGS AND RECOMMENDATIONS

AQUATIC

Theme: Restore aquatic processes and restore species integrity. Very high priority.

Aquatic Findings

Watersheds in this ERU are characterized by moist metamorphic steep breaklands at the lower and mid elevations. The upper elevations are composed of granitic mountain uplands with a small area of high elevation granitic glaciated slopes around Iron Mountain. Stream channels in the breaklands are steep and V-shaped. Lower gradient reaches occur in the headwater basins of Hamby Fork and upper O’Hara Creek. Moderate to steep gradient streams occur at mid elevations in O’Hara, Goddard, and Swiftwater Creeks.

This ERU is located within the coastal maritime climate and the rain-on-snow zone. Breakland streams are subject to rain-on-snow events with debris torrents and debris avalanches occurring around every 10 to 15 years (similar to the winter floods in 1995 and 1996), resulting in many debris torrents in this ERU. Steamflow regimes are dominated by snowmelt runoff at higher elevations, but winter rain-on-snow and heavy winter rainstorms can result in winter floods that result in landslides and debris torrents below 5000 feet elevation. These natural processes largely shape instream habitat, which is variable depending on stream order, gradient, and confinement. Riparian vegetation is critical to maintaining channel stability on lower reaches of larger streams and lower gradient streams in Hamby Fork and upper O’Hara Creek.

Habitat potential is high in O’Hara Creek, Goddard Creek, and Swiftwater Creek for steelhead trout/redband trout and westslope cutthroat trout. Habitat potential is moderate in O’Hara Creek for spring chinook salmon and bull trout, and low in Goddard Creek and Swiftwater Creek. Habitat potential in smaller streams in the ERU is low or none.

The existing hydrologic regime and instream habitat differ significantly from the historic condition. There has been a departure from natural pulse disturbances and an increase in press disturbances due to road building, timber harvest, and recreational development. This has changed sediment regimes, often resulting in chronic sediment in streams, and change in stream flow regimes and overall water yield. Significant changes in instream habitat have occurred due to road encroachment on stream zones, removal of riparian vegetation, and chronic sediment input from roads. In-channel habitat improvement and road decommissioning projects in O’Hara and Goddard Creek have been implemented to help restore historic conditions.

The existing species assemblage is different than the historic assemblage, due to introduction of brook trout in O’Hara Creek. Species assemblages in other watersheds in the ERU are similar to the historic assemblages. Abundance of anadromous fish is lower than the historic condition in all areas of the ERU. Brook trout are present in Hamby Fork and East and West Fork O’Hara Creeks. This species is strongly established in Hamby Fork. In East Fork and West Fork O’Hara, brook trout densities are moderate or low. Westslope cutthroat trout are also present in the upper reaches in very low densities.

Aquatic Recommendations

Restore watershed processes:

- Restore natural fire patterns, as much as possible, within the highly managed watersheds to restore natural sediment and stream flow regimes.
- Continue to reduce road density within the ERU, completing the watershed analysis to prioritize the roads with the greatest erosion hazard, mass wasting hazard, and the roads most affecting riparian function.
- Revegetate streamside zones where timber harvest and roads have reduced riparian shade. Consider moving Road 651 to another location or reduce it to a trail, due to frequent slides and mass wasting events that deliver heavy loads of

sediment to O'Hara Creek. Avoid building new permanent roads, according to direction provided in the *Land Resource Management Plan* (LRMP) biological opinions for listed fish species. Manage vegetation from the current transportation system.

Restore species integrity:

- Develop and implement a long-term monitoring plan in the lower reaches of O'Hara Creek to determine trends in habitat condition.
- Complete an assessment of the feasibility of removing brook trout from East and West Fork O'Hara Creeks.
- Defer brook trout removal in Hamby Fork to provide angler opportunity.
- Complete creel surveys in O'Hara Creek, in cooperation with the Idaho Department of Fish and Game, to determine level of harvest in lower O'Hara.
- Continue surveys and monitoring of other streams in the ERU to determine trend and status of habitat condition and fish populations.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and conserve species. High priority.

Landscape Ecology Findings

The dominant character of this ERU is moist forests in canyons and uplands, with shrub and forb dominated clearcuts. Around Iron Mountain is an isolated ridge that historically supported small amounts of whitebark pine. O'Hara Creek Research Natural Area is one of the largest RNAs in the nation. The moist meadows in the headwaters of West Fork O'Hara Creek, and the riparian areas and cascades are important botanical and aquatic features. Overall integrity is moderate for composition, process, and pattern, and generally high for species, except for the loss of white pine and whitebark pine.

Large trees are probably less well represented on moist uplands, due to past timber harvest. Canopy density has increased. Mature and old growth forests have been fragmented by timber harvest. The frequency of harvest disturbance within most subwatersheds has probably been higher than historical fire disturbance, and the pattern and composition resulting from harvest do not simulate natural disturbance processes in species, pattern, and dead and down material. The greatest departures at mid and upper elevations of the O'Hara and Goddard ERU appear to be in landscape pattern and old growth loss.

In lower elevation canyons, harvest has fragmented old growth. Construction of the road along lower O'Hara Creek has significantly affected habitat for coastal disjunct plant species. Western white pine has virtually disappeared. Early seral shrub fields are more common, due to harvest, compared to presettlement ranges. Canopy density has increased. Uniform sized clearcuts have reduced variability in patch size. Fuel accumulations are probably more continuous in the landscape, but fuel moisture is usually high. The highest departures from historic conditions are composition and loss of variability in patch size.

Landscape Ecology Recommendations

In vegetation response unit (VRU) 17, and to a lesser extent, VRUs 7 and 10:

- Conserve and restore mesic old growth; this is a very high priority.
- Consider small, mixed severity disturbance to retain some component of early seral species; this may be compatible in areas adjacent to old growth blocks on the basis of a watershed analysis.

In vegetation response unit (VRU) 3:

- Restore frequent low and mixed severity disturbance; this is a high priority.

- Emphasize reducing stand density, maintaining old pine or larch, and reducing the proportion of grand fir and Douglas-fir.

In vegetation response unit (VRU) 8:

- Restore infrequent, mixed and lethal severity disturbance; this is a moderate priority.
- Inventory riparian areas in RNA for nonvascular plants.
- Emphasize extending regeneration periods to allow for shrub and hardwood communities in early seral stages, increasing representation of down wood and snags, more variability in disturbance patch size, more variability in residual stand density, and more variability in completeness of slash disposal.
- Inventory coastal disjunct habitat and populations to identify populations vulnerable to harvest, fire or watershed response to disturbance.
- Restore western white pine as a minor seral component.

In vegetation response units (VRUs) 1 and 9:

- Restore infrequent mixed and lethal terrestrial disturbance regimes; this is a high priority in upper O’Hara and Goddard Creek in order to restore whitebark pine and lodgepole pine.
- Inventory to verify the historic occurrence of whitebark pine, availability of existing seed source, and stand condition; this ERU is a high priority area because of good access, and better ability to control the kind and extent of disturbance, and protect residual trees.
- Use mixed and lethal fire in the ridge around Iron Mountain to contribute to the restoration of whitebark pine by reducing encroachment of subalpine fir and spruce, and provide sites for regeneration of lodgepole pine and whitebark pine.
- Harvest or thin and slash (noncommercial) in the area not within the RNA.
- Provide for regeneration so selection for rust resistance can occur, which is critical to the persistence of whitebark pine.

WILDLIFE

Theme: Restore wildlife security and conserve species integrity. Very high priority.

Wildlife Findings

Mesic habitats dominate this ERU. Grand fir, Douglas-fir, and cedar comprise the dominant forest types. Grand fir in association with Pacific yew is a rare habitat feature that is highly preferred by moose. Mid-seral structure is prevalent. Late seral, early seral, and old growth structures are more limited and equally represented. The relatively high representation of shrublands may account for the large diversity of neotropical migrant species documented in the O’Hara and Goddard ERU. Wolves, goshawks, wolverines, and fishers are documented in the ERU. The Coeur d’Alene salamander, Idaho giant salamander, and long-toed salamander have also been observed in the ERU. The interspersion of old growth for denning and early seral structure for foraging indicate potentially suitable lynx habitat.

Xeric habitats are rare in this ERU. Ponderosa pine and Douglas-fir and xeric grand fir forest types characterize the xeric habitats. Most of the xeric habitats are currently in mid-seral structure, with less in late seral, early seral, and old growth. Xeric habitats are important wintering areas for ungulates and carnivores. The xeric late seral and old growth habitats indicate potential flammulated owl and white-headed woodpecker habitat.

Landscape pattern alteration and loss of old growth habitats are a result of fire suppression. In xeric habitats, fire exclusion has reduced the dominance of ponderosa pine and open, early seral habitat. Lack of fire has also resulted in increased canopy density. The grand fir and Pacific yew old growth component important to moose has been significantly reduced by timber harvest. The important standing and down dead wood habitat component has largely been removed or burned in clearcuts. Elk summer range habitat analysis units are variable in achievement of their objectives, and are primarily influenced by open road density. Some are substantially higher and some substantially lower than the objective. Most of the ERU has fairly low open road density with higher density in upper O'Hara Creek and Hamby Fork. Some of the road closures are being breached and are not effective. In 1987 there were significant numbers of wintering elk in O'Hara and Goddard ERU. By 1996, wintering elk had severely declined, although calf recruitment was higher than the other front country ERUs. Road 651 in O'Hara Creek and Hamby Fork is open yearlong to motorized traffic. In winter, snowmobile use occurs adjacent to winter range. There are potential impacts to lynx from winter snowmobile use in suitable lynx habitat.

Wildlife Recommendations

- Restore fire and restore old growth habitats.
- Conserve Pacific yew habitats.
- Conserve weed free areas and reduce existing infestations.
- Retain more standing and down dead wood habitat in clear cuts.
- Address influences of year long motorized access via Road 651, including snowmobiles, to wintering wildlife, especially elk and lynx in the higher elevations.
- Evaluate road closure breaches and resolve problems.
- Explore opportunities to reduce road densities where feasible.
- Monitor the Hamby Fork cattle allotment and outfitter camps and operations to ensure wildlife objectives are being met.
- Evaluate status of wolverines, lynx, coastal disjunct species, goshawks, and fishers, amphibians, and old growth dependent avian species including great gray owls.
- Conduct follow-up monitoring on the 1995 neotropical bird inventory.

ROADS

Theme: Reduce adverse effects throughout with an emphasis on reducing overall densities.

Roads Findings

There are approximately 185 miles of existing road in this ERU for a road density of 1.84 mi/mi^2. With the minor exception of driveway accesses near the mouth of Swiftwater Creek, all these road miles are in, and administered by, the Nez Perce National Forest.

Main roads include: portions of Swiftwater Road 470; portions of Hamby Loop 1129; Hamby Fork Road 651; portions of Boundary Ridge Road 464; and portions of American River-Selway Road 443. With the exception of portions of Road 443, all these main routes have a gravel surface and are maintained at level III (maintained for highway vehicles). Portions of Road 443 are maintained at level II (maintained for high clearance vehicles).

Due to the proximity of this ERU to population centers and the opportunity to travel from the Selway subbasin to the South Fork Clearwater subbasin, the road system provides a high potential for motorized recreation opportunities. Currently, 61 percent of the roads in the ERU are evaluated as having seasonal and vehicle use restrictions placed upon them.

In addition, several roads provide local recreation access to points of interest or viewpoints. These include: West Fork Lookout Road 2102, Iron Mountain Road 464G, and Stillman Point

Road 356. These roads are typically high on the slopes along the ridgelines and are currently managed as maintenance level II (maintained for high clearance vehicles), although portions of Road 356 have been improved to provide for timber haul.

Many of the roads in this ERU were constructed to provide for timber harvest access, although several of these routes have become important for recreation and administrative purposes. Consequently, the road system is composed of a variety of roads ranging from gravel-surfaced multipurpose collectors to local, overgrown dirt roads. Furthermore, some of the standards and techniques relative to logging and harvest access have changed, resulting in either an excess of roads in localized areas or unwanted roads in specific areas. Preliminary transportation analysis has been performed based upon harvest access needs and area transportation plans (ATPs). This analysis indicates approximately 52 miles of road in the O'Hara and Goddard Creeks drainages are excess to the transportation system needs.

Recently 23.3 miles of road were obliterated or decommissioned in this ERU. This amounts to approximately 12 percent of the 185 miles of roads. The majority of the roads obliterated or decommissioned were in the Hamby Fork drainage; many of them were overgrown or otherwise impassable.

Hamby Fork Road 651, while an important access route also presents concerns for watershed resources. Portions of this route between mile points 6 and 9 traverse steep sideslopes tributary to Hamby Fork. This section of roadway has a history of fill shoulder failures that have, at times, impacted the stream section. Some of these events are no doubt related to the original construction methods used on this route as well as to the existing drainage.

Portions of Goddard Creek Road 1119 as it crosses the Goddard Creek drainage are currently managed to prohibit all motorized traffic yearlong. This restriction primarily provides for big game security. Due to the rapid growth of brush along this route and the limitations on administrative access, drainage maintenance has been a concern. Possibilities to improve maintenance access and to provide for increased motorized recreation exist along this road segment by reassessing the travel management prescriptions.

Roads Recommendations

- Further refine transportation planning efforts in this ERU. Conduct this analysis as part of watershed analysis and incorporate the requirements of roads analysis.
- Update detailed road management objectives and include adequate consideration of recreation and administrative access needs as well as resource needs.
- Refine the evaluation of roads that may be candidates for decommissioning or obliteration.
- Analyze stabilization measures on Road 651. Provide ways to better "storm proof" this road to reduce potential impacts to Hamby Fork.
- Evaluate travel management on Road 1119; potential exists for this route to serve dispersed recreation. Consider reducing the travel restrictions on this route commensurate with ongoing and future road reductions elsewhere in this ERU.

RECREATION AND TRAILS

Recreation theme: Conserve recreation opportunity spectrum class (roaded modified, roaded natural, semi-primitive motorized and non-motorized and primitive experience, activity, and setting.)

Trails theme: Maintain existing trail system and reduce adverse effects of existing trail system. Explore reconfiguring use patterns to address trail conflicts or to accommodate future use.

Recreation and Trails Findings

Every category of the ROS (recreation opportunity spectrum) is represented in the O'Hara and Goddard Creeks ERU. Although it is heavily roaded and logged, a relatively large area is set aside as a research natural area where coastal disjunct and boreal species exist and where natural ecological processes are allowed to continue without interference of extractive human activity. Trails # 713 and # 717 have not been maintained in order to decrease recreational activity through the research area, but camping and travel are permitted. Most visitors can reach their destinations by automobile or other vehicles, and few hiking trails exist. Sixty-three per cent of the extensive road system within the ERU is restricted and barriers are often breached.

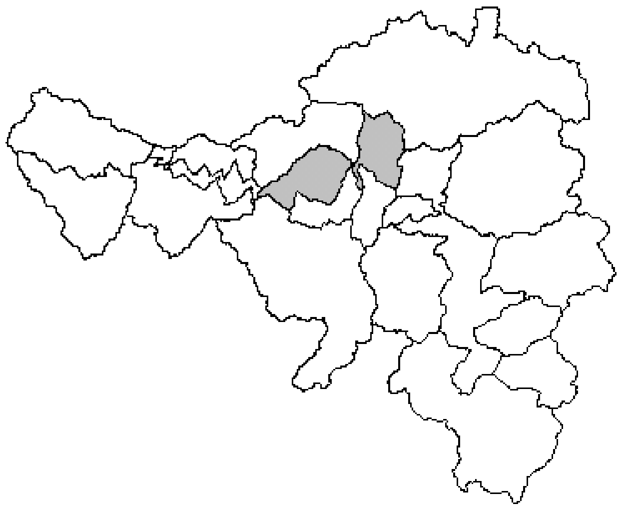
Several more roads exist in addition to those represented on forest visitor maps and some trails have been transformed into roads for logging activities. Motorists enjoy scenic drives into the area, motorcycle and OHV use is increasing, and snowmobile routes (groomed and ungroomed) border and traverse the region. There is increasing pressure for motorized use in the area. Gatherers frequent the area to hunt for antlers, pick berries and collect firewood. During hunting season, there is considerable private hunter activity and one outfitter operates from a base camp below Stillman Point. Lookout Butte is a popular rental site and is usually booked well in advance. Although easy access makes this area extremely popular for recreational activity, the public sometimes complains about road closures and restrictive practices by the agency.

Recreation and Trails Recommendations

- Reconfigure use patterns on existing routes to accommodate increase and diversity of motorized use: further accommodations for motorized activity are not necessary because many opportunities already exist.
- Monitor trail or off-trail conditions that result from motorized use and make appropriate management decisions to prevent erosion and damage to vegetation or other sensitive species.
- Monitor outfitter and other dispersed sites to insure that degradation is not occurring.
- Plan and conduct an ongoing education program in cooperation with the motorized community.

O'Hara and Goddard Creeks

MIDDLE SELWAY CANYON



Area Theme: Restore terrestrial species integrity.
Size: 61,342 acres.
Location: Selway River corridor between Meadow Creek and Moose Creek.
Land Classification: Undesignated, wilderness, and wild and scenic river.
Land Administration: USFS.
Primary Watersheds: Ballinger, Divide, Cupboard, Meeker, Pinchot, Hidden, Maiden, Wolf and Renshaw Creeks.
Landmarks: Race Creek Campground and Selway Bitterroot Trail # 4.

OVERVIEW

The Middle Selway Canyon ERU (ecological reporting unit) consists of the steep face drainages along the Selway River corridor from Meadow Creek to Moose Creek. This corridor is a primary portal to the Selway-Bitterroot Wilderness. Low elevation forests are not widely departed from natural fire intervals, but the spread of invasive non-native plants has altered plant community composition and ecological processes like erosion and succession, particularly near the heavily traveled river corridor. The low elevation open slopes provide important winter range for ungulates and their predators. Motorized traffic in wintering areas may impact wildlife security. Aquatic habitat potential in the tributary streams is low to moderate, but very high for all salmonids in the main Selway River.

Fire frequency has been reduced by suppression in more mesic forests and high elevation forests, but large portions of the mid and high elevation forests are still early seral shrub and young forest on the north side of the Selway River. Knapweed, sulfur cinquefoil, and other introduced annual grasses and forbs are well established at lower elevations, especially near the main Selway River Trail # 4.

Increasingly heavy recreational use of the main trail by day hikers, anglers, hunters, and administrative use has resulted in several campsites out of compliance with wilderness opportunity class standards. The Selway River Road is also experiencing increasing motorized recreational traffic.

INTEGRATED AREA THEME

RESTORE TERRESTRIAL SPECIES INTEGRITY

Populations of non-native invasive plant species including spotted knapweed and sulfur cinquefoil are extensive in the canyon along trails and lower slopes. Weeds reduce native plant community diversity, stability, and forage quality. They result in lower below ground biomass production, which impacts soil stability and nutrient cycling. Forage for ungulates and small mammals is reduced and seasonal availability of forage is affected. Quality of wilderness experience is affected because the natural complement of plant species, dependent animals, and disturbance processes like fire and erosion, are disrupted.

Compatible Themes

Restore Wilderness Values Consistent with Opportunity Class

Heavily impacted sites occur along the main Selway River Trail that do not meet wilderness management standards. Inventory and restoration of these sites is part of this theme. Restoration of these sites should address important weed source areas and support the area theme.

Conserve Aquatic Processes and Conserve Species

Stream flow and sediment regimes are probably within presettlement ranges on south aspects. North aspects have burned at frequencies somewhat lower than historic, so hydrologic regimes have been more affected. Habitat potential for steelhead/redband and westslope cutthroat trout is moderate in several tributaries, and very high for all species in the mainstem Selway River. Native assemblages are in place, although some populations may be depressed. Restoring natural fire frequencies in all settings would contribute to conservation of aquatic processes. Continuous measures to control erosion from the Selway River Road and the trail system are part of this theme.

Restore Terrestrial Processes

In moist forest and high elevation forest, restoration of natural fire disturbance processes will generally sustain native species integrity, as well as maintain natural patterns of habitat diversity. Conservation of fire disturbance regimes in low elevation dry forests will help conserve fire-tolerant communities and species.

Conserve Wildlife Security and Conserve Species

Road density is very low in this ERU but the Fog Mountain Road may pose a local risk to species sensitive to disturbance, as may unauthorized off-road motorized travel. Winter snowmobile traffic on the Selway River Road may impact wildlife restricted to low elevations. The status of the wintering bighorn sheep population is unknown. Visitor contacts and enforcement are recommended for this theme. Private inholdings may be further subdivided or developed and pose some localized risk to wildlife security and species integrity.

Maintain Backcountry Access

Maintenance of the Fog Mountain Road and Indian Hill Road for wilderness access, while keeping a low-impact travel way and driving experience compatible with the roadless and wilderness lands it accesses, is part of this theme.

Theme Interactions

Sustaining fire dynamics in low elevation forests may enhance the spread of weed populations. Weed population monitoring and control activities should emphasize susceptible habitats affected by recent fire and known weed populations.

Maintaining backcountry access with increased traffic could pose local risks to ecological, wilderness, and roadless values important in this ERU. As motorized use is expected to increase, effects, including wildlife security, should be monitored and needed actions taken to minimize impacts. Specially designed road maintenance or improvement activities can be implemented that retain the primitive driving experience while reducing watershed resource impacts.

Integrated Area Recommendations

- Inventory and treat weed abundance and increase reestablishment of native grasses and forbs across large areas at low and mid elevation along trails and in open dry forests and grasslands. Monitor and treat weeds as needed after fires.

Enforce use of weed-free stock feed. Collect and develop seed banks for native herbaceous species adapted to weed-susceptible habitats.

- Inventory and restore problem areas and sites out of compliance with wilderness opportunity classes, emphasizing the main Selway Trail at Pinchot Creek, Mink Creek and Cedar Flats, Ballinger Creek, and Renshaw Creek.
- Continue to address aquatic resource concerns in maintenance and improvement of the Selway River Road, including reducing floodplain encroachment, improving fish passage in culverts, and reducing surface and mass erosion.
- Support increased wildland fire use. The roadless portions of Middle Selway canyon have been added to the lands where wildland fire use is authorized, along with the wilderness. Assess costs of fire protection for private inholdings and consider acquisition, if they become available.
- Monitor effects of Fog Mountain Road 319 on wintering wildlife and to species vulnerable to disturbance in calving areas and alpine elevations, including mountain goats and wolverines. Evaluate impacts to wintering wildlife from snowmobile traffic on Selway River Road. Determine status of bighorn sheep population. Consider restrictions on off-road travel to minimize impacts to species.

FUNCTIONAL FINDINGS AND RECOMMENDATIONS

AQUATICS

Theme: Conserve aquatic processes and conserve species integrity. High priority.

Aquatic Findings

Metamorphic breakland canyons that drain directly into the Selway River characterize the watersheds in the Middle Selway Canyon ERU. Small areas of high elevation glaciated slopes occur in the upper portion of the watershed. Stream channels are most commonly steep, with streams flowing through highly confined valley bottoms. Debris avalanches and debris torrents occur, most commonly on south aspects after wildfire and during winter storms. Habitat potential for steelhead/redband and westslope cutthroat trout is moderate in Ballinger, Cupboard, Renshaw, Divide, and Meeker Creeks. Habitat potential for other species is low or none in the tributaries. Habitat potential in the mainstem is high for all salmonid species.

The steep south aspects in this ERU burned frequently, with fire often followed by debris torrents. Debris torrents and debris avalanches also occurred on the stream breaklands after winter storms and rain-on–snow floods. Weed encroachment, mostly from spotted knapweed, may significantly affect slope erosional processes. Stream flow regimes are mostly dominated by spring snowmelt runoff in the tributaries, but winter hydrologic events may periodically produce hydrologic peaks responsible for large wood recruitment in the streams. The steep gradient of these streams limits fish spawning and rearing habitat.

Fire regimes on south aspects are within presettlement ranges. Stream flow regimes and sediment regimes on south aspects related to pulse disturbances such as fire are within historic ranges. Weed encroachment may have changed the erosional processes on steep slopes, due to loss of native vegetation and establishment of shallow-rooted species. At the higher elevations the existing hydrologic regimes and sediment regimes are different than historic condition, due to reduction in naturally occurring fire. Mass wasting processes, such as debris torrents and debris avalanches related to fire and flooding are within historical ranges. Existing species assemblage is similar to the historic assemblage in the tributaries and the main Selway River.

Aquatic Recommendations

Conserve aquatic functions:

- Restore natural fire in the Middle Selway Canyon ERU where departures from historical patterns have decreased pulse disturbances. Large pulse disturbances such as fire are a significant part of the natural sediment regimes and stream flow regime. Debris torrents after fire and floods are important to channel forming processes, provide wood to the stream channels, and provide pulses of sediment to the Selway River.
- Continue the Pinchot post-fire monitoring of the spread of spotted knapweed after fire, and report results for forest use.
- Continue efforts to stabilize travel way surface and improve drainage on Selway River Road.
- Continue to manage Fog Mountain and Indian Hill Roads so they are closed during wet weather, and continue to manage the road with restrictions for horse trailers, stock trucks, and large recreational vehicles.

Conserve species integrity:

- Continue monitoring and reviewing trail fords to determine if spawning habitat is present. Conduct additional surveys to determine fish distribution.
- Review outfitter and guide and other campsites to determine level of risk, if any, to fish.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore terrestrial species integrity. Very high priority.

Landscape Ecology Findings

The dominant characteristic of this ERU is steep canyons with xeric and mesic forests. The overall integrity of landscape composition, process, and landscape pattern is moderate. Exotic plants in open dry forest and grassland areas have significantly affected species integrity.

Knapweed, sulfur cinquefoil, and other exotics have become established on dry slopes. In xeric and mesic forests, tree canopy density has increased. Old growth is less common in this ERU than in other parts of the Selway canyon, probably because of repeat burns. These fires created the large shrub fields that occur on the north side of the river. A few subwatersheds show vegetation indicators of fuel accumulations potentially higher than typical of presettlement conditions, but fire occurrence and effects have been generally within presettlement ranges over the last twenty years.

In more moist settings, moist toe slopes provide coastal disjunct plant habitat. This is about the easternmost occurrence of this habitat. Recent burn, shrub, and seedling and sapling communities are less well represented than historically. Tree canopy density has increased. Although few stands are outside their typical fire interval, restoration of fire occurrence at the landscape level is needed.

On high elevation ridges, nonforest areas, recent burns, and seedling and sapling communities are less well represented than historically. Restoration of fire at the landscape level is needed here, too.

Landscape Ecology Recommendations

In vegetation response unit (VRU) 3:

- Conserve frequent and very frequent low severity and mixed severity fire regimes; this is a high priority in Middle Selway Canyon, including the mixed conifer cover type.
- Consider low and mixed severity fire to sustain lower stand densities in the mixed conifer cover type, closer to historic levels, and to maintain representation of ponderosa pine as a seral component.
- Consider mixed severity fire regimes to continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch; however, fire will result in likely expansion of existing weed populations.
- Inventory weed populations. Treat to reduce weed abundance and increase reestablishment of native grasses and forbs, if needed.

In vegetation response unit (VRU) 8:

- Restore frequent to infrequent mixed severity terrestrial disturbance regimes; this is a moderate priority including the mesic mixed conifer cover type.
- Consider mixed severity fire regimes to contribute to reduced stand densities, provide some early seral herbaceous, snag, and shrub habitat and provide some establishment sites for shade intolerant tree species including pine and larch. Inventory to verify the occurrence of coastal disjunct plant species; knowledge of their distribution and condition would help validate the likelihood of their ability to persist or re-colonize after lethal fire, such as the severe 1934 fire that occurred in this area.

In vegetation response unit (VRU) 2:

- Restore mixed and lethal severity fire regimes; this is a high priority in Middle Selway Canyon to maintain disturbance dynamics in high elevation forests.
- Consider mixed and lethal fire regimes that would contribute to the restoration of lodgepole pine and whitebark pine by reducing encroachment of subalpine fir and spruce, and would provide sites for regeneration of lodgepole and whitebark pine.
- Provide for regeneration so selection for rust resistance can occur, which is critical to the persistence of whitebark pine.
- Consider fire regimes that would maintain recruitment of montane park, early seral shrub, and seedling and sapling communities.

WILDLIFE

Theme: Conserve wildlife security and conserve wildlife species integrity. High priority.

Wildlife Findings

Middle Selway Canyon features the Selway River, which provides important riverine habitat for many terrestrial species including bald eagles, fishers, ospreys, harlequin ducks, and moose. Tailed frogs have been observed in streams in the ERU. Mesic habitats are predominant in the ERU and occur primarily in upper elevations. Upper elevations are dominated by mesic conifer, spruce-fir and mesic shrub habitats. Half of the mesic habitat is in early seral structure. Mid-seral and late seral structures are moderately represented and old growth structure is very limited.

Xeric habitats are limited but valuable in the ERU. They are located primarily on the north side of the Selway River in low elevations. Ponderosa pine and Douglas-fir dominate the xeric forest types in association with foothills grassland. Western red cedar is also found in bands adjacent to the river. Early seral, mid-seral, late seral, and old growth are moderately represented in the xeric habitats. These habitats exhibit high diversity in structure and canopy density. The xeric habitats on the north face of the Selway River provide important elk and mule deer winter range. Bighorn sheep winter on the north face of the Selway River. Bald eagles and ospreys also inhabit the river corridor. Peregrine falcon observations in the canyon have been reported. Rattlesnakes are common in these xeric canyon lands as well.

Alpine habitat represents a small portion of the ERU. It occurs primarily at Big Fog Mountain. Early seral structure and mid-seral structure are almost equally represented. Old growth representation is minor. Subalpine fir and lodgepole pine are the primary forest types. Little whitebark pine remains. Although alpine habitat is a minor component in this canyon ERU, mountain goats, grizzly bears, wolverines, moose, and elk potentially occupy these elevations in summer. Unconfirmed reports of grizzly observations are documented.

Meadows, recently burned areas that are important to wildlife habitat, and early seral forests appear to be less well represented than historically due to fire suppression. Whitebark pine and montane park also have declined due to the absence of fire. Weed infestations are extensive in the canyon and displace native bunchgrass forage. Fire exclusion also has increased canopy density and fuel accumulations compared to presettlement conditions. Mesic meadows, important habitat for ungulates and other wildlife, are often used for grazing pack stock. Roads in winter range are open to snowmobiles. Wintering bull elk and the total elk numbers are decreasing at a higher rate than in the wilderness in general. Mule deer have significantly declined between 1995 and 1999. The potential for expanded winter recreation could significantly influence wildlife security. Winter snowmobile access may increase the vulnerability of furbearers to trapping. The Selway River Road is extensively used in summer for recreation and administrative needs. The road is open to snowmobiles in winter and the traffic may influence wintering wildlife. Three outfitters with six camps provide guided hunting trips in the Middle Selway Canyon. Winter activity is primarily associated with private and outfitted mountain lion hunting.

Whitebark pine is a critical component of grizzly bear habitat. The Fog Mountain Road accesses this alpine environment, which is contiguous with the significant alpine system in the Selway Crags and on the Lochsa-Selway divide. The road terminus at Big Fog Saddle is a popular destination for hunters and recreationists. Wilderness dependent and disturbance sensitive species, including mountain goats and wolverines, may be influenced by the concentrated human activity.

Wildlife Recommendations

- Restore fire and reduce weed populations.
- Evaluate the status of the bighorn sheep population and potential threats.
- Review potential impacts of motorized use on Fog Mountain Road and Selway River Road to wintering wildlife and to species vulnerable to disturbance in calving areas and in alpine elevations, including mountain goats and wolverines.
- Monitor motorized traffic and enforce restrictions on off-road travel to minimize impacts to species.
- Evaluate potential impacts of camp locations and salting practices to vulnerable species.

ROADS

Theme: Maintain backcountry access.

Roads Findings

The middle Selway Canyon ERU contains 13.43 miles of existing road for a road density of 0.14 miles per square mile. This road mileage consists of portions of Selway River Road 223, portions of Fog Mountain Road 319, and portions of Indian Hill Road 290. Roads that existed prior to the roadless areas being mapped include Fog Mountain Road 319.

Roads outside inventoried roadless areas include Selway River Road 223 and Indian Hill Road 290.

Roads Recommendations

- Maintain access along Road 223 to Racetrack Campground, Road 290 to Indian Hill and Road 319 to Big Fog Saddle. Although Road 319 is a pre inventory road, it appears the roadless inventory recognized it and its existing uses.

RECREATION AND TRAILS

Recreation Themes: Restore wilderness values consistent with opportunity class IV and conserve wilderness values in opportunity classes II and III (in wilderness). Conserve recreation opportunity spectrum class (semi-primitive motorized experience, activity and setting, in non-wilderness areas.)

Trails theme: Maintain existing trail system and reduce adverse effects of existing trail system. Explore reconfiguring use patterns to address trail conflicts or to accommodate future demands.

Recreation and Trails Findings

Middle Selway Canyon ERU is a primary recreation corridor, providing a portal to the Selway-Bitterroot Wilderness and access to Moose Creek Ranger Station. About 75 percent of the ERU is within wilderness, and the Selway River changes from recreation river status to wild river designation at the Selway-Bitterroot Wilderness boundary. Float trips originating at Paradise, 47 miles up the river, take out above Selway Falls.

The Selway River Trail # 4 (opportunity class IV) is the principal thoroughfare through the interior of the Selway subbasin with moderate to heavy use in the first five miles by day hikers and anglers. Stock users and serious hikers usually travel further along that route, on to Moose Creek Ranger Station, Moose Creek Ranches and points beyond. There is moderate use by backpackers in the summer months, but most trail activity is associated with hunting in the fall. Forest Service pack strings and personnel frequently utilize the trail for administrative purposes from March to November. Three problem areas are identified along the trail corridor: Pinchot Creek, Mink Creek and Cedar Flats. These are heavily impacted sites; they do not meet wilderness management direction standards.

Other areas where number of sites and impacts per square mile exceed management direction include campsites at Ballinger Creek and Renshaw Creek. All other trails within the ERU are in opportunity class III corridors that access opportunity class II areas and a very small opportunity class I area. Several publications and television programs have featured the Selway River as a major scenic and recreation attraction. Numbers of visitors to the area have increased, according to contacts made at Fenn Ranger Station. Fishing, in particular, has increased, probably due to media exposure.

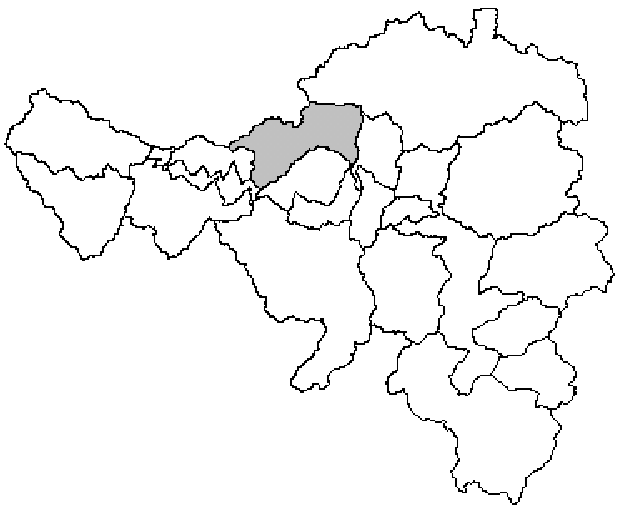
Outside the Selway-Bitterroot Wilderness, three roads converge near the Selway Guard Station. In addition to Selway River Road 223, Road 319 accesses trailheads at Fog Mountain Saddle and Big Fog Saddle, and Road 290 accesses Indian Hill Lookout, outfitter camps, and other trailheads. There is a seasonal closure (December 1 to June 15) on these roads for motor vehicles, but OHVs utilize the roads year round.

Motorists enjoy the scenic views along the 17-mile Selway River Road 223 up the Selway from US Highway 12 to Selway Falls or the end of the road at Race Creek. Traffic monitoring information, from 1991 to 1994, shows that about 28 percent of the vehicles that enter the road near Three Rivers continue to Gedney Creek. Three developed recreation sites are available in the area. A project to improve Road 223 and the dispersed and developed sites along that route began in summer 2000. The Selway Guard Station is an administrative site for the Forest Service where Forest Service packers stage operations to supply crews and other field personnel. The station has served as an information center and a base for wilderness rangers in the past. The area experiences considerable traffic by outfitters and private hunting parties during the hunting season.

Recreation and Trails Recommendations

- Monitor the problem areas and out-of-standard sites and trails in the wilderness and along Trail # 4. Restore areas to wilderness management direction standards (priority).
- Continue improvements (roads and trails) along Selway River Road 223 to allow travel and enable access for people who seek scenic views and “a wilderness experience” but might not otherwise be able to travel near wilderness or on trails; consider impacts on stream integrity and wildlife, where necessary.
- Consider an agency presence at the Selway Guard Station to monitor recreational use and provide visitor information and education.
- Monitor visitor use at trailheads, on roads, and on the river to determine trends in recreational use by using traffic counters, no-fee permits or visitor registrations.

GEDNEY AND THREE LINKS CREEKS



Area Theme: Restore wilderness values.
Size: 58,999 acres.
Location: North side of Selway River between Gedney and Three Links Creeks.
Land Classification: Undesignated, roadless, and wilderness.
Land Administration: USFS.
Primary Watersheds: Gedney, Canteen, Three Links, and Saddle Fork Creeks.
Landmarks: Big Fog Saddle, Fog Mountain, Cove Lakes, Canteen Meadow, and Three Links Point.

OVERVIEW

Approximately two-thirds of the Gedney and Three Links ERU lies within designated wilderness. About one-third is zoned semi-primitive motorized, with 8.5 miles of road, including Fog Mountain Road 319. Most of this ERU is remote, but the Selway Crags area is heavily visited. Ninety percent of the area is mesic habitat, dominated by mixed conifer and spruce-fir forests and shrublands. These habitats are suitable for elk calving, lynx forage and wolf home sites. Both mountain quail and grizzly bears have been extirpated from the area. Habitat potential for steelhead and westslope cutthroat trout is very high. Introduced brook trout have compromised aquatic species integrity.

Diversified recreational use is popular on trails that allow motorized vehicles along Gedney Creek. Fog Mountain Road provides seasonal use for highway vehicles and year-round use for OHVS. Fog Mountain Road allows access to opportunity class I areas in the Selway-Bitterroot Wilderness, where the natural environment is unmodified, without system trails, and not measurably affected by the actions of users. There is an outstanding opportunity for isolation and solitude, and management emphasizes sustaining the natural ecosystem. Stock users and hikers have historically camped and fished near high mountain lakes and damage to vegetation has resulted. Agency presence to monitor conditions near the increasingly popular Selway Crags area is limited.

Large, high severity fires historically affected hydrologic regimes and erosion processes, but fire suppression has reduced the occurrence of fire since 1934. Aquatic species assemblages in the upper reaches of the streams have changed from historic conditions; native species (probably westslope cutthroat trout) have been replaced by brook trout, which were introduced in the 1930s. The lower reaches are dominated by steelhead trout and fewer numbers of migratory westslope cutthroat trout. High mountain lakes at the headwaters of both the Gedney and Three Links watersheds have also been stocked with brook trout, and other lakes have been stocked with hatchery cutthroat trout. The non-native fish are associated with impacts to amphibian populations.

Low elevation forests have departed little from historic disturbance intervals. Old growth is less common than in other parts of the Selway canyon, probably because of high severity repeat burns prior to 1934. Representation of tree size classes in the upper elevations is generally within presettlement ranges, but recent burns are more poorly represented. Few areas are outside their typical fire return interval. Maintaining disturbance dynamics in high elevation forests would promote regeneration of lodgepole and whitebark pine, and historic levels of landscape diversity.

INTEGRATED AREA THEME

RESTORE WILDERNESS VALUES

Wilderness is an integral social and ecological resource, and the central focus of management must be on the function of the whole. Restoration of wilderness character includes both ecological and social components. It requires the ability to define natural ecosystem dynamics, and management to ensure that human use, in all its forms, does not disrupt the naturally functioning ecosystem processes that characterize wilderness.

The wilderness portion of the ERU is designated as opportunity classes I and II, and includes a sensitive and pristine high lakes area. It is accessible by Fog Mountain Road and attracts visitors (many of whom are stock users) interested in fishing and hunting. Human activity has resulted in impacts to the vegetation around high mountain lakes and alteration of aquatic species assemblages, and has also created defined problem areas and out-of-standard social and resource settings. Restoration may require increased regulation enforcement, user education, and restoration of impacted sites. Disturbance-sensitive species, including wolverines and mountain goats may be impacted by concentrated human activity.

COMPATIBLE THEMES

CONSERVE AQUATIC PROCESSES AND RESTORE SPECIES

Restoring species integrity will require efforts to reduce effects of introduced brook trout and monitor genetic integrity of westslope cutthroat trout. This theme will fully support the restoration of wilderness values by restoring species composition and ecosystem function.

RESTORE TERRESTRIAL PROCESSES AND RESTORE SPECIES INTEGRITY

Sustaining natural fire dynamics in high elevation forests is recommended to reduce encroachment of subalpine fir and spruce and provide for regeneration of whitebark and lodgepole pine and selection for rust resistance in whitebark pine. Natural fire patterns and the occurrence of fire-adapted plant communities would restore essential wilderness characteristics of vegetation structure and landscape dynamics, as well as hydrologic pulse disturbances.

Native amphibian, reptile and bird populations are at risk in lakes stocked with non-native species. Reduction of eastern brook trout at stocked lakes would facilitate recovery of native amphibian species. Weed populations are encroaching on grasslands and open forests. Control of weed populations and restoration of native species in heavily impacted areas is also part of this restoration theme. Restoration of natural plant and animal community composition including mountain quail would support both the area theme as well as other compatible themes. Reduction of weed populations would increase the likelihood of sustaining natural fire and erosion cycles by sustaining soil cover and organic matter.

CONSERVE WILDLIFE SECURITY AND RESTORE SPECIES INTEGRITY

The full complement of species is more likely to occur in remote areas, helping these areas to maintain their ecological integrity. Conserving wildlife security supports the area theme of restoring wilderness values and integrity. Motorized use of trails and Fog Mountain Road can affect wildlife security in localized areas. Mountain goats and wolverines are particularly vulnerable. Management to conserve security is recommended.

MAINTAIN BACKCOUNTRY ACCESS

Maintenance of Fog Mountain Road would be done in a manner that maintains wilderness access, while keeping a low-impact travel and driving experience compatible with the roadless and wilderness lands it accesses.

THEME INTERACTIONS

Sustaining natural fire dynamics in low elevation forests may enhance the spread of weed populations. Weed population monitoring and control activities should emphasize weed-susceptible habitats affected by recent fire.

With increased traffic, maintaining backcountry access could pose local risks to ecological, wilderness and roadless values important in this ERU. As motorized vehicle use is expected to increase, effects such as threats to wildlife security should be monitored, and necessary actions taken to minimize impacts. Specially designed road maintenance or improvement activities can retain the primitive driving experience while reducing watershed resource impacts.

Although the overall goal of reducing or eliminating non-native fish from mountain lakes is consistent with the area theme, actions to achieve this goal may involve conflicts. Effective, long-term removal or reduction of undesirable fish may require techniques that are not consistent with wilderness values and involve unacceptable social and ecological risks in a wilderness setting (for example, use of chemical piscicides, blasting, or non-native biocontrol agents). Methods with low risks are generally ineffective in removing fish from even small lakes. The ecological benefits of removal of non-native fish must be assessed within this context.

INTEGRATED AREA RECOMMENDATIONS

- Inventory and monitor opportunity class I and II areas to determine the level and extent of degradation to problem areas. Monitor visitor use, and provide visitor education.
- Develop a management plan for reducing limits of acceptable change impact ratings, and eliminating problem designations, for those areas that do not meet the desired future condition for resource and social settings of opportunity class I.
- Develop and implement a brook trout management plan in cooperation with the Idaho Department of Fish and Game. A long-term monitoring plan would determine trends in brook trout distribution and habitat conditions and annual variation in anadromous fish returns in Gedney Creek.
- Inventory whitebark pine populations to support enhanced use of wildland fire for restoration of high elevation disturbance regimes.
- Prioritize weed populations for treatment and restoration to native species.
- Collect and propagate local native seed sources for restoration of treated sites and impacted recreation sites.
- Inventory old growth areas and potential habitat for coastal disjunct plant species, and use the information to develop wildland fire use prescriptions.
- Monitor the effects on wildlife resulting from motorized vehicle use on Fog Mountain Road and trails open to motorized vehicles.
- Evaluate status of wolverine and mountain goat populations in association with motorized use.
- Evaluate conditions for repatriation of mountain quail.

Functional Findings and Recommendations

Aquatics

Theme: Conserve aquatic function and restore species integrity. Very high priority.

Aquatic Findings

Watersheds in the Gedney and Three Links ERU are characterized by granitic glaciated slopes, glacial valley bottoms, and moist metamorphic breaklands, which occur in the lower third of the watershed. Stream gradients are generally high or moderate, with short inclusions of low gradient reaches in low order, headwater streams. The ERU is within the maritime coastal climatic influence and the rain-on-snow zone associated with it. Numerous mountain lakes occur at the headwaters of both Gedney and Three Links Creeks. Habitat potential in streams is very high for westslope cutthroat, steelhead, and redband trout, and moderate for spring chinook salmon and bull trout. Historically, both the Gedney and Three Links watersheds experienced hot-burning fires that covered a significant number of acres, which were probably followed by large debris torrents. These events probably resulted in recruitment of woody debris in large pulses, which subsequently formed debris jams and highly complex instream habitat. Fire disturbances, in addition to driving the natural hydrologic regime and erosional processes, contribute significantly to habitat complexity and quality for aquatic organisms.

The existing aquatic disturbance regime in these watersheds is similar to the historic condition, except that fire suppression since 1934 has increased the interval between large fire events. Other changes are more site-specific. The lower reaches of Gedney Creek were the subject of debris-clearing efforts in the 1960s, resulting in less woody debris than occurred in the absence of this activity. The presence of Fog Mountain Road in the Gedney watershed may result in higher sediment yield. Recreational pack stock grazing and other use in streamside and lakeside areas have impacted riparian vegetation in some areas.

The existing aquatic species assemblage in both watersheds is different than the historic assemblage. Brook trout were introduced into mountain lakes in the 1930s and subsequently encroached into streams. Brook trout are the only species present in headwater reaches of both the Gedney and Three Links watersheds, and probably extirpated native westslope cutthroat trout from these areas through interspecific competition. The species assemblage in the lower reaches of both watersheds is similar to the historic assemblage.

Aquatic Recommendations

Conserve aquatic processes:

- Restore natural fire in the Three Links Creek and Gedney Creek areas that results in large pulse disturbances in the watersheds.
- Monitor Fog Mountain Road for surface erosion on steep grades and maintain drainage structures. Limit the use of large recreational vehicles and stock trucks to prevent rutting and decrease surface erosion. Maintain the current road closure during the wet season; this will continue to provide protection for the road's natural surface, thus preventing erosion.
- Survey Gedney Creek and West Fork Gedney Creek for restoration opportunities related to the debris jam removals.

Restore species integrity:

- Develop and implement a brook trout management plan in cooperation with the Idaho Department of Fish and Game.
- Develop and implement a long-term monitoring plan to determine if distribution of brook trout is changing.
- Conduct redd surveys to determine trends and annual variation in anadromous fish returns to Gedney Creek.

- Conduct a comprehensive basin-wide survey of the Three Links Creek watershed to define the habitat conditions that determine brook trout distribution.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore species integrity. High priority.

Landscape Ecology Findings

This ERU is characterized by mesic and xeric forests in canyons, extensive shrub fields, young forests, and high elevation spruce-fir forests. The overall integrity of the landscape composition, process, and pattern is moderate. Species integrity is high except for the loss of whitebark pine and local weed infestations.

In the dry canyons, seedling and sapling, and pole sizes are more highly represented and large trees are poorly represented, probably due to severe repeat burns. Old growth is relatively uncommon, probably for the same reason. Limited areas of potential coastal disjunct plant habitat probably occur along the lower reaches of Gedney and Three Links Creeks. There is little indication of departure from fire regimes in this part of the ERU.

Upper elevation forests include scattered stands of whitebark pine around Gedney Mountain and above Cove Lakes. Recent burns are more poorly represented than they were historically. The large fires in the early 20th century are reflected in extensive nonforest, seedling and sapling, and pole stages. Spruce and fir old growth and lodgepole pine old growth may be near the low end of its historic range. The restoration of fire occurrence at the landscape level is needed, even at high elevations.

Landscape Ecology Recommendations

In vegetation response unit (VRU) 3:

- Conserve frequent and very frequent low severity and mixed severity fire regimes in this VRU, including the mixed conifer cover type; this is a high priority in order to sustain lower stand densities in the mixed conifer cover type, and would maintain representation of ponderosa pine as a seral component.
- Consider mixed severity fire that would continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch; however, fire will result in likely expansion of existing weed populations.
- Inventory weed populations.
- Treat to reduce weed abundance and increase reestablishment of native grasses and forbs in localized areas if needed.

In vegetation response unit (VRU) 8:

- Restore frequent to infrequent mixed and lethal severity fire regimes in this VRU, including the mesic mixed conifer cover type; this is a moderate priority in order to contribute to reduced stand densities, provide some early seral herbaceous, snag, and shrub habitat, and provide some establishment sites for shade intolerant tree species including pine and larch. There is some potential for hardwoods in this VRU and fire would promote their reestablishment and persistence.
- Conserve mesic conifer old growth in moist draws and lower slopes; this is also a priority, which should be considered in fire use planning.

In vegetation response units (VRUs) 2 and 9:

- Restore mixed and lethal severity fire regimes in these VRUs; this is a high priority in order to maintain disturbance dynamics in high elevation forests, and would contribute to the restoration of lodgepole pine and whitebark pine by reducing encroachment of subalpine fir and spruce, and by providing sites for regeneration of lodgepole and whitebark pine. There is some potential for hardwoods like aspen, and fire would promote their reestablishment or persistence. Only by providing for regeneration can selection for rust resistance occur, which is critical to the persistence of whitebark pine. Fire would maintain recruitment of montane park, early seral shrub, and seedling and sapling communities.

- Conduct an inventory to assess the extent and status of whitebark pine and use the information to evaluate the risks and benefits of possible fire scenarios from naturally ignited fire. Elements to consider in this inventory include: community composition, size class, evidence of blister rust and mountain pine beetle activity and related tree mortality, encroachment by other tree species, fuels and susceptibility to stand replacement, opportunities for maintenance of whitebark pine in low or mixed severity fire, and need for stand replacement fire to provide additional sites for natural regeneration.

WILDLIFE

Theme: Conserve wildlife security and restore species integrity. Very high priority.

Wildlife Findings

Mesic habitats are a significant part of the Gedney and Three Links ERU. Forest types in the mesic habitats include mixed mesic conifer, western red cedar, lodgepole pine, and mesic shrub. Most of the mesic habitats are in early seral structure. Mid-seral structure is moderately represented, and there are minor representations of late seral and old growth. These mesic habitats exhibit suitable habitat for lynx and fishers. Mesic shrublands are well represented as a result of the early, large fires. Mesic meadows contribute significant elk calving habitat and are characteristic of wolf homesites. On the west side of lower Gedney Creek, Glover Ridge is an important elk calving ground. Wolf sightings are documented in the area.

The limited xeric habitats in the Gedney and Three Links ERU are concentrated on the east faces of Three Links Creek and Gedney Creek drainages. Douglas-fir and ponderosa pine habitats predominate. Minor representations of foothills grassland also occur here. The majority of xeric habitats are in early seral structure. Mid-seral structure is moderately represented. Late seral structure and old growth are very limited. Although minor, the xeric habitats in the ERU contribute important winter range.

Alpine habitats are a small but important component of the ERU. Most are in early seral structure. Late seral structure and old growth is very minor. Wolverines have been observed in the headwaters areas. Whitebark pine persists and occurs at most of the lakes within the ERU. The whitebark pine, wet avalanche chutes, and talus slopes are indicative of important grizzly bear habitat. Alpine lake environments are unique. Most of the high lakes are stocked with introduced trout that are associated with, in some cases, declining or absent amphibian populations.

Early and mid-seral structure has increased in mesic habitats compared to historic conditions. Mesic meadows, important habitat for ungulates and other wildlife, are often used for grazing pack stock. Weeds are prevalent in the xeric habitats and have reduced native bunchgrass forage on winter range. Although elk calf recruitment is increasing in the ERU, the total elk population is declining at a higher rate than the average for the wilderness in general. Mule deer winter counts in the Gedney and Three Links ERU sharply declined between 1995 and 1999. Fog Mountain Road is open in winter to snowmobiles and accesses winter range in the lower Gedney Creek area. Mountain quail historically occurred in the Three Links drainage but none are known to exist there today.

Whitebark pine and important recently burned habitat have declined due to fire suppression. Native amphibian populations are at risk or obliterated at lakes stocked with introduced fish, especially brook trout. Fog Mountain Road accesses alpine habitats that support species sensitive to disturbance, including mountain goats and wolverines. These species may be displaced by concentrated human activity.

Wildlife Recommendations

- Restore fire in alpine habitats to recover whitebark pine and lodgepole pine.
- Conserve fire in xeric habitats and reduce weed populations to restore grasslands.
- Reduce introduced eastern brook trout populations and other introduced fish in stocked high lakes and outlet streams to alleviate impacts to native terrestrial species, especially amphibians.
- Review existing trail and road systems associated with species populations vulnerable to disturbance, especially in alpine elevations, on winter range, and in meadow habitats and calving areas.
- Assess snowmobile activity associated with potential winter range impacts to evaluate impacts and make needed changes.
- Evaluate potential impacts of camp locations and salting practices to vulnerable species.
- Initiate a study of the feasibility of reintroducing mountain quail to their native habitat.
- Evaluate wolverine population status.
- Assess status and migration pattern of the mountain goat population.

ROADS

Theme: Maintain backcountry access for administrative use and recreation.

Road Findings

The Gedney and Three Links ERU contains approximately 8.5 miles of road, with a resultant road density of 0.09 mi/mi^2. This entire road exists in the Gedney Creek drainage, with the principal route being Fog Mountain Road 319. This road is maintained for high clearance vehicles. There are a number of restrictions in place on the road, including prohibitions against towing trailers as well as prohibitions against using highway vehicles between from November to June. It is open to OHVs and motorcycles year round.

Fog Mountain Road traverses inventoried roadless area 1841 (Rackliff-Gedney) as it ascends from Selway River Road 223 to a trailhead at Big Fog Saddle. No allowance in the drafting of the roadless area was made for the presence of the road. The trailhead at Big Fog Saddle provides access into portions of the Selway-Bitterroot Wilderness, including the Selway Crags and Three Links Creek.

Roads Recommendations

- Maintain Fog Mountain Road for administrative and recreation access consistent with wilderness access needs.
- Maintain Fog Mountain Road for semi-primitive motorized recreation.

Recreation and Trails

Recreation themes: Restore wilderness values consistent with opportunity classes I, II, and III. High priority (in wilderness). Conserve the recreation opportunity spectrum class for semi-primitive motorized experience, activity, and setting (in non-wilderness).

Trails theme: Maintain existing trail system and reduce adverse effects of existing trail system, and reduce off-trail impacts.

Recreation Findings

Two-thirds of the Gedney and Three Links ERU is within the Selway-Bitterroot Wilderness, and the other one-third is classified as semi-primitive motorized in the recreation opportunity spectrum. The wilderness portion of the ERU is in opportunity classes I and II, and trails are in opportunity class III.

Several high mountain lakes lie along the northwest boundary of the ERU, which follows a ridge that divides the Nez Perce and Clearwater National Forests. The lakes are in the remote and pristine Selway Crags area, which is in opportunity class I. Although travel in the region is challenging, visitor numbers have increased. Traditionally, there has been considerable horse traffic to the lakes, and now more and larger hiking groups are making the Selway Crags area their destination.

Several areas are not currently meeting forest plan wilderness management direction standards for numbers and impacts: North Three Links, Stuart Hot Springs, Cove Lakes, Lizard Lakes, South Three Links Lakes and Louse Lake. Cove Lakes, Lizard Lakes and South Three Links are identified as problem areas. There is little or no Forest Service presence in these areas to monitor visitor use or to make visitor contacts. In spite of identified problem areas, the region has not received much management attention. At Cove Lakes there is a special order to prohibit camping with stock, but it continues to be violated.

The northern reaches of the ERU have long been popular hunting areas, readily accessible via Fog Mountain Road 319. Today, that area remains available for private hunting activities, and one outfitter operates in a small area near Glover Ridge.

Fog Mountain Road facilitates access to wilderness portals including Fog Mountain Saddle, Fog Mountain, and Big Fog Saddle, and also to the popular, pristine Selway Crags region. Visitors consider the road to be in poor condition, and trailer traffic is no longer allowed. OHV and motorcycle travel is popular during summer months and snowmobile activity is moderate. There are few places where terrain is suitable for OHV travel. Snow causes the road to be impassable, except to 4-wheel drive vehicles, after November. Some stock users suggest the road be better maintained and trailer traffic allowed.

Motorcycle use is permitted on the first five miles of Trail # 708 to Gedney Mountain, but is restricted thereafter to avoid disturbance to elk calving grounds. Other trails within this ERU are minimally maintained, with most attention given to clearing logs and other obstructions from trails. Drainage structures are cleaned and erosion problems addressed when time and budgets permit. Travel off developed routes to access the high lakes area has resulted in the establishment of non-system trails and subsequent damage to sensitive riparian areas near the lakes.

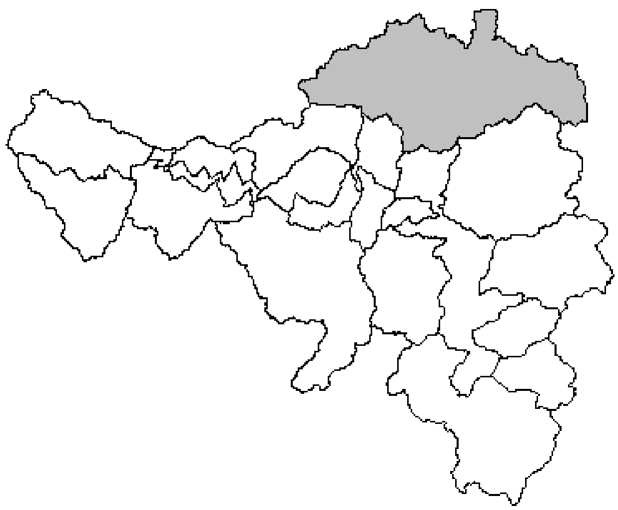
Recreation Recommendations

- Restore opportunity class I values (high priority).
- Monitor the Selway Crags area to assess problem and out-of-standard areas to develop and implement restoration plans.
- Consider maintaining a wilderness ranger presence at the three identified problem areas (Cove Lakes, Lizard Lakes, and South Three Links) and the other out-of-standard sites to ensure that no further degradation occurs and to implement rehabilitation.

- Monitor motorized vehicle use of Trail # 708 (Gedney Creek) to determine if use extends outside of the five-mile limit or off-trail; ensure security for elk habitat and sensitive vegetation.
- Monitor trail conditions; renew emphasis on maintaining forest standards, with priority for safety, drainage, and erosion control consistent with trails specifications for appropriate opportunity class.
- Facilitate education and self-monitoring among motorized vehicle user groups and individuals.

Gedney and Three Links Creeks

MOOSE CREEK



Area Theme: Restore aquatic and terrestrial biotic integrity.
Size: 233,207 acres.
Location: North side of Selway River, with Gedney and Three Links ERU to the west and Pettibone and Bear ERU to the southeast.
Land Classification: Wilderness and private.
Land Administration: USFS.
Primary Watersheds: Moose, Trout, North Fork Moose, Rhoda, Wounded Doe, Isaac, East Fork Moose, Fitting, Double, Freeman, Maple, and Monument Creeks.
Landmarks: Moose Creek Ranger Station, McConnell Mountain, Bailey Mountain, Maple and Isaac Lakes, and Elk Summit.

OVERVIEW

The Moose Creek ERU is the largest in the Selway subbasin. It is located almost entirely in designated wilderness, and contains one private land inholding (Seminole Ranch). Numerous mountain lakes exist within this ERU. The area is relatively undeveloped, despite a rich history of human activity. Moose Creek Ranger Station and surrounding areas are often destinations for hikers, hunters, and anglers, providing opportunities for day trips, hunting in adjacent areas, and fishing both the Selway River and Moose Creek. Access is provided by Moose Creek Airstrip, the river, and mainline trails.

Lower elevation portions of the Moose Creek ERU consist of steep canyons supporting grand fir and Douglas-fir habitat types and more moist grand fir and western red cedar habitats in riparian areas. Large fires occurred in 1889 and 1910. Alpine glaciated slopes and high elevation ridges were historically whitebark pine strongholds. These areas currently support dominantly spruce-fir forests and lodgepole pine forests, montane park, cold shrub communities, and small areas of whitebark pine.

Habitat for wildlife is highly diverse, ranging from high elevation lake basins populated with whitebark pine to low elevation ponderosa pine communities in xeric habitats. A significant portion of the streamside area along the East Fork Moose Creek is composed of a wide, flat valley bottom at a low elevation, which is ecologically unique and the most prominent rare wildlife habitat feature in the Selway subbasin. East Fork Moose Creek is a historic wolf travel way between the Bitterroot Mountains and the Selway River. The low elevation valley bottom provides significant calving areas and grizzly bears were extirpated from the area in the early 1900s and the last known sightings were in the headwaters of this ERU. Moose Creek's East Fork area is also influenced by a maritime climatic pattern, evidenced by coastal disjunct species.

Current hydrologic regimes and erosional processes are different than historic regimes due to fire suppression. The Moose Creek watershed supports the highest aquatic species potential of any in the Selway subbasin, given its size, diversity of habitats, remoteness, and inherent productivity. In some streams and lakes, establishment of non-native brook trout has resulted in reduction or extirpation of native amphibian and trout species. This is a significant departure from the historic condition.

Integrated Area Theme

Restore Terrestrial and Aquatic Biotic Integrity

Moose Creek is the single most important watershed in the Selway subbasin in terms of aquatic habitat and species potential, and it supports unique and very important terrestrial habitats as well. The importance of the aquatic habitat and species potential of Moose Creek cannot be overemphasized. The Moose Creek ERU encompasses a significant portion of the Selway subbasin, and both aquatic and terrestrial habitats are comprised of well connected, varying features, which together create an ecosystem where most parts remain intact.

Departures from the historic condition have occurred in specific areas in the ERU, however, and given its relative importance in the subbasin, restoration of affected areas is the highest priority. Larger-scale impacts include: introduction and establishment of non-native trout species in lake and stream environments across many higher elevation areas in the ERU, exclusion of frequent and very frequent fire in low elevation habitats, exclusion of infrequent mixed and lethal fire regimes in mid and high elevation forests, and establishment of weeds in lower and mid elevation areas. Small-scale impacts have occurred throughout the ERU, mostly associated with site-specific recreation impacts such as overgrazing. Restoration of areas affected by both small and large-scale departures is recommended.

Compatible Themes

Restore Wilderness Values Consistent with Opportunity Class

Restoration of wilderness values would result in reduced recreational impacts to wilderness resources, which is highly compatible with restoration of aquatic and terrestrial biotic integrity. This functional theme fully supports the unit theme.

Maintenance of the existing condition of Moose Creek Airstrip would allow continued use and would continue to facilitate visitor access to the area. If this is accomplished concurrent with restoration of wilderness values and reduction of adverse effects, this action is consistent with the area theme.

Conservation of the historic and cultural values of Moose Creek Ranger Station, and use of this facility to promote the minimum tool concept, traditional tools, and traditional skills, would result in reduced impacts to wilderness resources, including solitude and other social values as defined in the Wilderness Act. It could also result in reduced impacts to ecological and biotic integrity (for example, reduced or no blasting during trail maintenance or reconstruction). This action fully supports the area theme.

Restore Wildlife Security and Restore Wildlife Species

Restoration of wildlife security in this ERU is a very high priority. The Moose Creek drainage is important in population dispersal and interchange between other areas within and adjacent to the Selway subbasin. It provides an important corridor between the Selway River to the west and south and the Bitterroot valley to the east. Evaluating potential impacts from camp locations and salting practices to vulnerable wildlife species and habitats supports the area theme. Reduction of impacts to native amphibians by non-native trout in stocked high lakes also supports the theme. Restoration of wildlife security is integral in achieving the unit theme of restoring terrestrial biotic integrity.

Restore Terrestrial Processes

Restoration of terrestrial processes is focused on re-establishment of historic fire regimes at all elevations in the ERU. Restoration would also provide an emphasis on weed treatments at lower elevations. This theme and associated actions are integral to achieving the unit theme of restoring terrestrial biotic integrity.

Theme Interactions

Sustaining natural fire dynamics in low elevation forests may enhance the spread of noxious weed populations in this ERU. Weed population monitoring and control activities should emphasize weed-susceptible habitats affected by recent fire.

Maintaining backcountry access through current management of Moose Creek Airstrip and the trail system could pose local risks to ecological and wilderness values important in this ERU, especially if use increases. Implementation of actions recommended to restore wilderness values is critical in reducing potential impacts. Management of Moose Creek Ranger Station to promote traditional skills, low impact recreation, and wilderness ethics would also contribute to lower risk of impacts.

Although the overall goal of reducing or eliminating non-native fish from mountain lakes is consistent with the area theme, actions to achieve this goal may include conflicts. Effective, long-term removal or reduction of undesirable fish may require techniques that are not consistent with wilderness values and involve unacceptable social and ecological risks in a wilderness setting (for example, use of chemical piscicides, blasting, or non-native biocontrol agents). Methods with low risks are generally ineffective in removing fish from even small lakes. The ecological benefits of removal of non-native fish must be assessed within this context.

Integrated Area Recommendations

- Develop and implement, in cooperation with the Idaho Department of Fish and Game, a brook trout management plan for lakes and streams in the Moose Creek ERU in which removal or reduction of brook trout from some areas is a priority.
- Develop a long-term monitoring plan for brook trout encroachment in streams to determine if distribution of this species is changing over time.
- Continue cooperation with the Idaho Department of Fish and Game on the stocking rotation of lakes currently stocked, elimination of stocking of rainbow trout from lakes where they are currently stocked, and continued deferral of stocking of currently fishless lakes.
- Initiate and complete a genetic inventory of westslope cutthroat trout subpopulations to determine degree, if any, of introgression (hybridization), and existence, if any, of genetically unique subpopulations.
- Determine the cause for the mountain goat decline.
- Review all outfitter and guide base and spike camp locations, as well as any other heavily used sites, to determine risks to aquatic and terrestrial species.
- Develop a sanitation plan for moose Creek Ranger Station and campground and permitted outfitter camps to prevent bear habituation.
- Where risks or impacts are present, develop and implement a plan through an interdisciplinary process to reduce risks and restore areas to conditions consistent with their opportunity class.
- Review existing trail systems associated with species populations vulnerable to disturbance, especially in high elevation areas.
- Reduce artificial salt licks.
- Restore more natural fire regimes where departure from the historic condition is significant. Restoration of mixed and lethal severity fire regimes is a high priority in VRUs 2 and 9 in order to maintain disturbance dynamics in high elevation forests. Mixed and lethal fire would result in restoration of lodgepole and

whitebark pine by reducing encroachment of subalpine fir. This would also result in restoration of whitebark pine species assemblages.

- Reduce weed populations. When new weed infestations occur, initiate immediate control.

FUNCTIONAL FINDINGS AND RECOMMENDATIONS

AQUATICS

Theme: Conserve aquatic function and restore species integrity. Very high priority.

Aquatic Findings

The Moose Creek ERU is highly diverse. Watersheds are characterized by granitic glaciated slopes, glacial valley bottoms, mid and upper elevation alluvial valleys, and granitic and moist metamorphic breaklands. Large terraces define the area adjacent to Moose Creek and the lower reaches of the East and North Forks of Moose Creek. Stream gradients range from very high to low, with both forested areas and meadows in the valley bottoms. Moose Creek is within the coastal maritime climatic zone, and rain-on-snow events and winter rainstorms occur every 10 to 15 years. Debris torrents and debris avalanches occur frequently in response to these events, especially in small watersheds following fire events. Habitat potential is high or very high for all aquatic species. Numerous mountain lakes occur in the headwaters areas of the ERU.

Of all the ERUs, Moose Creek supports the highest aquatic species potential of any in the Selway subbasin, given its size, diversity of habitat, remoteness, and low level of human disturbance. Instream habitat is highly variable but generally of excellent quality. The lower reaches of the North and East Moose Creeks provide exceptional spawning and rearing habitat for anadromous fish, in addition to providing important late rearing habitat for fluvial cutthroat and bull trout and mountain whitefish. The middle and upper elevations of both watersheds provide preferred spawning and rearing habitat for westslope cutthroat and bull trout. These areas frequently support isolated resident populations, which may be genetically unique.

The existing aquatic disturbance regime is similar to the historic regime, except that fire suppression has increased the interval between large fire events. Other changes are more site-specific and are associated with past development on terraces adjacent to Moose Creek and the lower reaches of North and East Moose Creeks, high recreational use along streams and lakes, establishment of artificial salt licks, and pack stock grazing in riparian areas.

The existing species assemblage is different than the historic assemblage in some areas, particularly high elevation areas. Brook trout were introduced into mountain lakes in the 1930s and subsequently encroached into streams. Brook trout are the only species present in the headwaters of Rhoda, Lizard, and East Fork Moose Creeks. In addition, non-native cutthroats and hatchery rainbow trout have been introduced to mountain lakes, encroaching downstream and potentially interbreeding with native westslope cutthroat.

Aquatic Recommendations

Conserve aquatic processes:

- Restore the natural fire disturbance patterns.
- Conserve the high water quality and watershed condition.

Restore species integrity (all recommended actions in this section will be accomplished in cooperation with the Idaho Department of Fish and Game):

- Develop and implement a brook trout management plan in cooperation with the Idaho Department of Fish and Game and wilderness interest groups. This plan would make reduction or removal of brook trout from lakes and streams a very high priority.

- Continue partnership with the Idaho Department of Fish and Game on the stocking rotation of lakes and elimination of stocking of hatchery rainbow trout in mountain lakes.
- Review outfitter and guide base camps and trail fords to determine any risks to fish.
- Review outfitter and guide base and spike camp locations to determine level of risk, if any, to aquatic resources.
- Develop a human use management strategy to address high human use at specific mountain lakes.
- Continue a fish stocking deferral strategy in all fishless lakes in the ERU.
- Conduct a genetic analysis of the Chain and Isaac Creeks cutthroat trout populations to determine the degree, if any, of introgression.
- Conduct a reconnaissance level survey in West Moose Creek to determine the status of its westslope cutthroat trout subpopulation.
- Weight integrated management actions toward aquatic species integrity restoration.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore terrestrial species. High priority.

Landscape Ecology Findings

The dominant character of this ERU is mesic forests in canyons and spruce-fir forests on alpine glaciated slopes. The overall integrity of landscape composition, process and pattern is moderate. Species integrity is high except for localized weed infestations and loss of whitebark pine.

In the canyons, nonforest early seral communities are less well represented than historically, probably due to low fire incidence. Canopy density appears to have shifted to more high canopy closure in mesic and dry forest, compared to presettlement conditions. Old growth is less common and shrub fields more common in this portion of the ERU than in other parts of the Selway canyon, probably because of the 1910 fire that was lethal over extensive areas. Knapweed is well established along many trails, and around many campsites and old homesteads. The Trout Creek subwatershed shows vegetation indicators of fuel accumulations potentially higher than typical of presettlement conditions. Substantial portions of the low elevation canyons are one to two intervals outside their presettlement fire interval.

Upper elevation portions of the Moose Creek ERU include some rare forest elements: whitebark pine, alpine larch, occasional mountain hemlock, and aspen. Recent burns are more poorly represented, and medium and large trees are more highly represented than historically, in spite of the extensive 1988 burn. Few areas are outside their typical fire return interval, and vegetation indicators do not suggest fuel accumulations higher than typical of presettlement conditions. The low incidence of large fires since 1935 suggests that the restoration of fire occurrence at the landscape level is needed at high elevations.

Landscape Ecology Recommendations

In vegetation response unit (VRU) 3:

- Restore frequent and very frequent low severity and mixed severity fire regimes in lower elevations of the Moose Creek ERU in this VRU, including the mixed conifer cover type; this is a high priority. Low and mixed severity fire would sustain lower stand densities in the mixed conifer cover type and keep them closer to historic levels, and would maintain representation of ponderosa pine as a seral component.

- Consider mixed severity fire that would continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch. Fire restoration in these environments may help reduce the risk of the loss of remaining cedar old growth to lethal fire; however, fire will result in likely expansion of existing weed populations.
- Inventory weed populations. Treat to reduce weed abundance and increase reestablishment of native grasses and forbs in localized areas, if needed.
- Pursue purchase of the Seminole Ranch inholding to reduce the costs of fire use, fire risk to private property, and the costs of weed control.

In vegetation response units (VRUs) 2 and 9:

- Restore mixed and lethal severity fire regimes in the Moose Creek ERU in these VRUs; this is a high priority in order to maintain disturbance dynamics in high elevation forests. Mixed and lethal fire would contribute to the restoration of lodgepole pine, aspen, alpine larch, and whitebark pine by reducing encroachment of subalpine fir and spruce, and would provide sites for regeneration of lodgepole and whitebark pine. Only by providing for regeneration can selection for rust resistance occur, which is critical to the persistence of whitebark pine. Fire would maintain recruitment of montane park, early seral shrub, and seedling and sapling communities.
- Conduct an inventory to assess the extent and status of the whitebark pine and use that information to evaluate the risks and benefits of possible fire scenarios from naturally ignited fire. Elements to consider in this inventory include: community composition, size class, evidence of blister rust and mountain pine beetle activity and related tree mortality, encroachment by other tree species, fuels and susceptibility to stand replacement, opportunities for maintenance of whitebark pine in low or mixed severity fire, and need for stand replacement fire to provide additional sites for natural regeneration.

WILDLIFE

Themes: Restore wildlife security and restore wildlife species integrity. Very high priority.

Wildlife Findings

The Moose Creek ERU contributes significantly to wildlife habitat and population diversity both in the subbasin and in the larger Selway-Bitterroot area. Moose Creek is important in population dispersal and interchange between other areas within and adjacent to the subbasin. The wide, flat valley bottom along the East Fork of Moose Creek is the most prominent rare wildlife habitat feature in the subbasin. It provides an important travel corridor, wintering and calving areas, and optimal grizzly bear spring range. Mesic habitats dominate the Moose Creek area. Forest types include mesic conifer, spruce-fir, and lodgepole pine. Most of the mesic habitats are divided between early seral structure and mid-seral structure. Late seral structure and old growth are limited. The mesic forests exhibit suitable habitat for lynx, fishers, and moose. Mesic upland and lowland meadows contribute significantly to elk summer range and calving habitat in the subbasin. Coastal disjunct species, including large patches of old growth western red cedar, and Coeur d'Alene and Pacific giant salamanders, occur in the East Fork Moose Creek area. A diversity of bat species inhabits the ERU.

Xeric habitats, dominated by ponderosa pine and Douglas-fir forest types, are very limited in the ERU. Most of the xeric habitats are split between early and mid-seral structures. Late seral and old growth structures are moderately represented. The xeric habitats provide important elk and mule deer winter range. The xeric old growth habitat indicates potential white-headed woodpecker and flammulated owl habitat in ponderosa pine communities.

Alpine habitats comprise a small but significant part of the ERU. They are equally split between early seral and mid-seral structure, with a small amount of old growth. The alpine lake habitats are unique and support a diversity of terrestrial species, including amphibians, reptiles and birds. Lower Dead Elk Lake is the only lake in the subbasin known to support a tailed frog population, which is typically associated with stream environments. Mountain goats spend summers on the Lochsa-Selway divide and the Bitterroot divide that bound the ERU. Wolverines also occur in the ERU. Grizzly bears were common historically in the Moose Creek area. Whitebark pine, wet avalanche chutes, and talus slopes in the ERU provide important grizzly bear habitat.

Meadow habitats are less common and tree canopy densities have increased as a result of fire exclusion. Recently burned areas and whitebark pine, both important to wildlife, have declined, while mid-seral and late seral forests in alpine habitats have increased as a result of fire suppression. Weeds are prevalent and have impacted native forage. Mesic meadows, important habitat for ungulates and other wildlife, are often used for grazing pack stock. Mule deer populations appear to be declining. Elk populations are declining at a higher rate than the average for the backcountry in general. Elk calving and wintering areas in the East Fork Moose Creek area are vulnerable because they are easily accessed during the calving period and in early winter. Unauthorized salting has influenced distribution and vulnerability of ungulates and other wildlife. Introduced Merriam's turkeys occur in the Moose Creek area and potential impacts to native species are unknown. Developments in the ERU include an administrative facility and a private residence, both with associated airstrips. Impacts to wildlife include noise disturbance from air traffic and black bear habituation.

Native amphibian populations are at risk or extirpated at lakes stocked with introduced fish, especially brook trout. Elk Summit Road 360 accesses alpine habitats and species. Disturbance-sensitive species, including mountain goats and wolverines, may be influenced by the concentrated human activity. Limited surveys indicate that mountain goats are declining. Grizzly bears historically occupied this area. Historic accounts indicate that Selway-Bitterroot area grizzlies were last known to exist in the northernmost headwaters of Moose Creek tributaries on the Lochsa-Selway divide.

Wildlife Recommendations

- Restore fire with priority in alpine habitats and ponderosa pine communities.
- Reduce weed populations to restore grasslands.
- Suppress introduced eastern brook trout populations in stocked high lakes and outlet streams, where possible, to alleviate impacts to native terrestrial species, especially amphibians.
- Inventory and monitor terrestrial high lakes environments and species to prioritize additional restoration needs.
- Investigate status of the tailed frog population in the only known lake it occurs and plan subsequent monitoring.
- Determine the cause for the mountain goat population decline and evaluate the wolverine population.
- Review existing trail and road systems associated with species populations vulnerable to disturbance, especially in alpine elevations, on winter range, and in meadow habitats and calving areas.
- Evaluate potential impacts of camp locations and salting practices to vulnerable species.

- Assist other federal and state agencies in grizzly bear recovery and in developing an effective related information and education program.
- Develop a camp and administrative facility sanitation program.
- Evaluate the security of calving elk and avoid increasing activity in the East Fork Moose Creek area in spring during calving season.
- Continue pursuing federal acquisition of the Seminole Ranch property. The potential for increased development at this private inholding is significant. Additional residents and air traffic would impact wilderness wildlife security in the area.
- Minimize wildlife habitat impacts associated with firewood collection at Moose Creek Ranger Station.

ROADS

Theme: Moose Creek ERU is almost entirely wilderness. Roads theme is not applicable.

Roads Findings

There are approximately 0.05 miles of road in this ERU. This road is an extension of Road 360 accessing Elk Summit and Hoodoo Lake on the Clearwater National Forest.

Roads Recommendations

- Maintain Road 360 to provide access to the Selway-Bitterroot Wilderness.

RECREATION AND TRAILS

Recreation theme: Restore wilderness values consistent with opportunity classes I, II, III, and IV. Priority.

Trail theme: Maintain existing trail system and reduce adverse effects of existing trail system. Reduce off-trail impacts.

Recreation and Trails Findings

The Moose Creek ERU is almost completely within the Selway-Bitterroot Wilderness. The area is popular for hunters, and for hikers who pass through on their travels between Selway Falls and Montana or Elk Summit. Moose Creek Ranger Station is the primary place where Forest Service personnel meet the public. It is highly visible to every type of wilderness recreationist and to backcountry pilots. Moose Creek Ranger Station and Moose Creek Ranches are often destinations for hikers, hunters and anglers because they are hubs for day trips to outlying areas, and for fishing both the Selway River and Moose Creek. Many visitors arrive by aircraft and base their recreation from the camping area near the airfield. Wilderness values are difficult to defend in the proximity of the airfield, where many people do not understand why bicycles, mowers and chainsaws are not allowed in the same space as aircraft take-offs and landings. Floaters on the Selway River usually stop overnight at Tony Point and make short day hikes to Shissler Lookout or visit the ranger station.

Four outfitters presently operate within the ERU, and one outfitter area was unoccupied for the past five years, but reallocated in 2001. Both private and outfitted hunting activity has decreased in the last two year due to allotment of tags by the Idaho Department of Fish and Game.

In the 1920s, lands were opened for homesteading, and several private properties existed along Moose Creek and the Selway River until the 1960s and 70s (after the Wilderness Act of 1964). Those homesteads were cleared for farming and airfields. Today, those level, cleared areas near the river and creek are popular camping sites, and are infested with knapweed and other noxious species. The U. S. government has purchased all of the inholdings along Moose Creek except for one piece of private property, the Seminole Ranch.

Most trail corridors are in opportunity class III; the lower Moose Creek area is predominately opportunity class II; and opportunity class I is dominant in the upper Moose Creek area. Evidence of the concentration of use in this ERU is in the number of sites and trails that do not meet wilderness management direction standards, and the number of identified problem areas. Twenty-five sites do not meet standards for numbers of sites and impact ratings, and six non-system trails do not meet standards. Three problem areas are identified in opportunity class I, two in opportunity class II, four in opportunity class III, and one in opportunity class IV. Time and budget constraints have prevented adequate monitoring and attention to dispersed and outfitter sites. No action has been taken to mitigate the circumstances in the problem areas.

Trail maintenance has recently been limited to level I standards because of budget constraints. Emphasis has been on trail opening and clearance for traffic to Moose Creek Ranger Station. Selway River Trail # 4, a principal thoroughfare, receives the most extensive maintenance attention. On visitor maps, some trails are misclassified and shown as usable trails when, in fact, they have not been maintained for several years, often are not discernable, and are impassable by stock.

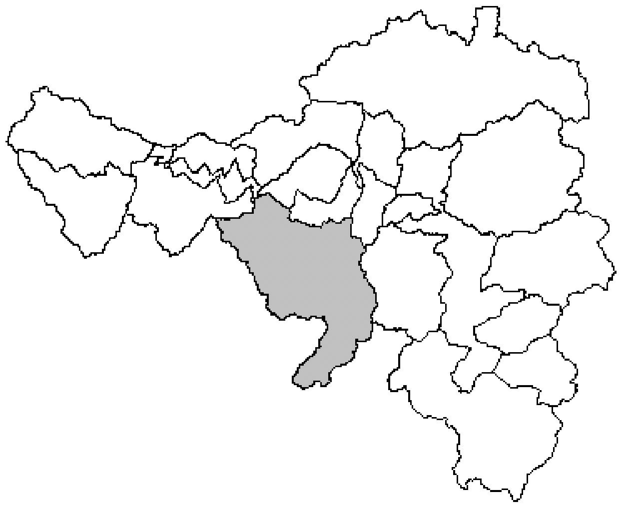
According to landing data at the Moose Creek Airstrip, activity has decreased considerably over the past years. Forest Service administration flights have been curtailed in a conscious effort to use traditional methods of supply transport and the minimum tool concept, and to reduce noise and aircraft presence for wilderness recreationists. The airfield, however, remains a strategic base for fire operations. Private air traffic has also decreased, and outfitters have served fewer clients for the past two years. Pilots feel it is important to keep picnic tables and restrooms in the camping area near the airstrip. They have concerns that airfield use will be restricted in the future. Pilots make reference to the field having been better maintained in the past and the need to aggressively address the weed problem. The Forest Service Region I airfield inspection team has recommended a long-range plan for field maintenance that includes removal of obstruction trees and noxious weed control.

Recreation and Trails Recommendations

- Monitor use and impacts at the sites and trails that do not meet wilderness management standards, and rehabilitate and naturalize areas to reduce further degradation (high priority).
- Survey the existing trail system as it appears on visitor maps. Retain and maintain or eliminate those routes identified as way (secondary) trails.
- Conserve historic and cultural values consistent with the National Historic Preservation Act at Moose Creek Ranger Station and administrative area. Also at this location, conserve wilderness character, minimum tool concept, and use of traditional tools and skills.
- Assure the public observes efficient and effective agency operations at Moose Creek Ranger Station and administrative area; consider a volunteer host there.
- Continue to strictly limit administrative flights at Moose Creek Airfield, and follow up on recommendations made by the Region I airfield inspection team.
- Maintain existing conditions and reduce adverse effects at Moose Creek Airfield; monitor use and impacts.
- Investigate and consider government purchase of private lands.

Moose Creek

MEADOW CREEK



Area Theme: Upper Meadow Creek Sub-ERU - restore aquatic processes and conserve aquatic species integrity. Lower Meadow Creek Sub-ERU - restore terrestrial processes.
Size: 155,310 acres.
Location: South of Selway River, with O'Hara and Goddard ERU to the west and Otter and Mink ERU to the east.
Land Classification: Undesignated, roadless, wild and scenic river, and wilderness.
Land Administration: USFS.
Primary Watersheds: Meadow, Horse, Anderson, Sable, Schwar, Disgrace, Buck Lake, Indian Hill, Three Prong, and Vermillion Creeks.
LANDMARKS: Slim's Camp and Selway Falls Campground, Meadow Creek Guard Station, Horse Creek Administrative Research Area, Indian Hill Lookout, Anderson Butte, Copper Butte, and Green Mountain.

OVERVIEW

Meadow Creek is so large and diverse that it is addressed as two sub-ERUs: upper Meadow Creek, in the headwaters area, and lower Meadow Creek, from the mouth to the confluence with the East Fork Meadow Creek.

UPPER MEADOW CREEK

The upper Meadow Creek area has very high potential for westslope cutthroat trout and bull trout, with extensive low and moderate gradient streams and cold water temperatures. There has been a moderate departure from the historic hydrologic regime and erosional processes in the upper Meadow Creek area, particularly the upper reaches, which have been affected by past domestic livestock grazing and current unrestricted OHV use. There has been some change from historic aquatic disturbance regimes due to fire suppression. Existing fish habitat has shown some changes from historic conditions. Levels of fine sediment deposition are generally low, but levels increase in stream margins and slow water reaches. Bank stability is low in some reaches with bank sloughing and active erosion of the fine substrate stream banks. This is due to grazing and to OHVs crossing upper Meadow Creek.

Vegetation represented in this area includes grand fir and Douglas-fir, grand fir and cedar, and subalpine habitats dominating the east side and headwaters. Grand fir and subalpine fir with alder and grand fir with Pacific yew dominate the west side of the drainage. Meadow Creek is important in population dispersal and interchange between other areas within and adjacent to the subbasin. Significant representation of lodgepole pine within the ERU may provide the most important lynx habitat in the subbasin. The high elevation alluvial subalpine meadows present in the headwaters areas and on the west side of this ERU are unique within this assessment area, and comprise important elk calving and elk summer range. The meadows are also in proximity to a wolf pack home site, and off-trail, unrestricted motorized use may impact wolf denning and elk calving.

A large portion of the headwaters area has not burned in the 129 years of record. The absence of any large fires since 1919 in the upper Meadow Creek area suggests that restoration of fire at the landscape level is needed, even at high elevations.

The East and West Meadow Creek Inventoried Roadless Areas are located within this drainage and encompass approximately 201,700 acres within and outside this ERU. Roads that access the upper Meadow Creek area are Elk Mountain Road 285 and Green Mountain Road 285A. Designation of motorized routes in the upper Meadow Creek area is not clear, and opens the area up for unrestricted access with OHVs.

LOWER MEADOW CREEK

Lower Meadow Creek is known for its clean, clear, high quality water that flows into the Selway River. Meadow Creek is a favorite recreation spot for horse riders, hikers, and outfitters, and is very popular in the early spring when other areas are still closed in by snow. Roads in the lower Meadow Creek area provide access to the Slim's Camp trailhead and the Indian Hill Lookout and trailheads. Meadow Creek is a candidate for eligibility for wild and scenic river designation. Lower Meadow Creek provides quality habitat for steelhead and spring chinook salmon. Horse Creek Administrative Research Area is located near Horse Creek, a tributary of Meadow Creek.

The low elevation canyons in the lower Meadow Creek area are dominated by grand fir and Douglas-fir, and on the more moist sites grand fir and western red cedar. Mesic old growth in the lower Meadow Creek area provides habitat for martens, fishers, pileated woodpeckers, and moose, and also for lynx denning and goshawk nesting. Coeur d'Alene salamanders have been documented in the lower reaches.

Historically, significant fires occurred in the low elevation canyons in 1889, 1910, and 1919. The dry canyons were subject to very frequent and frequent low and mixed severity fire. A large portion of this part of the canyon is one to two intervals outside the typical fire return interval in frequent and very frequent fire regimes, with fuel accumulation higher than typical of presettlement times. The loss of natural disturbance patterns due to fire suppression has caused a moderate departure from natural hydrologic and erosional processes.

INTEGRATED AREA THEMES

Upper Meadow Creek: RESTORE AQUATIC PROCESSES AND CONSERVE AQUATIC SPECIES INTEGRITY

The importance of the aquatic habitat and species potential of Meadow Creek cannot be overemphasized. The *Interior Columbia River Basin Assessment* identifies Meadow Creek as an important stronghold for several anadromous fish species. In upper Meadow Creek, existing habitat in the meadow reaches has departed from the historic condition. Fine sediment has increased in slow reaches, stream margins and pools. Bank stability in some reaches is low due to heavy grazing or OHV use on the stream banks.

There has been a moderate departure from the historic aquatic disturbance regime in the upper Meadow Creek area due to grazing, road building in the upper parts of the watersheds, dispersed OHV use, and fire suppression. There has been a low to moderate shift from pulse to press disturbance due to human-caused disturbances to the ecosystem.

Species integrity has been affected in some locations. Certain high mountain lakes support non-native brook trout populations. Restoration of native species integrity in these settings will require efforts to reduce the effects of introduced brook trout.

LOWER MEADOW CREEK: RESTORE TERRESTRIAL PROCESSES

Naturally ignited or management ignited fire is necessary to recover species and maintain stand and age class diversity in low elevation stands. Restoration of low and mixed severity fire would help maintain lower stand densities in the mixed conifer forests, and would help maintain ponderosa pine as a seral component. Mixed severity fire would also provide some early herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species, including pine and larch. Conservation and some restoration of late seral and old growth forest in harvested areas will help restore patch size of old growth forest. Control of weeds will help promote natural fire dynamics and patterns, and natural erosion cycles.

COMPATIBLE THEMES

UPPER MEADOW CREEK

Restore Terrestrial Processes and Conserve Species Integrity

Conservation and restoration of late seral and old growth forest is compatible with aquatic restoration. This theme emphasizes conserving late seral old growth and recovering late seral patch size in late seral forests impacted by logging. This applies to a small area around the headwaters. The absence of extensive fire since 1919 suggests that fire needs to be restored in the upper Meadow Creek area. Restoration of terrestrial disturbances at the upper elevations is needed for lodgepole pine and whitebark pine restoration.

Restore Wildlife Security and Restore Wildlife Species Integrity

Open road density and dispersed and unregulated OHV use in the upper Meadow Creek area impacts habitats for vulnerable species on a seasonal basis. In the upper meadows extensive motorized use impacts habitat for elk calving, and some OHV trails are located in alpine habitat where wildlife security for mountain goats, wolverines and other alpine species is affected. Transportation planning to reduce the effects of OHV use on vulnerable species and environments will improve wildlife security and is compatible with the restore aquatic processes theme. Native amphibian, reptile, and bird populations are at risk at lakes stocked with non-native species. Reduction of eastern brook trout at stocked lakes would facilitate recovery of native amphibian species.

Conserve Non-Motorized Recreational Experience and Maintain Existing Trail System to Reduce Adverse Effects

This theme emphasizes conservation of semi-primitive non-motorized recreation within the basin, and concentrates the semi-primitive motorized recreation on the upper slopes and ridges of the ERU. In the valleys, where vulnerability of aquatic resources is high, conservation of semi-primitive non-motorized experiences will be compatible with the area theme.

Maintain Backcountry Access at Current Levels

Road access to major trailheads such as Elk Mountain and Green Mountain will be maintained. No new roads would be constructed. This is compatible with the aquatic restoration theme.

LOWER MEADOW CREEK

Conserve Aquatic Processes and Conserve Species Integrity

Hydrologic processes in the lower Meadow Creek ERU have been moderately affected by fire suppression. Maintaining the natural fire disturbance patterns will conserve natural hydrologic processes and high water quality. Continued restoration of erosion in uplands, reduction of road density in the Horse Creek drainage, and identification and restoration of impacted sites will help conserve water quality, and supports the foundation for high aquatic species viability. Continued monitoring and assessment of coho salmon stocking activities and potential effects to native species assemblage are actions associated with the conserve species integrity theme. This supports the area theme.

Conserve Recreation Opportunity Spectrum Classes and Maintain Existing Trail System to Reduce Adverse Effects. Reconfigure Use Patterns.

Conservation of semi-primitive non-motorized recreation within the basin, and concentration of the semi-primitive motorized recreation on the upper slopes and ridges of the ERU is compatible with the aquatic restoration theme.

Defer New Roads

Road access to major trailheads such as Slim's Camp and Indian Hill will be maintained, but any new roads in the lower Meadow Creek area will be deferred. This is compatible with the restore terrestrial processes theme.

Conserve Wildlife Security

Increased winter snowmobile use may impact mountain goats on winter range. Monitoring snowmobile use and impacts on habitat is compatible with the area theme.

Theme Interactions

Upper Meadow Creek

Restoration of fire is compatible with the aquatic restoration theme, if season, severity and size of fire are commensurate with historic fire regimes.

Conservation of recreation opportunity spectrum classes is compatible with the area themes if motorized use is located and otherwise managed to reduce impacts to aquatic resources.

Lower Meadow Creek

Conservation of aquatic processes is compatible with the terrestrial restoration theme, if season, severity, and size of fire disturbance are commensurate with historic fire regimes. Coordination of weed management and fire use will be required.

Conservation of recreation opportunity spectrum classes is compatible with aquatic conservation if use is located and otherwise managed to reduce impacts to aquatic resources.

Integrated Area Recommendations

Upper Meadow Creek

- Review and inventory the impact of human use in outfitter camps, on trails, and in other high use areas.
- Develop a monitoring plan to document off-trail impacts associated with OHV use in the headwater meadows area.
- Develop a restoration plan to rehabilitate impacted areas and abandoned trails.
- Monitor brook trout populations in Buck Lake and Red Lake and conduct a feasibility study for brook trout removal.
- Review the transportation system and access prescriptions for roads and trails utilizing an integrated approach, such as the EAWS (ecosystem analysis at the watershed scale) roads analysis protocol process. This would further refine the transportation system and the part of the trail system that is open to motorized vehicle use.
- Provide for wildlife security by evaluating impacts of motorized use in alpine habitats, calving areas, and on winter range. Develop recommendations.
- Restore and conserve terrestrial disturbances such as fire to restore whitebark and lodgepole pine, and to restore wildlife habitats in alpine and mesic habitats.
- Monitor amphibian populations in high lakes populated with non-native fish.
- Inventory weed infestations, conserve weed-free areas, and control weeds where feasible.

- Develop a plan to inventory and monitor priority terrestrial and aquatic species within the ERU using partnerships and collaborative processes with other agencies, tribes, and the public.
- Maintain Elk Mountain Road 285 and Green Mountain Road 285A to provide access to backcountry trails.
- Collaborate with the public to avoid or reduce conflict among user groups.
- Complete a suitability study to determine eligibility for designated wilderness status for the area or wild and scenic waters status for Meadow Creek.

LOWER MEADOW CREEK

- Restore frequent and very frequent low severity and mixed severity terrestrial disturbance regimes in lower elevation portions of the Meadow Creek area.
- Restore and conserve old growth forest in the harvested areas in the Horse Creek watershed to increase old growth patch size.
- Inventory weed infestations, conserve weed-free areas, and control weeds where feasible.
- Determine potential presence of harlequin ducks in Meadow Creek. Monitor Coeur d'Alene salamander populations.
- Review and inventory the impact of human use in outfitter camps, on trails, and in other high use areas.
- Develop a monitoring plan to document off-trail impacts associated with OHV use.
- Develop a restoration plan to rehabilitate impacted recreation areas and abandoned trails.
- Continue the sediment, climatic, and stream flow monitoring in the Horse Creek watershed.
- Continue to cooperate with research on the ongoing road-decommissioning study in the Horse Creek watershed, and reduce road density there.
- Maintain Indian Hill Road 290 to provide access to backcountry trails.
- Collaborate with the public to reach management decisions that reduce conflict among user groups.

FUNCTIONAL FINDINGS AND RECOMMENDATIONS

AQUATICS

Theme: Upper Meadow Creek: Restore aquatic processes and conserve species integrity. Very high priority.

Theme: Lower Meadow Creek: Conserve aquatic processes and conserve species integrity. Very high priority.

Aquatic Findings

Upper and Lower Meadow Creek: Watersheds in the Meadow Creek ERU are characterized by granitic mountain uplands and ridges, granitic glaciated slopes and valley bottoms, and granitic and moist metamorphic breaklands. Streams are highly diverse. Gradients and channel confinement range from high or very high to low, and both forested and meadow habitat types occur in riparian areas in this watershed. In general, meadow complexes are located in the upper portions in granitic mountain uplands, while steeper, forested canyons occur in the mid and lower portions. Glaciated areas occur around east side tributaries, where mountain lakes also occur. Wildfire and floods created large pulse disturbances that historically influenced erosion and streamflow regimes. Habitat potential for aquatic species is high or very high.

The streamside zone of connected high elevation meadows in the upper watershed is a rare and unique part of this ERU. Habitat potential for fish and other aquatic organisms is very high in these reaches, especially for westslope cutthroat trout and bull trout. Resident redband trout also occur. Collectively, the presence of westslope cutthroat, redband, and resident bull trout comprises a unique species assemblage not documented elsewhere in the Selway subbasin. The lower reaches of Meadow Creek are important for spawning and rearing of anadromous fish. Buck Lake Creek supports disproportionately high densities of juvenile steelhead trout. East Fork Meadow and Schwar Creeks support isolated westslope cutthroat trout subpopulations.

There has been a moderate departure from the historic aquatic disturbance regime. Fire suppression has increased the interval between large fire and subsequent flood events, which historically affected channel formation, woody debris recruitment, formation of pools, and habitat complexity. The Upper Meadow Creek Sub-ERU has also been affected by road construction, dispersed OHV use, and past domestic livestock grazing. These activities have resulted in changes in watershed condition. Existing habitat in meadow reaches is probably different than the historic condition.

The existing species assemblage is similar to the historic assemblage in most areas, with three exceptions. Mountain lakes at the headwaters of Buck Lake Creek have been stocked with brook trout. Although brook trout have encroached into Buck Lake Creek, they constitute only a minor component of the species assemblage. Brook trout are not found elsewhere in the watershed. Juvenile coho salmon have been repeatedly stocked into Meadow Creek since 1995 over most of its length. The presence of this non-native species represents a departure from the historic condition. Its presence is maintained by yearly stocking, and the number of returning adult coho salmon is unknown. Horse Creek was historically fishless due to impassible barriers near the mouth. The stream has been stocked with hatchery rainbow trout, which are strongly established there.

Aquatic Recommendations

Upper Meadow Creek:

Restore aquatic processes:

- Restore sediment and streamflow regimes by restoring historic disturbance patterns such as fire.
- Review access prescriptions within the upper Meadow Creek area to address motorized vehicle use; this is necessary to start the restoration process in streamside areas.
- Recognize and reduce chronic sediment from roads and OHV trails in streamside zones; this is a priority.
- Continue recovery of stream banks where grazing has caused bank cracking; this is a priority.
- Consider restoring areas that have experienced soil erosion and compaction on abandoned trails, in meadow areas, in outfitter camps, and around alpine lakes. Restoration of these areas should be addressed as part of the recreation, road, and access management themes as well as aquatic themes.

Conserve species integrity:

- Review and possibly update the travel plan for this portion of the ERU to address human access and risk issues.

- Conduct a genetic analysis of westslope cutthroat trout and resident redband trout to determine genetic purity and possible origin.
- Monitor brook trout presence in Buck Lake Creek.
- Develop a brook trout management plan in cooperation with the Idaho Department of Fish and Game for Buck and Red Lakes.

Lower Meadow Creek:

Conserve aquatic processes:

- Restore natural fire disturbance patterns.
- Conserve the high water quality and watershed condition; this supports the foundation for high aquatic species viability.
- Reduce human impacts in uplands and streamside areas.
- Reduce road mileage in the Horse Creek watershed.
- Restore and revegetate compacted soil in abandoned or high use outfitter camps.
- Improve soil productivity in uplands and streamside areas, the Horse Creek watershed, and abandoned or high use outfitter camps.
- Inventory and treat noxious weeds.
- Update and analyze climatic data, hydrologic physical data, and historical stream flow data from the Horse Creek study so that it can be better used to understand physical changes caused by human disturbances, such as the instream physical changes taking place in the main stem of Horse Creek.

Conserve species integrity:

- Continue assessment of coho salmon stocking activities and their potential effects on the native species assemblage.
- Assess adult steelhead and spring chinook salmon returns through ongoing redd surveys.
- Monitor the physical effects of upstream activities.

LANDSCAPE ECOLOGY

Theme: Upper Meadow Creek: Restore terrestrial processes and restore species. High priority.

Theme: Lower Meadow Creek: Restore terrestrial processes and conserve species. High priority.

Landscape Ecology Findings

Upper Meadow Creek: The dominant character of this part of the ERU is rolling uplands and alpine glaciated slopes, with spruce-fir and lodgepole pine forests. The rolling terrain and the moist meadows around the headwaters of Meadow Creek are rare elements in the Selway subbasin. Overall integrity of landscape composition and pattern is moderate. Integrity of process is low. Integrity of species is high, except for the local loss of whitebark pine.

Recent burns are no longer represented. A large area has not burned in the 129 years of record. Canopy density and patch size and pattern are within natural ranges, except for the small, dispersed clearcuts in the uppermost headwaters. Few areas are outside their typical fire return interval, and vegetation indicators do not suggest fuel accumulations higher than typical of presettlement conditions. The absence of any large fires since 1919 in the upper Meadow Creek area suggests the restoration of fire occurrence at the landscape level is needed, even at high elevations. The greatest departures from historical condition are loss of whitebark pine in upper elevations, and loss of fire disturbance.

Lower Meadow Creek: Steep canyons supporting xeric and mesic forests characterize this part of the ERU. Adjacent uplands support moist and mesic forests and shrublands. Overall integrity of landscape composition and pattern is moderate. Integrity of process is low. Integrity of species is high except for localized weed infestations.

Non-forest openings have declined with fire exclusion. Canopy density appears to have shifted to more high canopy closure in mesic and dry forest, compared to presettlement conditions. Much of the xeric forest is one to two intervals outside the typical fire return interval in both very frequent and frequent fire regimes. More than 20 percent of the middle reaches of the canyon, and 10 to 20 percent of the lower reaches, show vegetation indicators of fuel accumulations potentially higher than typical of presettlement conditions. The greatest departures from historical condition are due to fire exclusion.

In the areas of mesic forest, timber harvest in the Horse Creek area has fragmented old growth. Western white pine, never a dominant species, has virtually disappeared because of blister rust. Shrubs now dominate clearcuts. Representation of tree size classes indicates decreased area in seedling and sapling forest and nonforest compared to presettlement ranges, probably due to fire exclusion. Stand densities have increased. Uniform sized clearcuts have reduced variability in patch size. Fuel accumulations are probably more continuous in the landscape but fuel moisture is usually high. The greatest departures from the historical condition are due to harvest design and fire exclusion.

Landscape Ecology Recommendations

Upper Meadow Creek:

In vegetation response units (VRUs) 1, 2, 6, and 9:

- Restore infrequent mixed and lethal fire disturbance regimes; this is a very high priority in high elevation portions of the Meadow Creek ERU in order to restore whitebark pine and disturbance dynamics in middle and high elevation forests. Mixed and lethal fire would contribute to the restoration of whitebark pine by reducing encroachment of subalpine fir and spruce, and provide sites for regeneration of lodgepole pine and whitebark pine. Only by providing for regeneration can selection for rust resistance occur, which is critical to the persistence of whitebark pine.
- Consider that VRU 9 should probably sustain slightly more frequent disturbance than VRUs 1, 2, and 6. Increased use of wildland fire is especially appropriate in these high-elevation, roadless areas of low timber productivity.

Lower Meadow Creek:

In vegetation response unit (VRU) 3:

- Restore frequent and very frequent low severity and mixed severity fire regimes; this is a moderate to high priority in lower elevation portions of the Meadow Creek area which are in VRU 3, including the mesic mixed conifer cover type. Low and mixed severity fire would contribute to the restoration of lower stand densities in the mixed conifer cover type, putting them closer to historic levels, and would maintain representation of ponderosa pine as a seral component. Mixed severity fire would continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch.

- Increase use of naturally ignited or management ignited fire; this is especially appropriate in this VRU because of its roadless character and high susceptibility to erosion and landslides.

In vegetation response unit (VRU) 8:

- Restore frequent to infrequent mixed severity fire regimes; this is a moderate priority in parts of the lower Meadow Creek area that are in VRU 8, including the mesic mixed conifer cover type. Mixed severity fire would contribute to reduced stand densities, provide some early seral herbaceous, snag, and shrub habitat, and provide some establishment sites for shade intolerant tree species including pine and larch. Harvest and prescribed fire may be used similarly in roaded lands.
- Plant rust resistant white pine in openings to increase the likelihood of its persistence in the landscape.
- Conserve and restore late seral and old growth forest; this is a high priority in the Horse Creek area.

In vegetation response units (VRUs) 7, 10, and 17:

- Conserve late seral and old growth forests; this is a moderate priority in the parts of the lower Meadow Creek area that are in VRUs 7, 10, and 17. These VRUs historically provided important multi-layered, mixed conifer old growth, including Pacific yew understories in VRU 7.
- Restore infrequent mixed severity terrestrial disturbance regimes in these VRUs (this can be compatible with conserving late seral and old growth forest).
- Do not allow large severe disturbances to occur; this will maintain existing Pacific yew communities and their potential as seed sources.

WILDLIFE

Theme: Conserve wildlife security and restore wildlife species integrity. Very high priority.

Wildlife Findings

The Meadow Creek ERU contributes significantly to wildlife habitat and population diversity in the Selway subbasin. Meadow Creek wildlife habitats and populations reflect the interface of attributes of both the drier and higher elevation backcountry ERUs and the more mesic, lower elevation front country ERUs. Mesic, low elevation habitats include a maritime coastal disjunct regime along the lower reaches of Meadow Creek, featuring western red cedar. The Meadow Creek area is important in population dispersal and interchange between other areas within and adjacent to the Selway subbasin.

Upper Meadow Creek: Mesic habitats dominate the entire ERU. The mesic habitats in the lower Meadow Creek area are primarily in mid-seral structure, with scattered early seral patches. Forest types include grand fir, Douglas-fir, and western red cedar. Pacific yew, important moose habitat, also occurs but is limited. Mesic old growth in the lower Meadow Creek area is well represented and provides habitat for lynx, fishers, goshawks, pileated woodpeckers, and moose. The Upper Meadow Creek area is largely comprised of extensive climax meadows. These are important to spring elk calving and elk summer range. Mesic, mid- seral habitats are also well represented. Spruce and fir forests and lodgepole pine forests are predominant with some cold shrublands. Lodgepole pine is significantly represented in this ERU relative to other ERUs, and may provide the most important lynx habitat in the Selway subbasin. Mountain goats winter in the upper Meadow Creek area. Coeur d'Alene salamanders have been documented in the lower reaches within the maritime coastal influence zone. Patches of mesic late and old forests in the upper Meadow Creek area may represent suitable lynx habitat. Stream characteristics are indicative of harlequin duck habitat.

Alpine habitats represent a small but important component of the ERU. Currently, most of the alpine habitats are in early seral structure, with mid-seral structure well represented. The alpine old growth is more limited, but the Meadow Creek, Otter and Mink, and Marten Creek ERUs share the largest concentration of alpine elevation old growth in the Selway subbasin. Wolverines favor these remote, alpine environments. Whitebark pine stands persist in the higher elevations, and were an important component in the diet of grizzly bears. Mountain goats observed in winter in adjacent lower elevations likely occupy these alpine elevations in summer. Five lakes occur in the alpine environment and whitebark pine persists at each of them. Neotropical migrant birds and amphibians in abundance have been documented at the three fishless lakes.

Lower Meadow Creek: Xeric habitats are rare in the Meadow Creek ERU. They occur adjacent to Meadow Creek on the east face. Mid-seral structure currently dominates the xeric habitats. Early seral structure is limited but provides important winter forage. Elk, mule deer, and whitetail deer winter in the lower Meadow Creek area. Bighorn sheep have been observed in summer in the ERU. The Meadow Creek area is within the territory of the Selway wolf pack. Xeric old growth habitats are well represented in the limited xeric component and are characterized by open canopy, large diameter ponderosa pine and Douglas-fir. These attributes provide important habitat potential for flammulated owls and white-headed woodpeckers.

Upper and Lower Meadow Creek: Recently burned areas, which provide important wildlife habitat, are absent, and early seral structure has decreased due to fire suppression. Stand density has increased. Other important habitat attributes including ponderosa pines, shrubs, and large snags have also decreased in the absence of fire. Whitebark pine, critical to grizzly bear diet, has declined due to fire suppression and blister rust disease. Timber harvest has fragmented old growth and decreased patch size variability. There is reportedly a significant level of off-trail motorized vehicle use in the headwater meadows of upper Meadow Creek. These meadows are important to elk calving and summer range. Wintering elk in the Meadow Creek area are declining. Elk calf recruitment in the Meadow Creek area is the lowest in the subbasin. Trail # 647, which is open to motorized vehicles, accesses high elevation habitats and species, possibly including mountain goats and wolverines that may be displaced by motorized vehicle disturbance. Trails # 609 and 632 also access some of the highest elevation habitats in the ERU and generate the same concerns. Buck Lake and Red Lakes-East are populated with brook trout, with associated impacts to native amphibian populations.

Wildlife Recommendations

- Restore fire, where feasible, to reestablish natural disturbance dynamics.
- Restore whitebark pine communities in alpine habitats; this is a very high priority.
- Initiate weed control in xeric habitats while weed populations are still confined. Conserve existing low elevation weed-free areas.
- Reduce introduced eastern brook trout populations in Buck Lake and Red Lakes-East, and lake outlet streams where possible, to decrease impacts on native amphibians, reptiles, and birds.
- Review existing trail and road systems associated with species populations vulnerable to disturbance, especially in alpine elevations, on winter range, and in meadow habitats. Address potential conflicts through access management recommendations.
- Consider implementing area closures to confine motorized vehicle traffic to designated routes.
- Initiate inventories for lynx and snowshoe hare in the extensive lynx habitat that occurs in the upper Meadow Creek area.
- Investigate harlequin duck status in Meadow Creek, where suitable breeding and nesting habitat conditions occur.
- Monitor documented Coeur d’Alene salamander populations.

- Assess status and migration pattern of the bighorn sheep population.
- Determine status of white-headed woodpeckers and flammulated owls in old growth ponderosa pine.

ROADS

Theme: Upper Meadow Creek: Defer new roads.

Theme: Lower Meadow Creek: Maintain backcountry access.

Roads Findings

The Meadow Creek ERU contains approximately 65 miles of existing road, resulting in an overall road density of 0.27 mi/mi^2.

Management of some of the roads in the Meadow Creek ERU may be affected by the proposed rules regarding roadless area conservation. Therefore, status of these roads as defined in the summary of the proposed rules is appropriate.

Roads that existed in roadless areas prior to their being mapped include Elk Mountain Road 285, Green Mountain Road 285A, and Three Prong Creek Road 9512 and its associated road system. These roads constitute approximately 27 miles.

Roads outside inventoried roadless areas include Indian Hill Road 290 and portions of American River-Selway Road 443, as well as the Horse Creek roads and roads high in the drainage that are associated with South Nez Perce Trail Road 468. These roads constitute the balance of the roads in the Meadow Creek ERU.

Additional roads could be developed in portions of the Meadow Creek ERU fairly readily to facilitate vegetation management. This is especially true in the vicinity of Simmons Ridge and Mountain Meadows.

Roads Recommendations

- Maintain backcountry access on long established routes such as Roads 290, 285, and 285A. Although several of these roads are pre-inventory roads it appears that the roadless inventory recognized them and their existing uses.
- Do not construct new roads in the Meadow Creek ERU; this is recommended due to the level of controversy regarding additional roads in inventoried roadless areas.
- Manage other roads in the Meadow Creek ERU following updated detailed road management objectives resulting from roads analysis.

RECREATION AND TRAILS

Upper and Lower Meadow Creek Trails

Theme: Maintain existing trail system and reduce adverse effects; explore reconfiguration of use patterns to reduce conflicts and provide for future needs.

Trails Findings: The Meadow Creek drainage contains 206 miles of system trails. Access to the Meadow Creek basin is provided by these trails, and also by Roads 468, 285, 285A, 223, 290, and 443. Three-quarters of the trail mileage exists below Schwar Creek and is distributed about one half on ridgelines and one half on the bottom or mid-slope.

A designated National Recreation Trail, which parallels Meadow Creek, is open to motorcycle travel for the first three miles. Above Meadow Creek Cabin, a system of trails provides motorized vehicle access from the south. According to the 1987 forest map, those trails are closed to motorized vehicle use, but because it was determined that the public did not have sufficient input to the closure decision, those trails are not presently signed and are utilized by motorized vehicle users.

A trail constructed for OHV (also a National Recreation Trail) extends for about 18 miles along the southwestern ridge of the watershed boundary, through the Anderson Butte lookout site, and south to Black Hawk Mountain. The trail is closed to motorized vehicle use for the next five miles, but open again from Trail # 668 to Road 468 near Mountain Meadows. That route receives use by motorized vehicle user groups year round, and has sustained some damage because of a lack of proper drainage structures.

There is evidence of considerable motorized vehicle use off system trails and outside of designated motorized vehicle use areas. Off-road vehicle groups (one has 250 members) have organized and seek extended opportunities for motorized use.

The Meadow Creek area trails are favorites for hikers, horse riders, off-road vehicle enthusiasts, outfitters and private hunters; as a result, there are sometimes conflicts among user groups.

Lack of financial resources has deterred adequate maintenance and restoration of trail impacts, and about 30 miles of trails do not receive attention or use.

A small northeast portion of the Meadow Creek drainage is in designated wilderness, and three out-of-compliance, non-system trail areas exist near Little Copper Butte. An abandoned ridgeline trail is badly eroded with multiple treads, and an abandoned section of Trail # 602 continues to be used instead of the longer reroute that was constructed in 1988. In 1999, a volunteer group worked to install drainage structures to control erosion and to naturalize those trails, but keeping traffic off the shorter, abandoned route remains a problem.

Trails Recommendations

- Determine designated routes and/or area closures for motorized vehicle use and sign them appropriately.
- Consider establishing alternative motorized routes outside the Meadow Creek basin.
- Restore damaged areas and implement drainage work on existing trails to address resource problems, with consideration to recreational experience and setting for visitors and to projected use.
- Collaborate with user groups and facilitate cooperation among them to determine future use and to assure protection of the resource.
- Consider removing approximately 30 miles of existing trail from the system of maintained trails.
- Monitor Trail # 602A near Little Copper Butte for use and condition. Either reroute and use that section of trail or determine how to route traffic to the designated system trail.

Upper and Lower Meadow Creek Recreation

Recreation theme: Restore wilderness values and conserve recreation opportunity spectrum classes.

Recreation Findings: The Meadow Creek area is a favorite for many people. It offers clear streams, extensive vistas, and high mountain peaks. Hikers trek up Meadow Creek in early spring before other areas can be accessed. Horse packers, hunters and anglers all consider Meadow Creek a special area. Floaters, motorcyclists, snowmobile and off-highway vehicle (OHV) enthusiasts enjoy a “wilderness experience” without the restrictions of designated wilderness.

At the same time, the Meadow Creek area is considered important for its unique ecosystems, its biodiversity, and its coastal disjunct species. It is important as a watershed and a fisheries stronghold. The eastern portion of the area is eligible for consideration as designated wilderness, and conservation advocates feel strongly that it should be included in the National Wilderness Preservation System. Logging occurred in the upper reaches in the past and some stands within the Meadow Creek ERU continue to be a point of contention. A wide variety of people and groups have an interest in the Meadow Creek area, and this sometimes results in polarized views among recreational users and poses difficulties in making management decisions.

A National Recreation Trail parallels Meadow Creek and accesses Meadow Creek Cabin, an administrative site also available for visitors to rent. About twenty-five outfitter and guide campsites are scattered throughout the basin. Those camps have not been routinely inspected or monitored in the past, and several areas exist where trash and abandoned caches remain. Vegetation has been disturbed or destroyed and damage trees have been damaged. Hunting activity by outfitters and private parties is considerable in the fall.

Recently, motorized vehicle recreation has increased. Users of motorized vehicles and other types of trail users sometimes do not agree on which trails should be open for motorized vehicle use. Snowmobile activity is allowed, but restricted to designated routes. High performance machines are capable of traveling far from groomed trails, and sometimes users enter areas that are sensitive for vegetation or wildlife and not intended for motorized vehicle travel.

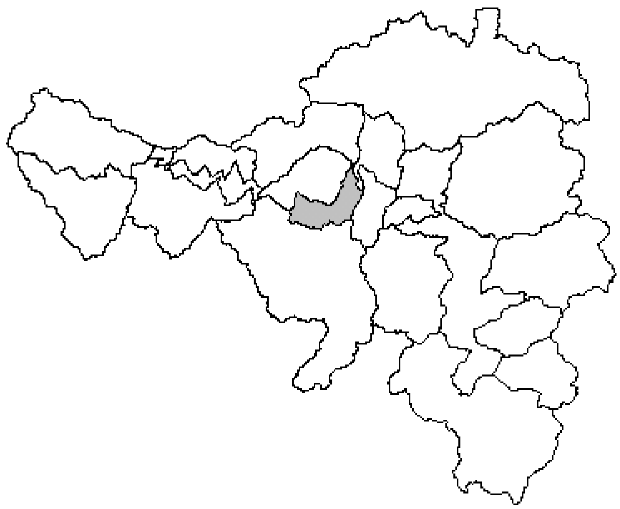
The Forest Service and interest groups are discussing a wilderness designation for the eastern portion of Meadow Creek ERU. Reasons for and against including part of the ERU in the Wilderness Preservation System are as follows: on the one hand, wilderness status would insure protection to this unique area from the effects of increasing and diverse recreational pressure; on the other hand, without a wilderness classification the area serves as a “buffer” for existing designated wilderness.

Recreation Recommendations

- Facilitate communication among recreational user groups to mitigate conflicts.
- Accommodate various user groups, within the limits of sustaining ecological integrity.
- Use signing and other appropriate means to provide visitors with use information that is clearly defined.
- Inspect and monitor outfitter camps on a systematic basis.
- Provide an agency presence to conduct site inventories and monitor visitor use, remove caches and restore sites, and provide information and education for the public.
- Complete a suitability study to determine eligibility for designated wilderness status for the Meadow Creek area or wild and scenic waters status for Meadow Creek.

Meadow Creek

OTTER AND MINK CREEKS



Area Theme: Restore wilderness values.
Size: 20,764 acres.
Location: South side of Selway River with Meadow Creek to the west and Marten Creek to the east.
Land Classification: Wilderness.
Land Administration: USFS.
Primary Watersheds: Otter, Bluff, Mica, Berry, Mink, Doe Lake, Coon and Jim's Creeks.
Landmarks: Highline Ridge, Wolf Point, and Otter Butte.

OVERVIEW

The small Otter and Mink ERU is located on the south side of the Selway River. The ERU is within the Selway-Bitterroot Wilderness with the exception of a small roaded area near Indian Hill Lookout. The streams are considered in natural or near natural condition and provide a source of high quality water to the Selway River. Both watersheds provide important habitat for steelhead/redband and westslope cutthroat trout. There are five mountain lakes present at the headwaters of Mink Creek. The upper elevations of this ERU consist of high elevation ridges, historically the stronghold of whitebark pine. The names of streams and landmarks (Otter, Mink, Weasel, Wolf, Coon, Doe, Fawn, etc.) probably reflect the historic abundance of wildlife in the area.

The area is relatively easily accessed from outfitter and other dispersed camps near Indian Hill Road; from there it is a short distance to the five area lakes. Many visitors travel to Indian Hill Lookout and this use appears to have been increasing over the past three decades. Outfitted and private hunting and fishing are popular, and these activities account for the most extensive use of the trail system. Abandoned trails and some heavily used campsites do not meet wilderness management direction. In addition, some mountain lakes in the ERU have been heavily impacted by stock and recreational activity.

Brook trout are present in several high lakes in the Mink watershed but have not encroached into the streams below. Brook trout have likely displaced native amphibians from some area lakes. Fire suppression in the past 60 years has affected the composition and dynamics of habitats and associated wildlife populations. Absence of moderate or large fires has influenced whitebark pine, lodgepole pine, and age class diversity, and reduced large pulse disturbances that affect erosion and streamflow. The natural fire regime is currently different than the historic regime due to fire suppression. Lower elevation areas are generally within the typical fire return interval in frequent fire regimes, but fire has been absent in a substantial portion for over 50 years. Susceptibility to weed invasion is considered moderate.

INTEGRATED AREA THEME

RESTORE WILDERNESS VALUES

Wilderness is an integral social and ecological resource, and the central focus of management must be on the function of the whole. Restoration of wilderness character includes both social and ecological components. It requires the ability to define natural ecosystem dynamics and management to ensure that human use, in all its forms, does not disrupt the naturally functioning ecosystem processes that characterize the wilderness.

This ERU is located almost entirely in designated wilderness and is categorized as opportunity classes II and III. It includes numerous sensitive high elevation lake, stream, and upland environments and species that are easily accessed and subject to high visitor use. The Indian Hill Road and Indian Hill Lookout attract many visitors and provide high elevation access. Most backcountry users are interested in hunting and fishing, and many use stock. Human activity has resulted in excessive impacts to the areas around mountain lakes, alteration of aquatic species assemblages in lakes, and created user defined problem areas and out-of-standard social and resource settings. Potential impacts to vulnerable wildlife species are also associated with human use in alpine lakes environments. Restoration may include an increase in outfitter and guide administration, closures of some additional areas to stock, more inventories and inspections, and a greater presence of field personnel to accomplish these actions and enforce any restrictions.

COMPATIBLE THEMES

RESTORE TERRESTRIAL PROCESSES AND RESTORE SPECIES

Naturally ignited fire is necessary to recover species in high elevation forests and maintain low elevation stands and age-class diversity. Historic infrequent mixed and lethal fire and floods that drive the natural hydrologic regime have not occurred in the ERU in the 129-year period of record. Focal communities for restoration include whitebark pine and lodgepole pine. Mixed and lethal fire would contribute to restoration of whitebark pine by reducing encroachment of subalpine fir and spruce and would provide sites for regeneration of lodgepole and whitebark pine. Burned areas would also provide snags. This theme is compatible with the area theme because ecological restoration is an integral part of restoration of wilderness values.

CONSERVE AQUATIC SPECIES AND CONSERVE AQUATIC FUNCTION

Conservation of existing aquatic function, habitat, and setting for aquatic species, is recommended as a high priority for this ERU. Conservation of aquatic species and aquatic function is consistent with and supports the area theme of restoration of wilderness integrity. Actions taken to remove or reduce brook trout in mountain lakes may facilitate dispersion of visitor use, thereby lessening impacts in sensitive lakeshore environments. This theme supports the area theme because decreasing human impacts in these areas is also an objective of restoring wilderness values.

CONSERVE WILDLIFE SECURITY AND RESTORE WILDLIFE SPECIES

Conservation of existing wildlife security and restoration of wildlife species is recommended for this ERU. Conservation of wildlife security and restoration of wildlife species is consistent with and supports the area theme, because these elements constitute a wilderness value. Actions taken to restore amphibian populations by reducing non-native fish may facilitate dispersion of visitor use at high-use areas.

MAINTAIN EXISTING TRAIL SYSTEM AND REDUCE ADVERSE EFFECTS

Eighty percent of the trails in this ERU are maintained, with some trails receiving moderate to heavy use. Non-system trails that are not maintained continue to receive heavy use and do not meet current wilderness management direction. Other system trails exhibit adverse effects and a need for increased maintenance. Reducing adverse effects associated with system and non-system trails contributes to achieving the area theme of restoring wilderness values.

THEME INTERACTIONS

Sustaining fire dynamics in low elevation forests may enhance the spread of weeds. Weed population monitoring and control activities should emphasize weed-susceptible habitats affected by recent fire.

Although the overall goal of reducing or eliminating non-native fish from some mountain lakes is consistent with the area theme, actions taken to achieve this goal may not be. Effective, long-term reduction or removal of undesirable fish from mountain lakes may require techniques that are not consistent with wilderness. Methods that are consistent with traditional wilderness values are generally ineffective in eliminating fish from even small lakes. In addition, some wilderness users may view removal of an established fish population from any lake as an unacceptable action.

The ecological benefits of removal of non-native fish must be assessed within the context of social costs and risks to other wilderness values. Development of a brook trout management plan for this area, in cooperation with the Idaho Department of Fish and Game and interested segments of the public, would address some social and ecological concerns regarding fish management in wilderness lakes. Incorporation of a public education proposal concerning the effects of fish stocking in naturally fishless lakes should be an integral part of this plan.

INTEGRATED AREA RECOMMENDATIONS

- Implement an integrated management strategy that includes watershed protection, habitat for rare or vulnerable plant and animal species, habitat for game and non-game fish and wildlife species, scenic beauty, and non-motorized recreation.
- Inventory and monitor campsites and trails currently identified as out-of-standard with the forest wilderness management plan. Bring the areas to acceptable standards by use of appropriate rehabilitation procedures and agency presence.
- Reduce the effects of fire suppression and restore the role of naturally occurring fire that would provide for restoration of whitebark pine, other wildlife habitat and natural erosion processes.
- Assess the status of weed populations and control invasive species.
- Evaluate and monitor the status of amphibian populations in high lakes and support brook trout reduction.
- Monitor potential impacts from motorized vehicle access to alpine elevations on wilderness sensitive species, including wolverines and mountain goats.

FUNCTIONAL FINDINGS AND RECOMMENDATIONS

AQUATICS

Theme: Conserve aquatic processes and conserve species integrity. High priority.

Aquatic Findings

Watersheds in the Otter and Mink ERU are characterized by glaciated high elevation slopes, low gradient glacial valley bottoms, and low and mid elevation breaklands. Stream gradients are generally high or very high, although moderate gradients exist in some reaches. Similar to other watersheds in the subbasin, a rich fire history in the Otter and Mink watersheds significantly affected instream function and process. Five mountain lakes are located at the headwaters of Mink Creek. Habitat potential for steelhead/redband and westslope cutthroat trout is high in both streams, but low for spring chinook salmon and bull trout.

The highest habitat potential reaches in Otter Creek are located from the mouth upstream to Bluff Creek. The highest potential reaches in Mink Creek occur in moderate gradient reaches located about midway in the watershed. High densities of westslope cutthroat trout have been anecdotally noted in this area.

There has been some departure from historic aquatic disturbance regimes in both watersheds due to fire suppression. Wildfire and floods created large pulse disturbances that affected recruitment of large wood in stream channels, formation of pools, channel maintenance and formation, and movement of sediment. Debris jams may have occurred more frequently due to higher historic fire frequency in riparian zones. Local impacts to lakeshore riparian areas have occurred from high visitor use and pack stock grazing in these areas.

The existing species assemblage in both streams is similar or the same as the historic assemblage. Brook trout have been introduced into mountain lakes at the headwaters of Mink Creek, but brook trout have not encroached into streams. Brook trout have affected the lake environments where they occur.

Aquatic Recommendations

Conserve aquatic processes:

- Conserve the natural erosional process related to natural disturbances such as wildfire and flood events
- Conserve the high water quality in the watershed.
- Restore the role of fire as it occurs naturally.
- Conserve watershed resilience to large pulse disturbances by maintaining and preserving watershed and species integrity.
- Restore compacted soils in campsites around Highline Lakes and revegetate impacted sites.
- Maintain the current restriction to overnight camping and stock use at Highline Lakes and consider expanding restrictions to other impacted areas.

Conserve species integrity:

- Monitor the upper reaches of Mink Creek to determine if brook trout become established.
- Assess riparian and other impacts to Highline Lakes to determine the appropriate strategy for managing human use in this area.
- Develop a brook trout management plan, in cooperation with the Idaho Department of Fish and Game.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore species. High priority.

Landscape Ecology Findings

The dominant character of this ERU is steep canyons supporting mesic and xeric forests, and alpine glaciated slopes with spruce-fir, and lodgepole pine forests. Overall integrity of landscape composition, process, and pattern is moderate. Integrity of species is high, except for the loss of whitebark pine.

A substantial portion of the upper elevations has not burned in the 129-year period of record. Whitebark pine no longer occurs as a cover type. There have been no recent burns. Canopy density has not increased, possibly because whitebark pine mortality and spruce-fir encroachment have compensated for one another. Few areas are outside their typical fire return interval, and vegetation indicators do not suggest fuel accumulations higher than typical of presettlement conditions. The absence of fire since 1920 in this part of Otter and Mink Creek suggests, however, that the restoration of fire occurrence at the landscape level is needed at high elevations.

In lower elevation mesic forests, canopy density has increased, compared to presettlement conditions. Lower elevations of Otter and Mink Creeks are generally within the typical fire return interval in frequent fire regimes, but a substantial portion has been without fire for 50 years. Susceptibility to weed invasion is considered moderate, but little is known of the current condition.

Landscape Ecology Recommendations

In mid and high elevations of Otter and Mink Creeks, vegetation response units (VRUs) 2 and 9:

- Restore mixed and lethal severity fire regimes; this is a very high priority in order to restore whitebark pine and disturbance dynamics in high elevation forests. Mixed and lethal fire would contribute to the restoration of whitebark pine by reducing encroachment of subalpine fir and spruce, and would provide sites for regeneration of lodgepole and whitebark pine. Only by providing for regeneration can selection for rust resistance occur, which is critical to the persistence of whitebark pine. Burned areas would also provide snags.

In lower elevations of Otter and Mink Creeks, vegetation response units (VRUs) 3 and 8:

- Conserve frequent mixed severity fire regimes; this is a moderate priority to sustain disturbance dynamics in mixed mesic and xeric conifer cover types. Mixed severity fire would contribute to the restoration of lower stand densities in the mixed conifer cover types, closer to historic levels, and would maintain representation of ponderosa pine as a seral component. Mixed severity fire would continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch. Inventory to assess weed status is recommended.

WILDLIFE

Theme: Conserve wildlife security and restore wildlife species integrity. High priority.

Wildlife Findings

The names of creeks and other landmarks in the Otter and Mink ERU, including Otter Creek, Mink Creek, Weasel Point, and Wolf Point, probably reflect the historic abundance of those species in the area. The Otter and Mink Creeks ERU is largely comprised of mesic, early and mid-seral habitats. Spruce-fir, lodgepole pine, grand fir, and western red cedar forest types with shrublands and mesic meadows characterize these habitats. They are indicative of lynx foraging and fisher thermal habitat. The mesic, early and mid-seral habitats also provide for ungulate summer range and elk calving. Mountain goats may use this habitat in winter. Mesic late and old forest structures are well represented. The old forest component provides habitat for pine martens and fishers, lynx denning, goshawk nesting, pileated woodpeckers, great gray owls, and moose.

Xeric habitats are rare in Otter and Mink ERU. Most of the xeric habitats are in early and mid-seral structure currently. Primary forest types are ponderosa pine and Douglas-fir. Xeric early seral communities are important for ungulate winter forage. These habitats are characterized by the presence of bunchgrasses, forbs, and shrubs. Although some elk winter in these habitats in lower Otter and Mink ERU, it is not a significant wintering area. The elk calf recruitment in Otter and Mink Creeks is high. Mule deer and whitetail deer probably winter in lower Otter and Mink Creeks. Bighorn sheep were observed adjacent to the Otter and Mink ERU. Otter and Mink Creeks are within the territory of the Selway wolf pack. Xeric late seral and old growth habitats are well represented. Xeric old growth communities are characterized by open canopy, large diameter ponderosa pines and Douglas-firs. They provide potential habitat for flammulated owls and white-headed woodpeckers.

Alpine habitats are limited in the ERU but contribute significantly to habitat diversity. Currently, early, mid, and old tree structures are almost equally represented in the alpine habitat. The Otter and Mink Creeks, Meadow Creek, and Marten Creek ERUs share the largest concentration of alpine elevation, old tree structures in the subbasin. Wolverines favor these remote, alpine environments. Whitebark pine stands persist in the higher elevations and were an important component in the diet of grizzly bears. Mountain goats observed in winter in adjacent lower elevations likely occupy these high elevations in summer. Reports of peregrine falcons flying in the alpine elevations have been documented. The high lakes environments are unique. Whitebark pine occurs at all but one of the five lakes in the ERU. Fawn Lake is barren of fish and well populated with amphibians. A variety of migrant bird species have been observed in the high lakes environment.

Fire has been absent for 50 to 80 years in the ERU. Recently burned areas, important for wildlife habitat, are absent. Elk calf recruitment is high, but total numbers of elk are declining. Whitebark pine, important to grizzly bears, is poorly represented relative to historic populations. In four of the five lakes, large populations of stocked eastern brook trout appear to be limiting native amphibian populations. Road 290 leads to Indian Hill Lookout and provides access to two outfitter camps, trailheads, and high elevation habitats and species. The disturbance sensitive species, including mountain goats and wolverines, may be influenced by the concentrated human activity.

Wildlife Recommendations

- Restore fire, where feasible, to reestablish natural disturbance dynamics. Focal habitats for restoration include the whitebark and lodgepole pine forest types.
- Assess weed population status and conserve existing weed free areas.
- Reduce introduced eastern brook trout populations in stocked high lakes and outlet streams, where possible, to alleviate impacts to native terrestrial species. This is a high priority for the ERU because of the remnant spotted frog populations that remain at the brook trout populated lakes.
- Review existing trail and road systems associated with species populations vulnerable to disturbance, especially in alpine elevations, on winter range, and in meadow habitats and calving areas. The potential for increased motorized traffic via Road 290 to Indian Hill is significant. Observations indicate that ORV traffic is increasing on the road and access to alpine habitats will increase.

RECREATION AND TRAILS

Themes: Restore wilderness values consistent with opportunity classes II, and III. Priority. Conserve semi-primitive motorized experience, activity and setting as described in the recreation opportunity spectrum (ROS).

Recreation and Trails Findings

Road 290 accesses Indian Hill Lookout at the extreme southeast boundary of the Otter and Mink Creeks ERU, adjacent to the Selway-Bitterroot Wilderness. Other road segments allow travel to trailheads and to outfitter base camps nearby. Other than this small areas designated for semi-primitive motorized use, all lands within this ERU are within designated wilderness.

All wilderness trail corridors are classified opportunity class III, and adjacent areas are opportunity classes II and III. One exception, a corridor between Little Copper Butte and Drake Saddle, is classified as opportunity class IV. It is an identified problem area and does not meet wilderness management direction standards.

Campsites at Highline Lakes and Drake Saddle also do not meet opportunity class III standards. Newly reported out-of-standards areas exist on Highline Ridge, Indian Park and Mink Peak. At Highline Lakes, the area has been closed to stock use since 1989, and an outfitter has not operated there since 1977. There is evidence of stock use since the 1989 closure. Three outfitters are permitted within or through the area, and the lookout at Indian Hill reports considerable use by private individuals (hikers and horse riders) as well.

Two hundred to 500 visitors per season drive to Indian Hill to enjoy views from the lookout tower and receive interpretive information from lookout personnel. The lookout is the destination of 95 percent of summer visitors who usually do not use the trails. Picnicking and short day hikes are popular. In the fall, most of the traffic in the area is associated with private and outfitted hunting. Hunters account for the most extensive use of the trail system. Nearly all day-hunters visit the lookout personnel and about 5 to 10 percent of other hunters and visitors contact the lookout in the hunting season. In 27 years on the lookout tower, the lookout reports that motorized traffic has steadily increased, and that presently, 50 percent of the traffic on Indian Hill Road is motorcycles and OHVs.

Eighty percent of the trails within this ERU are maintained. Trail # 602 receives moderate to heavy use as a route from Indian Hill Lookout to Bilk Mountain for access to the Selway-Bitterroot Wilderness to the north and the Meadow Creek basin to the south.

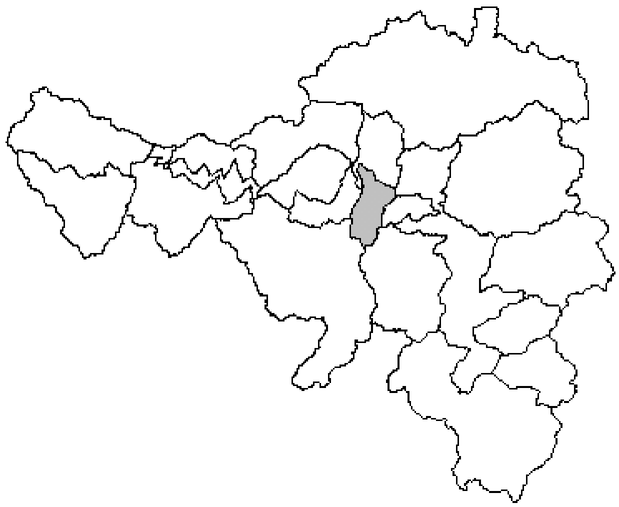
Eight non-system trails and two campsite areas in this ERU do not meet wilderness management direction. See the *State of Wilderness 1999* for more information.

Recreation and Trails Recommendations

- Inspect and manage outfitter camps and other campsites near road segments in the vicinity of Indian Hill Lookout to reduce visual and ecological impacts. Lookout personnel could monitor visitor use and motorized activity, and focus on education for hunters and other backcountry recreationists.
- Within the wilderness, bring problem and out-of standard campsite areas and trails to forest wilderness management standards.
- Enforce closures to camping with stock and routinely inspect outfitter operations.
- Inventory, monitor and accurately map all dispersed sites and non-system trails. (Very high priority).
- Monitor use patterns on reconstructed and abandoned sections of Trail # 206 near Little Copper Butte. Evaluate impacts and mitigate the existing situation.

Otter and Mink Creeks

MARTEN CREEK



Area Theme: Restore wilderness values.
Size: 20,973 acres.
Location: South of Selway River with Otter and Mink Creeks ERU to the west and Ditch Creek ERU to the east.
Land Classification: Wilderness.
Land Administration: USFS.
Primary Watersheds: Marten, Pack, and Pillar Creeks.
Landmarks: Grave Meadows, Bilk Mountain, Indian Park, and Square Rock.

OVERVIEW

The Marten ERU is located on the south side of the Selway River. The ERU is entirely within the Selway-Bitterroot Wilderness, classified as opportunity classes I and II. Opportunity classes I and II are characterized by unmodified natural environments and are not measurably or slightly affected by the action of users with outstanding opportunities for isolation and solitude. No system trails or signs should be present in opportunity class I.

The streams are considered in natural or near natural condition. The watershed provides a source of high quality water to the Selway River. Habitat potential for steelhead/redband and westslope cutthroat trout in Marten Creek is very high. There are three mountain lakes in the watershed, and they are probably fishless. Westslope cutthroat trout in Marten Creek are probably genetically pure. The lower reaches of the stream may provide important spawning and rearing habitat for steelhead trout.

Mesic habitats characterized by spruce-fir, lodgepole pine, mesic grand fir and western red cedar dominate the ERU. Mesic old growth is significant in Marten Creek and provides habitat for lynx, goshawks, great gray owls and moose. Early and mid-seral habitats are suitable for ungulate summer range, elk calving, wolf home sites, and prey opportunities for carnivores. Mountain goats may use this habitat in winter. Marten Creek provides important wildlife habitat connectivity between winter range along the central portion of the Selway River Canyon and spring and summer range to the west and north. Representation of tree size classes is generally within presettlement range. Whitebark pine no longer occurs as a cover type. Fire has not occurred in the upper Marten Creek area since 1934 nor for 50 years in the lower reaches.

INTEGRATED AREA THEME

RESTORE WILDERNESS VALUES IN OPPORTUNITY CLASSES I AND II

Wilderness values are an integral social and ecological resource, and the central focus of management must be on the function of the whole. Restoration of wilderness character includes both ecological and social components. It requires the ability to define natural ecosystem dynamics and management to ensure human use, in all its forms, does not disrupt the naturally functioning ecosystem processes that characterize wilderness.

In the Marten ERU, the *State of the Wilderness Report* indicates an access trail to a now-abandoned outfitter camp on Pillar Creek is eroding and degradation is increasing. Also, campsites (former outfitter camps) on Marten Creek and Pillar Creek were recorded as newly reported impacts in the 1997-1998 *State of the Wilderness Report*. These sites do not meet forest wilderness management standards and are too highly impacted to meet opportunity class I standards for resource and managerial setting components. These sites have not been monitored recently, and no management direction has been taken to restore them or to reduce the impact ratings.

COMPATIBLE THEMES

RESTORE TERRESTRIAL PROCESSES AND RESTORE TERRESTRIAL SPECIES

The high elevation ridges were historically strongholds for whitebark pine. Whitebark pine, lodgepole pine, and ponderosa pine are focal species for wildlife habitat restoration. The absence of fire since 1934 in upper Marten Creek suggests that restoration of fire occurrence at the landscape level is needed, even at high elevations. Lower elevations of the ERU are generally within the typical fire return interval in both very frequent and frequent fire regimes, but a substantial portion has been without fire for 50 years. This functional theme is compatible with the area theme because ecological integrity is an integral and fundamental part of the wilderness resource.

CONSERVE AQUATIC PROCESSES AND CONSERVE AQUATIC SPECIES

Natural disturbances of fire and flood contribute to the high quality of the watershed. Maintaining the hydrologic regime and watershed resilience to large pulse disturbances is important. Significant fires occurred in upper Marten Creek in 1910, 1917, 1919, and 1934. Aquatic species potential for steelhead and westslope cutthroat trout is very high. Conservation of aquatic resources is compatible with the area theme, because conservation of aquatic processes and species is an integral component of the wilderness resource.

CONSERVE WILDLIFE SECURITY AND CONSERVE WILDLIFE SPECIES

Marten Creek provides important connectivity between winter range in the central portion of the Selway River canyon and spring and summer range in upper Meadow Creek. Human influences are currently relatively minimal and are confined to fire suppression and related habitat effects. Trail density is low. Conservation of wildlife security and species is compatible with the area theme because these elements are integral components of the wilderness resource.

MAINTAIN EXISTING TRAIL SYSTEM AND REDUCE ADVERSE EFFECTS

System trails are sparse in this ERU, and most trail activity is associated with hunting and stock use. Many trails are in poor condition due to lack of regular maintenance, and lack of maintenance has resulted in eroding tread in some areas. Correction of these problems supports the area theme of restoration of wilderness values.

THEME INTERACTIONS

Sustaining fire dynamics in low elevation forests may enhance the spread of noxious weed populations. Weed population monitoring and control activities should emphasize weed-susceptible habitats affected by recent fires.

INTEGRATED AREA RECOMMENDATIONS

- Restore fire, where feasible, to reestablish natural disturbance dynamics.
- Inventory and monitor those areas that do not meet wilderness management standards.

- Rehabilitate campsites and trails that do not meet standards, prevent further degradation, and bring those areas to appropriate standards for opportunity classes I and II.
- Inventory at risk habitats and species potentially inhabiting the area. The Marten Creek ERU exhibits a notable lack of data. Little information concerning population status of terrestrial and aquatic species is available.
- Inventory data concerning human use, sufficient to determine if conditions are consistent with opportunity class designations.
- Conserve the naturally fishless character of high lakes.

Functional Findings and Recommendations

Aquatics

Theme: Conserve aquatic processes and conserve species integrity. High priority.

Aquatic Findings

The Marten watershed is characterized by lower and middle elevation breaklands, glaciated high elevation slopes, and glacial valley bottoms. Stream gradients generally range from high to moderate, with low gradient reaches present in some areas, and channel confinement ranges from high to moderate. The hydrologic regime in Marten Creek is controlled by high elevation snowmelt runoff that generally occurs in May and June. Three mountain lakes are located at the headwaters. Habitat potential for steelhead/redband trout and westslope cutthroat trout is very high and high, respectively, and moderate for spring chinook and bull trout.

Marten Creek in its entirety is probably the most remote watershed in the subbasin, at least in terms of human access. Information is lacking concerning species assemblages, distribution, and habitat. The highest potential habitat is probably located in moderate and low gradient reaches about midway up the mainstem. Cutthroat trout are probably genetically pure, especially in higher elevation areas, due to lack of stocking history in most of this watershed. There are no known non-native species present in either the mountain lakes or the streams. This watershed is therefore a stronghold for westslope cutthroat trout.

Departure from the historic aquatic disturbance regimes is moderate due to fire suppression. Wildfire and floods created large pulse disturbances that historically influenced erosion and streamflow regimes. These processes affected recruitment of large wood in stream channels, formation of pools, channel maintenance and formation, and movement of sediment. Fire suppression has increased the interval between significant pulse events related to fire.

The existing species assemblage is similar or the same as the historic assemblage. There are no known departures in species present, although abundance of anadromous fish is probably less than historic. One mountain lake has been stocked with non-native trout in the past, but the lake is currently fishless, and no known downstream encroachment occurred.

Aquatic Recommendations

Conserve aquatic processes:

- Conserve the natural erosional process related to natural disturbances such as wildfire and flood events. These events are part of and help drive the natural hydrologic regime.
- Conserve the high water quality in the watershed; this is a priority as part of wilderness designation and direction.
- Restore the role of fire that would contribute to maintenance of the historic disturbance regimes in the watershed.

- Conserve watershed resilience to large pulse disturbances that would maintain the hydrologic regime.

Conserve species integrity:

- Conduct a reconnaissance-level survey, at a minimum, to determine species presence and distribution.
- Continue deferral of fish stocking in all lakes in the watershed to conserve fishless lake ecosystems.
- Conduct a genetic analysis of cutthroat trout to affirm this subpopulation is unhybridized.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore species. High priority.

Landscape Ecology Findings

The dominant character of this ERU is steep canyons of mesic forests and alpine glaciated slopes with spruce-fir, and lodgepole pine forests. Overall integrity of landscape composition, process, and pattern is moderate. Integrity of species is high, except for localized loss of whitebark pine.

At upper elevations, a substantial area has not burned in the 129-year period of record. Whitebark pine no longer occurs as a cover type. Fires have not occurred recently, and large trees may be slightly above historic levels. Few areas are outside their typical fire return interval, and vegetation indicators do not suggest fuel accumulations higher than typical of presettlement conditions. The absence of fire since 1934 in upper Marten Creek suggests, however, that the restoration of fire occurrence at the landscape level is needed, even at high elevations.

In lower elevation areas, canopy density appears to have shifted to more high canopy closure in mesic forests, compared to presettlement conditions. Lower elevations of Marten Creek are generally within the typical fire return interval in both very frequent and frequent fire regimes and show little evidence of unnatural fuel accumulations, but a substantial portion has been without fire for 50 years.

Landscape Ecology Recommendations

In upper Marten Creek, vegetation response units (VRUs) 2 and 9:

- Restore mixed and lethal severity fire regimes; this is a very high priority in order to restore whitebark pine and disturbance dynamics in mid and high elevation forests. Mixed and lethal fire would contribute to the restoration of whitebark pine by reducing encroachment of subalpine fir and spruce, and would provide sites for regeneration of lodgepole and whitebark pine. Only by providing for regeneration can selection for rust resistance occur, which is critical to the persistence of whitebark pine. Inventory to identify stands including whitebark pine is recommended, to assess their condition and vulnerability to stand replacing fire.

In lower Marten Creek:

- Conserve frequent mixed severity fire regimes; this is a moderate priority in lower elevations of Marten Creek, to sustain disturbance dynamics in mesic and xeric conifer cover types. Mixed severity fire would contribute to the restoration of lower stand densities in the mixed conifer cover types, closer to historic levels, and would maintain representation of ponderosa pine as a seral component. Mixed severity fire would continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch.

WILDLIFE

Theme: Conserve wildlife security and conserve wildlife species. High priority.

Wildlife Findings

Marten Creek provides important connectivity between winter range along the central portion of the Selway River canyon and spring and summer range in upper Meadow Creek to the west and the north. The Marten Creek ERU is largely comprised of mesic early and mid-seral habitats. Spruce and fir, lodgepole pine, grand fir, and western red cedar forest types with meadows and shrublands characterize mesic habitats. They are suitable for lynx foraging, and fisher winter thermal cover. The habitats also provide ungulate summer range, elk calving habitat, and prey opportunities for carnivores. Mountain goats may use this habitat in winter. Mesic old growth is significant in Marten Creek. The old forest component provides habitat for fishers, lynx denning, goshawk nesting, pileated woodpeckers, great gray owls, and moose.

Xeric habitats are rare in the Marten Creek ERU. Early and mid-seral structures dominate, currently. Primary forest types are ponderosa pine and Douglas-fir. Shrublands and bunchgrass also occur in the early seral structure. Xeric, early seral communities are important for ungulates' winter forage and for carnivores that prey on them. Wintering elk populations in lower Marten Creek are not significant. The total elk population in Marten Creek appears stable with bulls significantly increasing. Some mule deer and whitetail deer may winter in lower Marten Creek. Marten Creek is within the territory of the Selway wolf pack. Xeric old growth is fairly well represented in Marten Creek. Open canopy, large diameter ponderosa pines and Douglas-firs characterize the old growth. Old growth provides important potential habitat for flammulated owls and white-headed woodpeckers.

Alpine habitats are limited but contribute significantly to habitat diversity in the ERU. The primary forest types are spruce-fir, lodgepole pine, with some montane park and shrublands. Currently, early and mid-seral structures dominate the high elevation habitat. Alpine old growth is well represented. The Marten Creek, Otter and Mink Creeks, and Meadow Creek ERUs share the largest concentration of alpine elevation old growth in the subbasin. Wolverines favor these remote alpine environments. Whitebark pine, important to grizzly bears, may persist in the higher elevations. Mountain goats observed in winter in adjacent lower elevations likely occupy the alpine elevations in summer. Reports of peregrine falcons flying at high elevations are documented. All lakes in the ERU are fishless and support significant amphibian populations. Shorebirds and hummingbirds have also been documented at the lakes.

Long absence of fire has precluded recently burned areas, important for wildlife habitat, and large trees may be more common than historically due to fire exclusion. Tree canopy density has increased. Whitebark pine is poorly represented in comparison with the historic populations because of lack of fire and subsequent blister rust disease. Weeds have probably infested the xeric habitats to some extent but information is lacking on status.

Wildlife Recommendations

- Restore fire where feasible to reestablish natural disturbance dynamics with priority for alpine habitats.
- Assess weed population status. Conserve existing weed-free areas.
- Review existing trail systems and camps associated with species populations vulnerable to disturbance, especially in alpine elevations, on winter range, and in meadow habitats and calving areas.
- Initiate inventories for lynx and snowshoe hares in appropriate habitats.
- Assess the status and migration patterns of the mountain goat population.
- Conserve the naturally fishless character of the high lakes to sustain amphibian populations.

RECREATION AND TRAILS

Recreation theme: Conserve and restore wilderness values consistent with opportunity classes I, II and III. Priority.

Trails theme: Maintain existing trail system and reduce adverse effects. Reduce off-trail impacts.

Recreation and Trails Findings

In some areas of the Marten ERU, data are insufficient to determine if conditions are consistent with opportunity class designations.

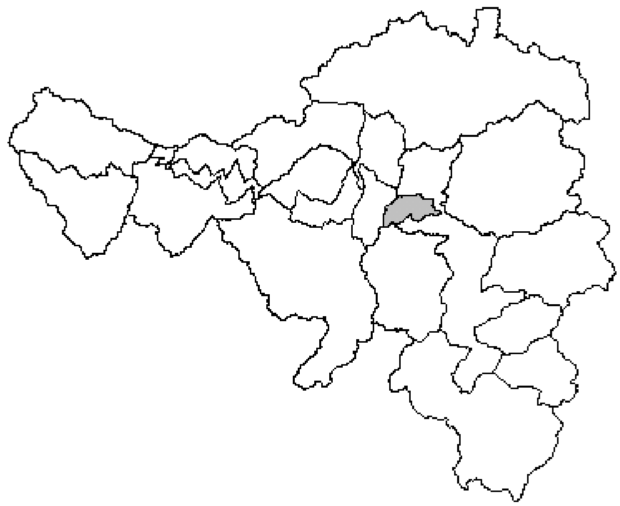
The southern boundary of the Marten Creek drainage can be accessed by Road 285 at Elk Mountain, about two miles outside the wilderness boundary. The entire area is within the Selway-Bitterroot Wilderness and more than half is classified as opportunity class I, and the remaining is opportunity class II. Trail corridors are classified opportunity class III. The site of the first U. S. smoke jump, 1951, is located on Marten Creek. It is considered an important historic site, but visitors do not travel to the area to view it. Most recreational activity is associated with hunting and outfitting. The *State of the Wilderness* report indicates that sites on Marten Creek and Pillar Creek in opportunity class I, do not meet wilderness management standards. Formerly, they were heavily impacted outfitter camps and had been reported as healing until 1997, when monitoring and field inventory data reported new impacts.

System trails are sparse within this ERU and most trail activity is associated with hunting and stock use. Most trails are in bad repair because of budget and time constraints. They are in need of level I maintenance, and in some places, are highly eroded because of lack of adequate drainage structures. Non-system former outfitter trails access the camps on Marten and Pillar Creeks mentioned above. Non-system trails should not exist in opportunity class I according to forest wilderness management direction.

Recreation and Trails Recommendations

- Conduct field inventories; update, record, and accurately map monitoring.
- Restore or naturalize the damaged and out-of-standard campsites and non-system trails to prevent further degradation and to bring the area closer to wilderness management standards for opportunity classes I and II.
- Maintain system trails to specifications for opportunity class III.

DITCH CREEK



Area Theme: Restore terrestrial processes.
Size: 11,510 acres.
Location: West of the Selway River with Marten ERU to the west and Running and Goat ERU to the south.
Land Classification: Wilderness and private.
Land Administration: USFS.
Primary Watersheds: Ditch Creek.
Landmarks: Wylie's Peak, Wylie's Ridge, Shearer Peak, Moose Ridge and Selway Lodge private inholding.

OVERVIEW

The Ditch Creek ERU is a small watershed located on the south side of the Selway River. The ERU is almost entirely comprised of designated wilderness with one inholding (Selway Lodge) located near the mouth of Ditch Creek. The streams are in natural or near natural condition, providing a source of high quality water to the Selway River. Ditch Creek provides high quality habitat for steelhead/redband and westslope cutthroat trout. One mountain lake is located in the ERU. The upper elevations of Ditch Creek consist of high elevation ridges that were the historic stronghold of whitebark pine.

Most of the ERU is classified as opportunity class I, with the exception of trail corridors classified as opportunity class III, and a small area classified as opportunity class II. The Selway Lodge is a private inholding and operates within the stipulations of a wild and scenic river easement. The lodge management holds permits to outfit and guide within the ERU.

The higher elevations in the ERU were historically subjected to infrequent mixed and lethal fire. Significant fires have not occurred since 1934, suggesting that restoration of fire occurrence is needed. The lower elevations were historically subjected to frequent and very frequent low and mixed severity fire. Significant fire most recently occurred in 1979, although much of this portion of the ERU is 1 to 2 intervals outside the typical fire return interval in both frequent and very frequent fire regimes.

INTEGRATED AREA THEME

RESTORE TERRESTRIAL PROCESSES

Naturally ignited fire is necessary to recover species in high elevation forests and maintain low elevation stands and age class diversity. Sustaining natural fire dynamics in high elevation forests is recommended to reduce encroachment of subalpine fir and spruce, and provide for regeneration of whitebark pine and lodgepole pine and selection for rust resistance in whitebark pine. Burned areas also provide snags.

Compatible Themes

Conserve Aquatic Processes and Conserve Aquatic Species

There has been some departure from the historic watershed disturbance regimes in Ditch Creek due to fire suppression and lack of large fires in some areas. Conservation of aquatic processes is consistent with restoration of fire in this watershed. Ditch Creek supports high densities of steelhead/redband trout and westslope cutthroat trout. Conservation of aquatic species is consistent with restoration of fire and watershed disturbance regimes.

Conserve Wildlife Security and Conserve Wildlife Species

Substantial use of this area occurs in hunting season and is facilitated by two airstrips. Potential impacts to wildlife security are unknown. Conservation of existing wildlife security and species is recommended. These actions are consistent with and support the area theme because restoration of fire to reestablish natural disturbance regimes is a functional recommendation for wildlife resources. Whitebark pine, ponderosa pine, and Douglas-fir are focal species for habitat restoration.

Maintain Existing Trail System and Reduce Adverse Effects

The Ditch Creek trail has not been maintained in recent years, although outfitters and hunters use the trail. All trails are classified as opportunity class III. This functional theme is compatible with the area theme of restoring terrestrial processes.

Conserve Wilderness Values Consistent with Opportunity Class

The majority of the ERU appears to meet its classified opportunity class standards, although substantial portions have not been inventoried, and specific areas may exist that are not consistent with opportunity class standards. This functional theme does not conflict with the area theme of restoring terrestrial processes.

Theme Interactions

Sustaining fire dynamics in low elevation forests may enhance the spread of weeds, thereby potentially compromising maintenance of weed-free areas. This risk is particularly significant in the Ditch ERU. Weed population monitoring and control activities should emphasize weed-susceptible habitats affected by recent fire.

Integrated Area Recommendations

- Restore fire to reestablish natural disturbance dynamics.
- Collect data concerning human use, sufficient to determine if conditions are consistent with opportunity class; much of this data is lacking over a majority of the ERU. Inventory areas used by people concurrently with an assessment of potential risks to terrestrial and aquatic biotic resources where problems are identified.
- Conduct reconnaissance-level inventories of terrestrial and wilderness resources to better identify management needs.

Functional Findings and Recommendations

Aquatics

Theme: Conserve aquatic processes and conserve species integrity. High priority.

Aquatic Findings

Glaciated slopes and low elevation breaklands characterize the Ditch watershed. Stream gradients are generally steep, but there are numerous moderate and low gradient reaches, especially in the upper portion of the watershed. The hydrologic regime is dominated by high elevation snowmelt runoff that usually peaks in late spring. One mountain lake is located in the headwaters. Habitat potential for westslope cutthroat trout and steelhead/redband trout is high; habitat potential is moderate for spring chinook and bull trout.

Similar to other Selway River tributaries, the Ditch watershed was subjected to a rich fire history. Most recently, the lower elevations of the watershed burned significantly in 1979. Changes in the lower reaches of Ditch Creek have been recently documented; they include channel braiding and some aggradation of gravel and fine sediment. These changes are considered the natural response of streams to fire disturbance, and the channel is expected to adapt naturally over time.

In upper areas of the watershed, suppression of fire may have resulted in a moderate departure from the historic aquatic disturbance regime. Degree of departure is not as great as in other areas because of more recent fires. An irrigation diversion structure near the mouth of Ditch Creek has resulted in detrimental disturbance to the stream channel condition and significant aggradation of bedload material immediately upstream of the structure.

The existing species assemblage is similar to the historic assemblage. Spring chinook salmon occur only sporadically, if at all, in this watershed, but probably were a regular but minor component of the assemblage historically. Westslope cutthroat trout in Ditch Creek, particularly in the upper reaches, are probably genetically pure due to the lack of stocking history in the watershed. This watershed therefore functions as a stronghold for this species.

Aquatic Recommendations

Conserve aquatic processes:

- Conserve natural erosional processes related to fire and flood regimes that help drive the natural hydrologic regimes.
- Develop an agreement with private landowners at the lower reaches of Ditch Creek to restore the riparian zone related to changes resulting from the irrigation diversion; address risks associated with this structure.

Conserve species integrity:

- Include a survey of Lonesome Lake to determine its status.
- Conduct a genetic analysis of westslope cutthroat trout to determine genetic purity.
- Implement the above aquatic process recommendations.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore species. Very high priority.

Landscape Ecology Findings

The dominant character of this ERU is xeric and mesic forests in canyons and spruce-fir, and lodgepole pine forests on alpine glaciated ridges. Overall integrity of landscape composition and pattern is moderate, integrity of process is low. Integrity of species is high except for loss of whitebark pine and weed infestations.

At upper elevations, whitebark pine no longer occurs as a cover type. Fires have not occurred in the recent past. Few areas are outside their typical fire return interval, and vegetation indicators do not suggest fuel accumulations higher than typical of presettlement conditions. The absence of fire since 1934 in this part of Ditch Creek suggests, however, that the restoration of fire occurrence at the landscape level is needed, even at high elevations.

At lower elevations, canopy density appears to have shifted to more high canopy closure in mesic forests, compared to presettlement conditions. Much of this portion of Ditch Creek is one to two intervals outside the typical fire return interval in both very frequent and frequent fire regimes. Ten to 20 percent of the ERU as a whole, mostly in lower Ditch Creek, shows vegetation indicators of fuel accumulations potentially higher than typical of presettlement conditions. Knapweed is thought to be well established, especially near and within the private inholding.

Landscape Ecology Recommendations

In upper Ditch Creek:

- Restore mixed and lethal severity fire regimes; this is a very high priority in upper elevations in Ditch Creek in order to restore whitebark pine and disturbance dynamics in mid and high elevation forests.
- Inventory to assess the condition and vulnerability of whitebark pine. Mixed and lethal fire would contribute to the restoration of whitebark pine by reducing encroachment of subalpine fir and spruce, and would provide sites for regeneration of lodgepole and whitebark pine. Only by providing for regeneration can selection for rust resistance occur, which is critical to the persistence of whitebark pine.

In lower Ditch Creek:

- Restore frequent and very frequent low severity and mixed severity fire regimes; this is a high priority in the lower elevation portions of Ditch Creek, including the mixed conifer cover type. Low and mixed severity fire would contribute to the restoration of lower stand densities in the mixed conifer cover type, closer to historic levels, and would maintain representation of ponderosa pine as a seral component. Mixed severity fire would continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch. Fire will result in likely expansion of existing weed populations.
- Inventory weed populations. Maintain weed-free areas and treat to reduce weed abundance and increase reestablishment of native grasses and forbs. Inventory and treatment are a very high priority.

WILDLIFE

Theme: Conserve wildlife security and conserve wildlife species. High priority.

Wildlife Findings

The Ditch Creek ERU is largely comprised of mesic, early and mid-seral habitats. Spruce and fir, lodgepole pine, and mixed conifer forests, meadows, and shrublands characterize the mesic habitats. These habitats indicate potential for lynx foraging and fisher winter thermal cover. The mesic, early and mid-seral habitats also provide ungulate summer range, elk calving, wolf homesites, and prey opportunities for carnivores. Mountain goats may use this habitat in winter. Mesic old growth and late forest structures are limited. The old forest component provides habitat for pine martens and fishers, lynx denning, goshawk nesting, pileated woodpeckers, great gray owls, and moose.

Xeric habitats are limited in the Ditch Creek ERU. The primary forest types are ponderosa pine and Douglas-fir. Low elevation grasslands are also represented. Currently, most of the xeric habitats are in early seral structure. Mid-seral and old growth structures are less well represented. Xeric early seral communities are important for ungulates' winter forage and for carnivores that prey on them. They are characterized by the presence of bunchgrass, forbs, shrubs, saplings, and poles. Some elk winter in these habitats in lower Ditch Creek, but the small population is not significant to the subbasin. Some mule deer and whitetail deer may winter in lower Ditch Creek. Ditch Creek is within the territory of the Selway wolf pack. The xeric old growth communities are characterized by open canopy, large diameter ponderosa pines and Douglas-firs. They provide important habitat for flammulated owls and white-headed woodpeckers.

Alpine habitats are limited in Ditch Creek and are almost equally split between early seral and mid-seral structures with a small amount of old growth. Spruce-fir and lodgepole pine are the primary forest types with whitebark pine, montane park, and shrublands less common. Wolverines and mountain goats favor these remote, alpine environments. Alpine lake environments are unique. Little is known about terrestrial wildlife populations at the lake in this ERU. Typically, high lakes in the subbasin support amphibian, reptile, and migrant bird populations.

The long absence of fire has precluded recently burned areas important to wildlife habitat and has resulted in increased tree canopy density. The status of whitebark pine in Ditch Creek is unknown, but whitebark pine populations, in general, are greatly diminished from historic levels due to fire suppression and blister rust disease. Whitebark is a critical component of grizzly bear habitat. Spotted knapweed and sulfur cinquefoil are prevalent and are impacting native ungulate forage on winter range. The wintering elk population in Ditch Creek is declining more than the average for the backcountry ERUs. Bull elk winter counts in the ERU are declining significantly more than any ERU in the subbasin. Selway Lodge, a private inholding business at the mouth of Ditch Creek, holds permits to outfit and guide within Ditch Creek. A private airstrip is associated with the lodge. The lodge and the adjacent Shearer Guard Station with a public airstrip, likely influence the use of Ditch Creek. Private hunters utilize Shearer airstrip yearlong to hunt elk, bears, and mountain lions.

Wildlife Recommendations

- Restore fire, where feasible, to reestablish natural disturbance dynamics with priority in alpine habitats.
- Assess weed population status and conserve existing weed free areas.
- Investigate the status of amphibian populations at the alpine lake.
- Review existing trail systems and camps associated with species populations vulnerable to disturbance, especially in alpine elevations, on winter range, and in meadow habitats and calving areas.
- Evaluate potential impacts of camp locations and salting practices on vulnerable species.

Recreation and Trails

Recreation theme: Conserve and restore wilderness values consistent with opportunity classes I, II and III.

Trails theme: Maintain existing trail system and reduce adverse effects. Reduce off-trail impacts.

Recreation and Trails Findings

The entire Ditch Creek drainage is categorized as opportunity class I, with the exception of the trail corridors that are opportunity class III, and an approximate two-mile square section near Fox Park that is opportunity class II.

The area is used almost exclusively during hunting season. Selway Lodge, at the mouth of Ditch Creek on the Selway River, is a private inholding and operates within the stipulations of a wild and scenic river easement. The Lodge management holds permits to outfit and guide within the Ditch Creek drainage.

A former outfitter camp was located near the junction of Trails # 562 and # 547 (Fox Park). It was determined a damaged site, and was moved into another drainage to prevent further impacts and facilitate natural restoration. The abandoned outfitter site has since become a campsite for private hunting parties.

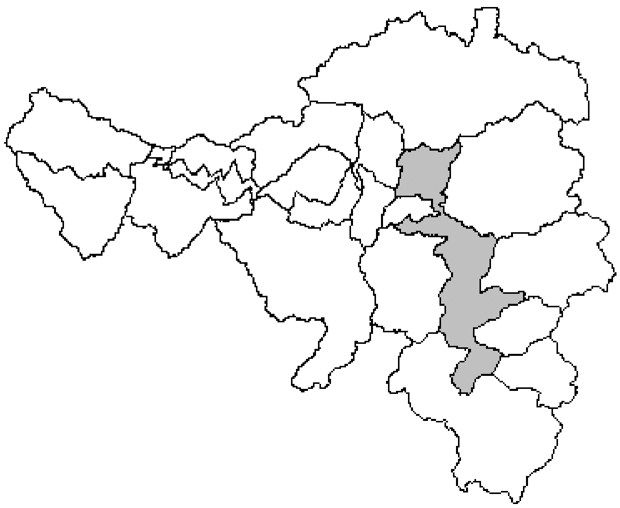
Ditch Creek

Both Trail # 562 (to the north) and Trail # 523 (Ditch Creek, to the south) traverse the entire ERU from east to west. The Ditch Creek trail has not been maintained in recent years and outfitters and hunters use the northern Trail # 562 and Trail # 547. The Forest Service has a right-of-way for the Selway River Trail # 4 to pass through the private property at Selway Lodge.

Recreation and Trails Recommendations

- Inventory, monitor, and act to insure the area remains at opportunity class I (opportunity class II in the small area near Fox Park and old outfitter camp) forest wilderness management standards.
- Rehabilitate the former outfitter site.
- Maintain trails to opportunity class III specifications or consider eliminating duplication of access (Ditch Creek Trail and Trail # 562).

UPPER SELWAY CANYON



Area Theme: Restore wilderness values.
Size: 110,954 acres.
Location: Selway River corridor between Moose Creek and Deep Creek.
Land Classification: Wilderness and private.
Land Administration: USFS (Nez Perce and Bitterroot National Forests).
Primary Watersheds: Selway River, Hopwood, Dog, Cow, Crooked, Hell, Bad Luck, Magpie and Magruder Creeks.
Landmarks: Rattlesnake Bar, Shearer Guard Station, Elevator Mountain, North Star Ranch, Running Creek Ranch, and Paradise Guard Station.

OVERVIEW

The Upper Selway Canyon ERU lies mostly within wilderness, but three private inholdings are located within the ERU. Magruder Road 468 and Paradise Road 6223 transect the southern portion. The Upper Selway Canyon ERU is classified as opportunity class I or II on either side of the river, opportunity class III on the trail corridors, and opportunity class IV near the boat launch at Paradise Guard Station and the entire river corridor just above Shearer Guard Station. Use by private parties, outfitters and guides has increased at Shearer Airstrip, although activity is not formally monitored. The xeric habitats on the east side of the Selway River are significant and provide the most important mule deer and bighorn sheep winter range in the subbasin. The area is also important winter range for mountain goats and elk. The motorized traffic occurring in winter and early spring is a significant threat to these wintering populations. Recent observations of lynx and wolverines in the ERU are documented. One mountain lake is located at the headwaters of Bitch Creek, but it is difficult to access and not significantly impacted by human use.

The mainstem Selway River supports very high aquatic habitat potential for all four imperiled salmonid species and provides a critical migratory and adult rearing habitat for bull trout and westslope cutthroat trout. Habitat potential for the tributaries ranges from low to moderate for cutthroat and steelhead trout, and from low to none for spring chinook salmon and bull trout. All tributaries are important contributors to the water quality of the Selway River and may provide thermal refuge for fish during summer.

The steep canyons of the Upper Selway ERU support grand fir and Douglas-fir habitat types, minor cedar habitat in riparian areas, and subalpine fir on the small area of higher elevation glaciated ridges. Several large fires occurred from 1889 to 1986, and smaller fires from 1910 to 2000. Fires have been fairly numerous in these recent years, but burned far fewer acres than in the period 1870 to 1935. Knapweed and other invasive species are well established at low elevations associated with the roads, river corridor and private inholdings. Potential for further weed invasion is considered high. Some trails and campsites do not meet forest wilderness management standards for opportunity class I.

INTEGRATED AREA THEME

RESTORE WILDERNESS VALUES

Wilderness is an integral social and ecological resource, and the central focus of management must be on the function of the whole. Restoration of wilderness character includes both ecological and social components. It requires the ability to define natural ecosystem dynamics, and management to ensure human use, in all its forms, does not disrupt the naturally functioning ecosystem processes that characterize wilderness.

Non-system trails in opportunity class I along Crooked Creek, Moose Ridge, and Snake Creek do not meet forest wilderness management standards and have not been recently monitored. The Shearer Airstrip is not currently monitored and private, outfitter and guide use is increasing. The trail through the airstrip is unauthorized, and the numerous campsites around the airstrip do not meet the Selway-Bitterroot Wilderness management standards (LAC). A by-pass trail was established to route traffic off the Shearer airstrip, but stock traffic continues to concentrate impacts to the middle of the runway.

COMPATIBLE THEMES

RESTORE TERRESTRIAL SPECIES INTEGRITY

The effects of fire suppression and blister rust threaten whitebark pine and lodgepole pine. Restoration of disturbance dynamics in high elevation forests will reduce encroachment and provide sites for natural regeneration of lodgepole and whitebark pine. Restoration of natural disturbances to restore species integrity is compatible and enhances the area theme. Introduced trout may impact native amphibians, reptiles, and birds. Potential impacts of introduced trout should be evaluated. Invasive weed species are abundant along the river corridor, Magruder and Paradise Roads, along trails, and on the Shearer Airfield. They have diminished foraging habitat for wildlife species and continue to spread. Inventory and mapping of existing populations would facilitate management plans for weed control, especially in those isolated populations that might easily be controlled if detected before infestations become rampant.

CONSERVE AQUATIC PROCESSES AND SPECIES INTEGRITY

Restoration of frequent and very frequent low severity and mixed severity fire regimes is important to conserve habitat, natural sediment processes and hydrologic regimes. Continued monitoring and sediment reduction efforts on the road along the Selway River will reduce the impact of this road. Restoration of hydrologic processes and species integrity is a part of restoration of wilderness values and focuses on ecological restoration in wilderness as a whole.

RESTORE WILDLIFE SECURITY

Wintering bighorn sheep, mule deer, and elk in the Selway Canyon are vulnerable to motor vehicle activities in winter and spring. The present use and potential for increased motor vehicle activity may threaten the security of wintering populations. The potential for increased development and air traffic associated with private inholdings also threatens wildlife security.

THEME INTERACTIONS

Sustaining fire dynamics in low elevation forests may enhance the spread of weed populations. Weed population monitoring and control activities should emphasize weed-susceptible habitats affected by recent fire. Providing backcountry roaded access along the Selway River makes it more difficult to restore natural erosional processes in the streamside zone. Preservation of roaded access to provide for administration and recreational backcountry experience may enhance the spread of weed populations. Regular treatment programs will be required to control weeds along the corridor.

Integrated Area Recommendations

- Monitor the Shearer airstrip and adjacent areas and develop a plan to bring the airstrip trail and campsites into compliance with the Selway-Bitterroot Wilderness standards.
- Monitor trails, outfitter camps, and impacted areas within the ERU, and develop a plan to bring these elements into compliance with the Selway-Bitterroot Wilderness standards.
- Pursue federal acquisition of the private inholdings within the ERU to prevent further development and air traffic in the wilderness.
- Restore mixed and lethal severity fire regimes in VRUs 1 and 2 to restore whitebark and lodgepole pine.
- Restore low and mixed severity fire in the mixed conifer type forests to reduce stand density, retain ponderosa pine as a seral component, provide snags, herbaceous and shrub components, and provide sites for regeneration of pine and larch.
- Evaluate impacts to bighorn sheep, mule deer, mountain goats, and elk on winter range from motorized traffic in winter and early spring. Manage motorized traffic to reduce impacts.
- Monitor and inventory weed infestations and continue to work with the Bitterroot National Forest to develop management plans for treatment and prevention.
- Continue to improve the drainage and erosion control on the road to Paradise Guard Station, and monitor Magruder Road for erosion sources.
- Evaluate the impact of introduced fish species in lake environments on native fish, amphibians, reptiles and birds.

Functional Findings and Recommendations

Aquatics

Theme: Conserve aquatic function and conserve species integrity. Very high priority.

Aquatic Findings

Watersheds in this ERU are generally comprised of a group of small face watersheds that drain directly into the Selway River. The area is characterized by low elevation granitic breaklands comprising up to 90 percent of the total area. Small amounts of glaciated slopes and mountain uplands occur at the highest elevations. Most watersheds are low to mid elevation with very steep channels and high confinement. A Rocky Mountain climatic regime dominates this portion of the Selway subbasin, which is only slightly affected by the coastal maritime rain-on-snow belt. Stream temperature is dominated by snowmelt runoff and provides cold water to the mainstem during the summer months. One mountain lake exists in this ERU. Habitat potential in tributaries is variable but generally low or moderate for cutthroat and steelhead/redband trout and low or none for spring chinook and bull trout. Habitat potential in the Selway River is very high for all aquatic species.

The reaches of the Selway River in this ERU function as a critical migratory corridor for all aquatic species and provide staging habitat for adult anadromous fish destined for the upper Selway and high elevation tributaries. Spawning by spring chinook salmon has also been documented. This section of the river may also provide the most important late rearing habitat for fluvial trout. Large deep pools, rapids, and pocket water between pools characterize habitat in the river. Habitat complexity is high. Rapid recovery has been observed in tributaries affected by floods and debris torrents occurring in 1995 and 1996.

Establishment of roads in the upper portion of the ERU has changed the natural sediment regime from historical conditions by increasing accelerated sediment into the Selway River and Magruder Creek. All 14 miles of road present in the ERU are streamside roads, thus affecting riparian function. Fire suppression has increased the interval between large pulse events in tributaries that historically were important in driving the hydrologic regime. Local impacts to streamside and lakeside riparian areas may have occurred due to heavy human and pack stock use.

The existing species assemblage in both the tributaries and the river is similar to the historic assemblage, except that abundance of anadromous fish is less. Abundance of westslope cutthroat trout may be less as well, especially large, fluvial adult cutthroat. Non-native cutthroat trout have been stocked in the lake in this ERU and may have encroached downstream, hybridizing with native westslope cutthroat.

Aquatic Recommendations

Conserve aquatic processes:

- Monitor Paradise Road for effectiveness of drainage and sediment reduction work completed on the road in 1999.
- Survey Magruder Road for sediment sources, and establish areas where revegetation work on cutslopes and fillslopes would address erosion.
- Restore natural fire regimes within the ERU that would help restore and conserve natural sediment processes and hydrologic regimes.

Conserve species integrity:

- Work with the Idaho Department of Fish and Game and the Nez Perce Tribe to conduct annual redd counts for spring chinook salmon in the mainstem river.
- Continue coordination with the Idaho Department of Fish and Game to monitor trends in the populations of all species in the mainstem Selway River.
- Assess genetics of cutthroat trout in specific areas of the ERU to determine degree, if any, of introgression with non-native cutthroat trout.
- Review outfitter and guide camp locations and trail fords in streams to determine potential risks to fish.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore species. Very high priority.

Landscape Ecology Findings

Steep canyons supporting mesic and xeric forests are the dominant characteristics of this ERU. Overall integrity of landscape composition and pattern is moderate, but integrity of processes is low. Integrity of species is high, except in grasslands and dry forests where weeds are widely established.

Although fires have been fairly numerous in recent years, they have burned far fewer acres than in the period between 1870 and 1935. Ponderosa pine appears to be less well represented than historically. Young forests (seedling through pole) are less well represented than historically, probably due to reduced fire extent. Canopy density appears to have shifted to more high canopy closure in mesic and dry forests, compared to presettlement conditions. Most subwatersheds show vegetation indicators of fuel accumulations potentially higher than typical of presettlement conditions; upstream from the mouth of Bear Creek departures from historic fire intervals of 2 to 5 intervals are typical. Douglas-fir beetle levels appear to have increased locally, as a consequence of reduced fire occurrence and development of favorable stand conditions. Susceptibility to weed invasion is considered high, and knapweed and other non-native species are well established at low elevations. Fire in 2000 between Magruder Crossing and Paradise Guard Station has increased the potential for weed expansion, but has also reduced fuel accumulations and canopy density.

At upper elevations, nonforest, recent burns, and seedling and sapling communities are less well represented than historically. Although few stands are outside their typical fire interval, the absence of any large fires since 1910 suggests that the restoration of fire occurrence at the landscape level is needed.

Landscape Ecology Recommendations

In vegetation response unit (VRU) 3:

- Restore frequent and very frequent low severity and mixed severity fire regimes; this is a high priority in Upper Selway Canyon ERU, including the mixed conifer cover type. Low and mixed severity fire would sustain lower stand densities in the mixed conifer cover type, closer to historic levels, and would maintain representation of ponderosa pine as a seral component. Mixed severity fire would continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch. Fire will result in likely expansion of existing weed populations.
- Inventory weed populations. Treat to reduce weed abundance and increase reestablishment of native grasses and forbs, if needed. Collaborate with local landowners.

In vegetation response units (VRUs) 1 and 2:

- Restore mixed and lethal severity fire regimes; this is a high priority in Upper Selway Canyon in order to restore disturbance dynamics in high elevation forests. Mixed and lethal fire would contribute to the restoration of lodgepole pine and whitebark pine by reducing encroachment of subalpine fir and spruce, and would provide sites for regeneration of lodgepole and whitebark pine. Only by providing for regeneration can selection for rust resistance occur, which is critical to the persistence of whitebark pine. Fire would maintain recruitment of montane park, early seral shrub, and seedling and sapling communities.

WILDLIFE

Theme: Restore wildlife security and restore species integrity. Very high priority.

Wildlife Findings

The Upper Selway Canyon ERU is dominated by the Selway River, which provides significant riverine habitats important to many terrestrial species, including bald eagles and harlequin ducks. Mesic habitats represent half of the ERU in the upper elevations. They are dominated by spruce-fir forests and lodgepole pine forests with some montane park and cold shrublands. Most of the mesic habitats are split between early seral and mid-seral structures. Late seral and old growth habitats are more limited. Species associated with the old growth mesic habitats in this ERU include lynx, fishers, pileated woodpeckers, great gray owls, boreal owls, and goshawks. The large representation of lodgepole pine associated with spruce-fir is indicative of important lynx habitat. Recent lynx and wolverine observations in the ERU are documented.

The Upper Selway Canyon ERU contributes a significant portion of the xeric habitat in the subbasin. Ponderosa pine and Douglas-fir dominate the xeric forest types. The xeric habitats represent half of the ERU and are located primarily on the east face of the Selway River in low elevations. Half of the xeric habitats are early seral and mid-seral and old growth structures are also well represented. The xeric habitats provide important elk winter range. According to winter counts, the elk population in the ERU is stable to increasing. The ERU also supports the largest wintering mule deer population in the subbasin, which appears to be stable. Winter-spring mountain goat range is located on the east face of the Selway River. There are three important bighorn sheep wintering areas in the ERU. These xeric habitats also represent potential flammulated owl habitat in Douglas-fir and ponderosa pine types and white-headed woodpecker habitat in the large old growth ponderosa pine. The Selway wolf pack inhabits the area.

The limited alpine habitat in the ERU occurs at Spot Mountain. Most of the alpine habitat is in mid-seral structure with early seral structure well represented. Alpine old growth is very limited. Spruce and fir forests and lodgepole pine forests with some montane park and cold shrublands occur in these habitats. Remnants of whitebark pine remain. Mountain goats and wolverines potentially occupy the alpine elevations in summer.

Whitebark pines, ponderosa pines, and large trees are less common in the absence of fire. Meadows, recently burned areas, and early seral forests, all important to wildlife habitat, have declined as a result of fire suppression. Canopy density and down wood accumulations have increased. Weed infestations are extensive in the canyon and are denser in the lower portion of this ERU. Weeds compete with native grass forage and reduce availability for wintering ungulates.

Road 6223 to Paradise Guard Station is used extensively for Selway River float expeditions and winter snowmobile use. Potential impacts to wintering bighorn sheep, elk, and mule deer are unknown. The potential for expanded winter recreation could significantly influence wildlife security. The three private inholdings in the ERU have associated airstrips and hold outfitter–guide permits. Should these private holdings be subdivided in the future, an increase in air traffic and human activity could negatively impact wildlife, especially in winter. Limited surveys indicate mountain goats are declining in the upper Selway River area. Introduced trout may threaten native amphibian populations in the lake in this ERU.

Wildlife Recommendations

- Restore fire with priority for whitebark pine and ponderosa pine communities.
- Reduce weed populations and conserve existing weed-free areas.
- Inventory and monitor the terrestrial environment and species in lake environments, including amphibian population status.
- Investigate the apparent decline in the mountain goat population.
- Evaluate white-headed woodpeckers and flammulated owls in the significant xeric old growth habitats.
- Determine potential impacts of motorized traffic on bighorn sheep, elk, and mule deer on winter range.
- Assess species at risk and vulnerable to human disturbance in alpine environments, including mountain goats and wolverines.
- Continue pursuing federal acquisition of the three private inholdings within the ERU as they become available for purchase. The potential for increased development of these inholdings within the ERU is significant. Additional dwellings, residents and air traffic would impact wilderness wildlife security in the area.

ROADS

Theme: Maintain backcountry access to provide for administration and recreation.

Roads Findings

There are 23.8 miles of road in the Upper Selway Canyon ERU. These miles are composed principally of the South Nez Perce Trail Road 468 (also known as Magruder Road) and Road 6223 along the Selway River. The Bitterroot National Forest administers these roads. The South Nez Perce Trail Road is being considered for inclusion in the Forest Service public road system.

Roads Recommendations

- Maintain the roads in the Upper Selway Canyon ERU for recreation and administrative use.
- Address resource concerns related to watershed values and weeds on Roads 468 and 6223 through maintenance and reconstruction, where necessary.

RECREATION AND TRAILS

Recreation theme: Restore wilderness values consistent with opportunity classes II, III, IV. Priority. Within Magruder Corridor, conserve recreation opportunity spectrum class (semi-primitive motorized experience, setting, and activity).

Trails theme: Maintain existing trail system and reduce adverse effects of existing trail system. Reduce off-trail impacts.

Recreation and Trails Findings

Magruder Road 468 intersects Paradise Road 223 and the Selway Wild and Scenic River Corridor near the Magruder Ranger Station. Four developed recreation sites, five trailheads and other dispersed sites are available for visitor use and access to the Selway-Bitterroot Wilderness or to the Frank Church-River of No Return Wilderness. The boat launching area near Paradise is opportunity class IV, trail corridors are classified opportunity class III, and other areas on each side of the river are opportunity class I or II. The entire river corridor is opportunity class IV from just above Shearer Guard Station.

Magruder Road and Paradise Road bear a considerable amount of traffic during the rafting season. Visitors observe that the river recreation shuttle traffic is fast and frequent and some consider it dangerous to travel on these roads. Motor vehicle travel has encouraged introduction and spread of spotted knapweed and the Bitterroot Forest launched an ambitious weed control program in 1977. Use by OHVs is not excessive now, but there is potential for increased activity by OHVs and snowmobiles.

Permits are required to float the Selway from May 15 to July 31, and one launch per day is allowed. Dispersed campsites are available on both banks of the river. Forest Service river rangers and river outfitters educate floaters about low impact camping methods and strive to “leave-no-trace”. Outfitters are requesting pre- and post season launching dates. The 47-mile run through the wilderness is extremely popular and appealing, and there is a great deal of pressure from the public to allow more launches per day to accommodate those who wait, sometimes for years, to get their permit on the Selway River.

Private inholdings still remaining within the wilderness along the Selway River include Running Creek, North Star, and Selway Lodge. All inholders have outfitter and guide permits in the adjacent wilderness areas, but recently they have been moderately active to inactive. Running Creek Ranch and North Star Ranch do not operate under a Wild and Scenic Rivers easement, and speculation about the potential for future operations at these locations raises some concerns about maintaining wilderness character and integrity. Private ownership at the mouth of Ditch Creek (Selway Lodge) presents stream integrity and fisheries issues.

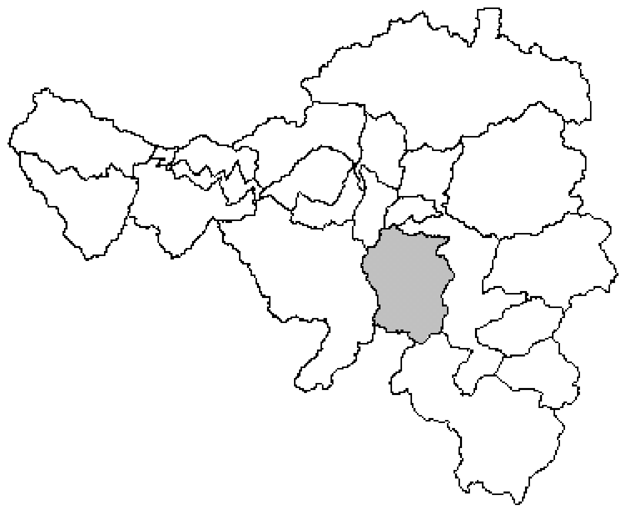
Three non-system trails exist within this ERU and are do not meet forest wilderness management direction. Out-of-standard-sites at Mt. Aura and Green Ridge are addressed in Goat and Running Creek ERU.

At the Shearer Forest Service administration site and airfield, the number of campsites in the area exceeds the wilderness management direction standards, and the system Trail # 4 has become routed directly through the center of the runway where it presents a hazard for aircraft. Air traffic has significantly increased, influenced by outfitter operations and growing popularity of the area among other hunters, aviators, and other recreationists. The Selway-Bitterroot Wilderness management direction recommended monitoring air traffic at Shearer Field for a three-year period. After one year monitoring was discontinued because of budget constraints, and pilots are invited to sign a guest register located near the airstrip. Spotted knapweed continues to proliferate on the runway and throughout the site, radiating to the trail systems that ingress and egress the area. Controversy stirs around the appropriateness of a corral recently built to contain Forest Service animals while crews and personnel work in the area.

Recreation and Trails Recommendations

- Monitor traffic in Magruder Corridor and along Road 223 to Paradise Guard Station and act to improve visitor safety.
- Continue or reestablish weed control programs and educate visitors about noxious species.
- Investigate and pursue purchase of private inholdings when they become available, or purchase easements where appropriate.
- Reconfigure trail routes or add signing to avoid center of runway at Shearer Airstrip.
- Monitor the encroachment of spotted knapweed and act to control or eliminate the weeds.
- Systematically inspect outfitter and guide operations and administer permits to insure compliance with operating plans.
- Rehabilitate and maintain the Shearer Airstrip to address problems and concerns reported by the Forest Service Region I airstrip inspection team. Rewrite special order.
- Conserve the use permit system for floating the Selway River.
- Rehabilitate non-system trails that do not meet forest wilderness management direction.
- Inventory system trails to determine adverse effects and develop management strategies to reduce them.
- Assure administrative facilities are consistent with the general management direction.

RUNNING AND GOAT CREEKS



Area Theme: Restore wilderness values, terrestrial processes and species.
Size: 76,500 acres.
Location: East of Selway River with Ditch Creek ERU to the north and Selway Headwaters ERU to the southeast.
Land Classification: Wilderness and unclassified.
Land Administration: USFS.
Primary Watersheds: Running, Eagle, Lynx, Tom, Warm Springs, Grouse, Goat, Box Car and Long Prairie Creeks.
Landmarks: Running Creek Ranch, Archer Mountain, Wylie's Peak, Goat Ridge and Windy Saddle.

OVERVIEW

The Selway-Bitterroot Wilderness boundary divides the 76,500-acre Running and Goat ERU almost in half diagonally from NW to SE. Semi-primitive motorized and non-motorized areas are directly adjacent to wilderness opportunity classes I and II (unmodified natural environment, not measurably affected by the action of users). The area includes the outreaches of two ranger districts of the Nez Perce National Forest and one district of the Bitterroot National Forest as well as a private inholding, Running Creek Ranch, within the wilderness. Upper Running and Goat Creeks ERU is in a low state of development and supports moderate to high aquatic potential and high existing water quality.

Habitat potential for fish is variable, ranging from very high for steelhead and westslope cutthroat trout in the lower reaches of Running and Goat Creeks, to low for all species in the headwaters of Goat Creek due to low productivity and lack of accessibility. Habitat potential for spring chinook is high in lower Running Creek, but low elsewhere and high for bull trout in the lower reaches of Running Creek and high elevation tributaries. Goat Lake has no stocking record and it supported abundant populations of western spotted frogs in 1986. Brook trout are present in the upper reaches of Running Creek, having encroached downstream from Running Lake.

Running Creek is important for wildlife population dispersal and interchange providing connectivity for bighorn sheep and other ungulates and predators between the Salmon and Selway Rivers. Running and Goat Creeks ERU is also an important wintering area for mountain goats, elk, and mule deer. Lynx habitat is significant in the ERU and historic occurrence is documented. The upper elevations of this ERU were historically strongholds for whitebark pine and presently support the greatest reported acreage of whitebark pine of any in the Selway basin. Significant fire occurred in intervals since 1880, but absence of large fires since 1919 suggests that natural disturbance is needed, especially for restoration of whitebark pine.

Integrated Area Theme

Restore Wilderness Values, Restore Terrestrial Processes and Restore Species Integrity

Nearly the entire wilderness portion of this ERU is classified opportunity class I, characterized by an unmodified natural environment. Four trails and campsites have been identified that do not meet forest wilderness management standards. Those areas have not been recently monitored nor managed to ameliorate conditions.

Natural fires necessary to restore aquatic and terrestrial wildlife habitat have been suppressed for the past sixty years. Some areas show vegetation indicators of fuel accumulations potentially higher than typical of presettlement conditions. Tree size classes are within presettlement range except that recent burns and seedling and sapling classes are more poorly represented. Species integrity is threatened by loss of whitebark pine at upper elevations and conversion of low elevation grasslands and open forest to knapweed and other non-native annual grasses and forbs.

Compatible Themes

Conserve Aquatic Processes and Species Integrity

The cutthroat trout represented in upper Goat Creek appear to be unique and of unknown origin. Further analyses is needed to determine brook trout influence and feasibility of removing them from Running Lake, trends of returning chinook salmon, stream influence for thermal refuge, and species richness of upper Goat Creek. Conservation of aquatic processes and species integrity supports the area theme.

Restore Wildlife Security and Restore Wildlife Integrity

Vulnerable species including wolverines, denning wolves, lynx, mountain goats, and elk could be influenced by motor vehicle use, including winter snow machine activity, and by hunter activity. Bull elk numbers are declining here at twice the rate of other backcountry areas. Limited surveys indicate that mountain goats are also declining. Introduced trout may threaten native amphibian populations in the high lake environment. Restoration of wildlife security and species integrity strongly supports the area theme.

Theme Interactions

Restoration of frequent fire in low elevation forests may enhance the spread of weed populations. Weed population monitoring and control activities should emphasize weed-susceptible habitats affected by recent fire.

Although the overall goal of reducing or eliminating non-native fish from mountain lakes is consistent with the restore wilderness values theme, actions taken to achieve this goal may present a conflict. Traditional methods of removing fish (use of chemical piscicides, blasting, or introduction of non-native biocontrol organisms) may include biological and social risks that are unacceptable in a wilderness setting. Less risky methods are generally ineffective in removing fish from even small lakes. The ecological benefits of removal of non-native fish must be assessed within the context of social and ecological risks.

Integrated Area Recommendations

- Evaluate human activities that threaten wilderness.
- Implement an integrated management strategy that provides for watershed protection, restoration of habitat and security for rare and vulnerable plant and animal species and game species, scenic beauty, and non-motorized recreation.

- Review existing trails and road systems and evaluate potential impacts to vulnerable wildlife.
- Evaluate the impacts to identified trails and campsites that do not meet forest wilderness management standards and rehabilitate them to opportunity class I standards.
- Evaluate the decline in bull elk and mountain goat populations.
- Restore the natural erosion processes and stream flow regimes tied to natural pulse disturbances by restoring historic fire regimes through natural fire starts. Infrequent, mixed and lethal fire is needed in high elevation forests to recover whitebark pine, lodgepole pine, and age class diversity.
- Reduce threats to native amphibian populations in high lakes.
- Conduct field inventory and monitoring for the following: campsites and trails for those areas that may not meet forest wilderness management standards, invasive weed populations, extent and status of whitebark pine, status of wildlife and aquatic species populations.
- Consider prescribed fire in unroaded portions of the ERU to reduce fuels and initiate terrestrial restoration.

Functional Findings and Recommendations

Aquatics

Theme: Restore aquatic processes and restore aquatic species. Moderate priority.

Aquatic Findings

High elevation glaciated slopes, low gradient glacial valley bottoms, low elevation breaklands, and mountain uplands characterize the watersheds in the Running and Goat Creeks ERU. Stream gradient and confinement are variable, ranging from high to low. Many stream reaches in the ERU are moderate gradient with gravel and cobbles as the dominant substrates. A grussic granitic geology characterizes substantial portions of both Running and Goat Creeks at the mid- and higher elevations, resulting in a high percent of sand and pea-size gravels in low gradient reaches. The runoff regimes for both watersheds are controlled by high elevation snowmelt with late spring high water. There are two mountain lakes in the ERU.

Habitat potential is variable, ranging from very high for steelhead/redband trout and westslope cutthroat trout in the lower reaches of both streams to low for all species in the headwaters of Goat Creek due to low productivity. Habitat potential for spring chinook is high in the lower reaches of Running Creek but low or none elsewhere. Habitat potential for bull trout is high or very high in the lower reaches of Running Creek and high elevation tributaries but low elsewhere.

High elevation reaches of both watersheds display a remarkable lack of primary productivity, due primarily to geology and cold stream temperatures. Cutthroat trout in the upper reaches of Goat Creek are phenotypically unique. Lynx Creek, a high elevation tributary to Running Creek, is dissimilar to other high elevation reaches because it has a different geology and higher productivity. This stream supports a resident bull trout subpopulation as well as relatively high densities of westslope cutthroat trout. The lower reaches of both streams provide spawning and rearing habitat for anadromous fish and late rearing habitat for fluvial cutthroat trout.

The upper reaches of Running Creek have been affected by road construction and maintenance, which has resulted in a continuous contribution of sediment from stream crossings and streamside roads. No roads have been constructed in the Goat Creek area. The upper portions of both watersheds have been affected by fire suppression for the past 60 years, resulting in a departure from historic aquatic disturbance regimes, which historically influenced erosion and streamflow regimes.

The existing species assemblage in Goat Creek is similar to the historic assemblage. The existing assemblage in upper Running Creek is different than the historic assemblage. Brook trout were stocked in Running Lake in the 1930s and have encroached into the headwaters of Running Creek, presumably extirpating the existing assemblage through interspecific competition. The existing assemblage in lower Running Creek is similar to the historic assemblage, except that abundance of anadromous fish is less.

Aquatic Recommendations

- Restore aquatic processes:
- Conserve the natural erosional process related to natural disturbances such as wildfire and flood events. These events are part of and help drive the natural hydrologic regime. A reduction in sediment sources would help conserve the high water quality in the watershed.
- Inventory Running Creek Road for sediment sources on the five perennial stream crossings on South Fork Running Creek, Lynx Creek, and main Running Creek to identify sediment sources for additional rehabilitation. Inventory Elk Mountain Road, to accomplish this objective as well.

Restore species integrity:

- Analyze the genetics of the cutthroat trout in upper Goat Creek to determine origin or uniqueness.
- Assess macroinvertebrate abundance and species richness in upper Goat Creek.
- Complete a brook trout management plan for Running Creek and consider removal of brook trout.
- Implement a long-term monitoring strategy to assess risk to bull trout in Lynx and South Fork Running Creeks.
- Conduct additional surveys in lower Goat Creek to determine the importance of this stream in providing thermal refuge for species such as bull trout.
- Cooperate with the landowners of Running Creek Ranch to screen any irrigation ditches.
- Monitor anadromous fish in lower Running Creek to determine trends of returning spring chinook salmon.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore species integrity. Very high priority.

Landscape Ecology Findings

Steep canyons with xeric and mesic forests and alpine glaciated slopes supporting spruce-fir and lodgepole pine forests are the dominant characteristics of this ERU. The whitebark pine communities around Running Lake and Three Prong Mountain comprise the greatest acreage in any ERU. Alpine larch has been observed in this ERU, isolated from the nearest other alpine larch stands. Overall integrity of landscape composition and pattern is moderate. Integrity of process is low. Integrity of species is high, except for loss of whitebark pine and establishment of exotics and noxious weeds on dry slopes.

At upper elevations, recent burns and seedling and sapling classes are more poorly represented than historically. Substantial whitebark pine is now dead. Few areas are outside their typical fire return interval, and vegetation indicators do not suggest fuel accumulations higher than typical of presettlement conditions. However, the absence of any large fires since 1919 suggests that the restoration of fire occurrence at the landscape level is needed at high elevations.

Lower elevations support some foothills grasslands and grasslands invaded by knapweed and other non-native species. Canopy density appears to have shifted to more high canopy closure in mesic forest, compared to presettlement conditions. Ponderosa pine and Douglas-fir old growth may be less well represented because of the severe 1919 fire in this area. Much of this part of Running and Goat Creeks ERU is one to two intervals outside the typical fire return interval in both very frequent and frequent fire regimes. More than 20 percent of Eagle Creek and lower Running Creek show vegetation indicators of fuel accumulations potentially higher than typical of presettlement conditions. Lower Goat and the rest of Running Creek show 10 to 20 percent of the area having fuel accumulations potentially higher than natural. Susceptibility to weed invasion is considered moderate, but the inclusion of private inholdings, the nearness to the main Selway trail, and the grussic geology suggest that weed expansion in response to fire disturbance could be rapid.

Landscape Ecology Recommendations

- Restore mixed and lethal severity fire regimes; this is a very high priority in upper elevation portions of Running and Goat Creek in order to restore whitebark pine and disturbance dynamics in high elevation forests. Mixed and lethal fire would contribute to the restoration of whitebark pine by reducing encroachment of subalpine fir and spruce, and would provide sites for regeneration of lodgepole and whitebark pine. Only by providing for regeneration can selection for rust resistance occur, which is critical to the persistence of whitebark pine.
- Inventory, maintain and restore the substantial whitebark pine population. This is a high priority for this ERU. Elements to consider in inventory include:
    - Community composition, size class, evidence of blister rust and mountain pine beetle activity and tree mortality, and encroachment by other tree species.
    - Fuels and susceptibility to stand replacement, and opportunities for maintenance of whitebark pine in low or mixed severity fire and need for stand replacement fire to provide additional sites for natural regeneration.
- Restore frequent and very frequent low severity and mixed severity fire regimes; this is a high priority in lower elevation portions of Running and Goat ERU, including the mixed conifer cover type. Low and mixed severity fire would contribute to the restoration of lower stand densities in the mixed conifer cover type, closer to historic levels, and would maintain representation of ponderosa pine as a seral component. Mixed severity fire would continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch. However, fire will result in likely expansion of existing weed populations.
- Inventory weed populations. Treat to reduce weed abundance and increase reestablishment of native grasses and forbs, if needed. Collaborate with other landowners.

WILDLIFE

Theme: Restore wildlife security and restore wildlife species integrity. Very high priority.

Wildlife Findings

Running Creek is important in population dispersal and interchange between other areas within and adjacent to the subbasin. Bargamin Creek on the Salmon River side and Running Creek on the Selway River side provide connectivity between the Salmon and Selway Rivers for bighorn sheep and other ungulates and predators.

Mesic habitats dominate Running and Goat Creeks ERU. Forest types in the mesic habitats include mixed conifer, spruce-fir, lodgepole pine, and shrublands. Half of the mesic habitats are in mid-seral structure. Early seral structure and old growth are well represented. Around 1,500 acres burned in mesic habitats in the 1960s. The significant lodgepole pine component in association with the spruce-fir forest type indicates primary lynx habitat. Lynx Meadows in the headwaters of Running Creek was probably named because of the presence of lynx in the area historically. Lynx tracks were reported at Archer Saddle in years past. Mesic old growth also provides habitat for pine martens and fishers, great gray owls, nesting goshawks, and moose. Mesic meadows occur in the uplands of the ERU and provide habitat for elk calving and summer foraging. Wolves currently occupy a homesite in Running and Goat ERU. Winter and spring mountain goat habitat is located on the north face of Goat Creek and on the northwest face of middle Running Creek.

In Running and Goat Creeks ERU, the predominance of the drier habitats in the upper Selway Canyon is apparent. Ponderosa pine and Douglas-fir are the dominant xeric forest types with grasslands well represented. Most of the xeric habitats are in early and mid-seral structure with old growth well represented. The significant xeric old growth representation indicates potential white-headed woodpecker and flammulated owl habitat in ponderosa pine communities. Xeric habitats extend into higher elevations than is typical in the lower Selway River area. Running and Goat Creeks ERU is an important elk wintering area. The mule deer winter count in the ERU doubled from 1995 to 1999.

Alpine habitats are limited, but contribute significantly to wildlife diversity in the ERU. They are split between early seral and mid-seral structures with old growth a minor component. Spruce-fir and lodgepole pine are the primary forest types with whitebark pine, alpine larch, montane park, and cold shrublands less common. Wolverines and mountain goats favor these remote, alpine environments. A mountain goat herd summers on the west side of Elk Mountain, adjacent to the ERU. This is probably the same herd that winters in Goat Creek and Running Creek within the ERU. Mule deer have been observed at Elk Mountain in summer. A grizzly bear was reported in Goat Creek in the 1950s. Two alpine lakes, Running Lake and Goat Lake, occur in the ERU. Whitebark pine, important to grizzly bear habitat, is prominent at Goat Lake. Most of the whitebark pine at Running Lake is decadent or dead. Little is known about terrestrial wildlife populations at Running Lake, but brook trout are established in the lake and areas downstream. Goat Lake is fishless and supports abundant spotted frogs and other terrestrial wildlife including migrant birds and shore birds.

Due to fire suppression, recent burns and early seral structure are poorly represented. There is a greater predominance of old growth spruce-fir and lodgepole pine forests than occurred historically. Canopy density has increased. The xeric habitats are significantly beyond the expected fire return interval. Whitebark pine has declined due to fire suppression and blister rust disease. Spotted knapweed and sulfur cinquefoil are prevalent and are impacting native ungulate forage on winter range. The total wintering elk population is fairly stable but bull elk are declining at twice the rate of bulls in the backcountry in general. An extensive trail system provides access throughout the ERU. Roads 285 and 357 provide access to high elevation habitats and species. These disturbance sensitive species, including mountain goats and wolverines, may be influenced by human and motorized activity. Limited surveys indicate that mountain goats are declining. Running Lake is stocked with brook trout that threaten amphibian populations.

Wildlife Recommendations

- Restore fire, where feasible, to reestablish natural disturbance dynamics with priority for alpine and xeric habitats.
- Reduce weed populations. Conserve existing weed-free areas.
- Review existing trail and road systems associated with species populations vulnerable to disturbance, especially in alpine elevations, on winter range, and in meadow habitats and calving areas.
- Assess status and migration pattern of the mountain goat population.
- Investigate the significant decline in bull elk.

- Assess potential impacts to the known wolf homesite.
- Evaluate potential white-headed woodpecker and flammulated owl populations in old growth ponderosa pine.
- Reduce the brook trout population to conserve amphibians at Running Lake.
- Conserve the fishless condition of Goat Lake.

ROADS

Theme: Maintain backcountry access and defer new roads.

Roads Findings

The Running Goat ERU contains approximately 10.6 miles of existing road resulting in an overall road density of 0.09 mi/mi^2. These road miles are portions of Elk Mountain Road 285 and Running Creek Road 357. These roads are managed at maintenance level II (maintain for high clearance vehicles).

Management of these roads in Running and Goat ERU may be affected by the proposed rules regarding roadless area conservation. Therefore, status of these roads as defined in the summary of the proposed rules is appropriate. Roads that existed prior to mapping the roadless areas include Elk Mountain Road 285 and Running Creek Road 357.

There are no existing roads outside the inventoried roadless areas in this ERU.

Roads Recommendations

- Maintain backcountry access on long established routes, Elk Mountain Road 285 and Running Creek Road 357, for public and administrative use. Although these roads are pre-inventory roads it appears that the roadless inventory recognized them and their existing uses.
- Do not construct new roads in Running and Goat ERU, considering the level of controversy regarding additional roads in inventoried roadless areas.

RECREATION AND TRAILS

Recreation theme: Restore wilderness values consistent with opportunity classes I and II. High priority. This theme applies to the wilderness portion of the ERU. Conserve recreation opportunity spectrum. Conserve semi-primitive non-motorized and motorized experience, activity, and setting in the non-wilderness portion of the ERU.

Trails theme: Maintain existing trail system and reduce adverse effects of existing trail system. Reduce off-trail impacts.

Recreation and Trails Findings

Management responsibilities are fragmented and sometimes obscure among the two forests and three districts that share common boundaries within this ERU. To further complicate matters the southwestern one-third of the ERU is both semi-primitive motorized and semi-primitive non-motorized, and the remaining two-thirds is wilderness (opportunity classes I and II) administered on the east by the Bitterroot National Forest and on the northwest, by the Nez Perce National Forest. Road 285 to Elk Mountain accesses both the Meadow Creek drainage and Goat and Running Creeks. Road 357 ends at Warm Springs Bar and an outfitter base camp. Motorized vehicle use is allowed on that road, and a limited amount of off-road motorized travel occurs on Patrol and Grouse Ridge trails. The trails are not in condition to invite regular off-road motorized use. Most recreational activity in the area is fall hunting supported by stock use. Management at Running Creek Ranch, a private inholding with an airstrip, holds permits to outfit and guide. Because this area is on the outlying reaches of three districts, a verbal agreement is usually made to arrange for overlapping visits by wilderness rangers or crews that happen to be in the vicinity.

Nearly the entire wilderness area is classified as opportunity class I, and trail corridors therein, class II. Based on past monitoring data, maximum number of campsites and impacts exceeds forest plan wilderness management standards at Mt. Aura, Green Ridge, Spot Mountain Spring, and Trail # 536 (Parachute). Former outfitter camps need cleanup and rehabilitation. Presently, private parties use these camps.

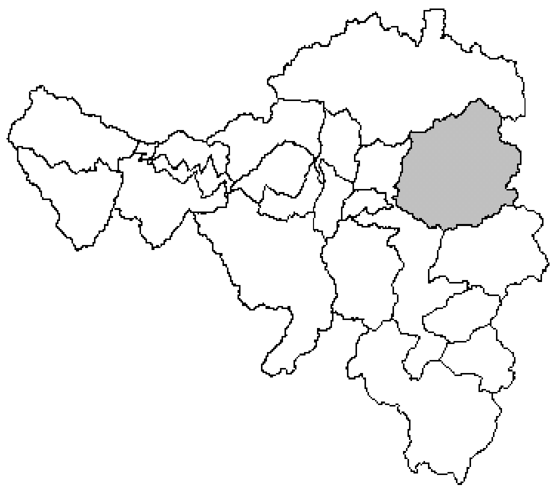
Common boundaries and distant outlying administrative responsibilities can present challenges for management attention to this area. The trails south of the wilderness boundary on the Nez Perce National Forest portion of this ERU are within the Moose Creek District administrative area, but have historically been maintained (level I maintenance) by the Red River District. A verbal agreement provides for this arrangement to continue on a year-to-year basis. In year 2000, Moose Creek District contracted level I maintenance for system Trails # 529, # 562, # 533, and # 602.

Trails within the wilderness are badly eroded and in need of tread work and drainage structures, and some segments are considered dangerous for stock travel. System trail maintenance priority and frequency for opportunity class II and III have not been accomplished because of time and budget constraints.

Recreation and Trails Recommendations

- Monitor campsite and trails that do not meet wilderness management direction standards and bring the areas into standards consistent with opportunity classes I and II.
- Cooperate and plan among districts and forests so that management responsibilities are clearly defined and executed.

PETTIBONE AND BEAR CREEKS



Area Theme: Conserve aquatic processes and restore species integrity.
Size: 135,795 acres.
Location: Northeast of Selway River with Moose Creek to the west and Deep Creek to the south.
Land Classification: Wilderness.
Land Administration: USFS.
Primary Watersheds: Pettibone, Brave, Paradise, Spruce, Bear, Cub, Gardiner, Brushy Fork, Squaw, Wahoo and Granite Creeks.
Landmarks: Gardiner Peak Lookout, Bear Creek Pass, Wahoo Pass, Elk Ridge, Mt. Paloma, and Twin Butte.

OVERVIEW

The Pettibone and Bear ERU is entirely within the Selway-Bitterroot Wilderness. The headwaters of Pettibone and Bear Creeks extend to the Bitterroot Divide between Idaho and Montana. The lower reaches of Bear Creek are unique in the subbasin for their very high habitat potential for spring chinook salmon. Habitat potential for steelhead trout is also very high, and habitat potential for westlope cutthroat trout is very high in the upper reaches of Pettibone Creek, Paradise Creek and Brushy Fork Creek. Both watersheds support many subpopulations of westslope cutthroat trout in the higher elevations, which are critically important to the genetic diversity of this subspecies across its range. Water quality and existing habitat condition are high. Hydrologic regimes have been moderately affected by fire suppression. Species integrity may have been locally affected by stocking of hatchery rainbow and non-native cutthroat trout and brook trout.

This ERU is accessible from Montana over Bear Creek Pass and Lost Horse Pass, and hunter and outfitter use is popular. Certain areas show impacts exceeding wilderness standards.

The area is dominated by subalpine and mid elevation forests and extensive rocky alpine glaciated ridges and cirques. Departures from historic fire regimes and plant community structure are no more than moderate, but whitebark pine has still declined from its presettlement levels. Weeds are established along lower elevation trails and campsites. Low elevation slopes provide important winter range for ungulates and predators. Grizzly bears were extirpated in the early 1900s. The alpine habitat in conjunction with alpine areas in the adjacent ERUs and the important spring range in Pettibone and Bear ERU constitute the most significant grizzly bear habitat in the subbasins. Mesic habitats dominate the ERU and provide important habitat components for lynx and other fur-bearers, ungulates, amphibians, and insect foraging birds. Wolverines and mountain goats find habitat in the remote rocky ridges. The alpine rock component in Pettibone and Bear and adjacent ERUs probably provides the most important mountain goat summer range in the subbasin.

INTEGRATED AREA THEME

CONSERVE AQUATIC PROCESSES AND RESTORE SPECIES INTEGRITY

Bear Creek supports habitat potential for spring chinook salmon that is unique in the subbasin. The diversity and condition of aquatic habitat provide a stronghold for populations of salmon, steelhead/redband trout, and westslope cutthroat trout. Departures from historic terrestrial and aquatic disturbance regimes are only moderate, and pulse disturbances continue to provide inputs of large wood and gravel, and natural fluctuation in streamflow. Bear Lake Dam, constructed to provide irrigation water, affects the level of Upper Bear Lake and the flow regime between Upper and Lower Bear Lakes.

Most mountain lakes have been stocked with of non-indigenous fish, including Yellowstone cutthroat and rainbow trout. Introgression with native cutthroat trout may have occurred. Brook trout have been stocked in one lake, and have probably emigrated downstream, with the potential to affect local native cutthroat populations. Fishless lakes support a high diversity of amphibian and macroinvertebrate species.

COMPATIBLE THEMES

RESTORE TERRESTRIAL PROCESSES AND RESTORE SPECIES INTEGRITY

Conservation and restoration of infrequent, mixed and lethal fire regimes in high elevation forests would help recover whitebark pine and sustain alpine larch. Natural fire regimes would sustain the diversity and pattern of aquatic habitats to contribute to the unit theme. Treatment of weed populations would help sustain natural levels of soil stability and erosion regimes, contributing to the unit theme.

CONSERVE WILDLIFE SECURITY AND RESTORE SPECIES INTEGRITY

Mountain goats and bull elk are declining. Evaluation of impacts to security of these populations is needed. The ERU is easily accessible from Selway Lodge and Shearer Guard Station, where both facilities have associated airstrips. The non-indigenous fish introduced into most of the mountain lakes threaten amphibian populations. Conservation of security and restoration of species integrity is compatible with the area theme.

RESTORE WILDERNESS VALUES CONSISTENT WITH OPPORTUNITY CLASS

Campsite naturalization would address local erosion sources and support the area theme.

MAINTAIN EXISTING TRAIL SYSTEM AND REDUCE ADVERSE EFFECTS OF EXISTING TRAIL SYSTEM

Reducing erosion sources from the trail system would support the area theme.

THEME INTERACTIONS

Restoration of frequent fire in low elevation forests may enhance the spread of weed populations. Weed population monitoring and control activities should emphasize susceptible habitats affected by recent fire. Conservation of fire regimes at high elevations may eliminate rust-resistant sources of whitebark pine. Inventory to identify potential sources of rust resistance is recommended, with adjustment of fire use prescriptions to protect this genetic resource.

Although the overall goal of reducing or eliminating non-native fish from mountain lakes is consistent with the theme, restore wilderness values, actions taken to achieve this goal may result in a conflict. Traditional methods of removing fish (for example, use of chemical piscicides, blasting, or introduction of non-native biocontrol organisms) may include biological and social risks that are unacceptable in a wilderness setting. Less risky methods are generally ineffective in removing fish from even small lakes. The ecological benefits of removal of non-native fish must be assessed within the context of social and ecological risks.

INTEGRATED AREA RECOMMENDATIONS

- Conserve, or restore as needed, natural fire disturbance processes and conserve high water quality and watershed condition commensurate with natural disturbance dynamics. Natural fire regimes will maintain hydrologic regimes resulting in the appropriate pattern and fluctuation of diverse aquatic habitat conditions.
- Breach Bear Lake Dam to restore natural lake levels and streamflow.
- Assess Spruce Lake trail, repair its ability to bear traffic, and reduce adverse effects to wetland and riparian functions resulting from use of the trail.
- Investigate the decline in mountain goat and bull elk populations in Pettibone Creek.
- Develop a long-term monitoring plan for brook trout encroachment to determine if distribution of the species is changing over time.
- Reduce threats from non-indigenous fish to native amphibian populations.
- Continue cooperation with the Idaho Department of Fish and Game on the stocking rotation of lakes already stocked, elimination of stocking of rainbow trout from lakes where they are currently stocked, and continued deferral of stocking of currently fishless lakes.
- Initiate a genetic inventory of westslope cutthroat trout subpopulations to determine degree, if any, of introgression (hybridization), and if genetically unique subpopulations exist.
- Pursue federal acquisition of Selway Lodge to prevent further development and use in the ERU.

FUNCTIONAL FINDINGS AND RECOMMENDATIONS

AQUATICS

Theme: Conserve aquatic function and restore species integrity. Very high priority.

Aquatic Findings

Watersheds in the Pettibone and Bear ERU are highly diverse. Granitic glaciated slopes, glaciated basins, glacial bottoms, and granitic mountain uplands characterize the upper portions of the ERU. The lower portions are characterized by middle and low elevation breaklands. Numerous glacial cirque and glacial chain lakes are scattered across the headwaters of both watersheds. Low gradient, high elevation meadow and stream complexes characterize many areas in the Pettibone watershed. High order canyon reaches in Bear Creek are characterized by low to moderate gradient streams. The lower elevation breaklands are within the coastal maritime climate rain-on-snow effect. Habitat potential for anadromous fish in the lower and middle reaches of Bear Creek is very high. Habitat potential in the lower reaches of Pettibone Creek is very high for steelhead/redband trout and moderate for spring chinook. Habitat potential for westslope cutthroat trout is very high in both watersheds and moderate for bull trout.

The lower reaches of Bear Creek support possibly the most important spawning and rearing habitat for anadromous fish in the Selway subbasin, particularly spring chinook salmon. Large contiguous areas of spawning gravels are located in the mainstem reaches below Cub Creek. Both the Bear and Pettibone watersheds support many westslope cutthroat subpopulations in their upper reaches and are therefore critically important to the genetic diversity of this subspecies. Westslope cutthroat trout may also have been present historically in some mountain lakes in the ERU.

Historic hydrologic regimes and erosional processes have been affected by fire suppression. Historically, water yield increases and sediment pulses as a result of wildfire were a part of the natural regime. Fire suppression has increased the interval between large events. Although fires have occurred with some regularity in the lower elevations of the ERU, their occurrence is still probably less than historic. Other changes include construction of Bear Lake Dam at the outlet of Upper Bear Lake in the Bear watershed. Numerous lakeside and streamside riparian areas have been affected by high human use, trail construction, and pack stock grazing and trampling, especially in sensitive high elevation areas.

The existing aquatic species assemblage is similar or the same as the historic assemblage at lower elevations of the ERU, but is substantially different in some high elevation areas. Non-native trout have been stocked and are established in most mountain lakes in both watersheds. Brook trout are present in one lake in the Pettibone watershed. Non-native cutthroat and hatchery rainbow trout are present in most lakes in the Bear watershed. Downstream encroachment of these species may have occurred, possibly resulting in hybridization of westslope cutthroat trout subpopulations. Hatchery trout have been stocked into lakes that historically may have supported native westslope cutthroat.

Aquatic Recommendations

Conserve aquatic process:

- Restore natural fire disturbance patterns.
- Conserve high water quality and watershed conditions.
- Breach Bear Lake Dam to restore natural hydrologic processes.
- Complete a survey of the Spruce Lake Trail to evaluate the drainage problems in wet areas along the trail.

Restore species integrity:

- Complete species distribution surveys, as a minimum, in Bear and Pettibone Creeks.
- Conduct a genetic analysis of cutthroat trout below mountain lakes where rainbow or non-native cutthroat trout have been stocked, and cutthroat trout in Indian, Spruce, and Bigfoot Lakes to determine the degree of introgression, if any, of these populations.
- Continue the policy of not stocking existing fishless lakes.
- Survey Coquina Lake to determine if it is currently fishless and determine the degree of human impacts and effects on other resources.
- Survey streams below Papoose Lake to determine if brook trout are established.
- Review outfitter and guide base and spike camp locations in both watersheds to determine the level of risk to fish, if any.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore species integrity. Moderate priority.

Landscape Ecology Findings

Steep canyons dominate the character of this ERU; they support xeric and mesic forests, and the alpine glaciated ridges support spruce-fir and lodgepole pine forests. The cedar old growth in the stream bottom is a rare element in the subbasin. Overall integrity of landscape composition and pattern is moderate, integrity of process is high, and integrity of species is high except for localized loss of whitebark pine and weed infestations.

At upper elevations, recent burns are less well represented than historically. Whitebark pine and alpine larch are poorly represented in small stands isolated from one another on ridge tops.

Montane park occupies areas that whitebark pine may have once occupied. Old growth is well represented, mostly the spruce-fir type in glacial valley bottoms. Although fires have occurred with some regularity in this part of Pettibone and Bear ERU, fire occurrence is probably still less than historic levels, and whitebark pine is reduced from historic levels.

At lower elevations, ponderosa pine-Douglas-fir forests are less well represented than historically. Old growth cedar occurs along the stream bottoms, but large trees are otherwise more poorly represented, and pole sized trees are more highly represented than historically. Based on stand density, lower elevation areas in Pettibone Creek may have fuel accumulations higher than presettlement times, although the area is not generally outside its fire interval. Weeds are generally well established at lower elevations near trails.

Landscape Ecology Recommendations

In middle and high elevations of Pettibone and Bear Creeks, in vegetation response units (VRUs) 2 and 4:

- Restore mixed and lethal severity fire regimes; this is a high priority, in order to recover whitebark pine and alpine larch.
- Restore disturbance dynamics in high elevation forests. Mixed and lethal fire would contribute to the restoration of whitebark pine and larch by reducing encroachment of subalpine fir and spruce, and would provide sites for regeneration of lodgepole, whitebark pine, and larch. Only by providing for regeneration can selection for rust resistance occur, which is critical to the persistence of whitebark pine. At mid elevations, mixed and lethal fire regimes would maintain recruitment of early seral shrub, and seedling and sapling communities.
- Inventory the existing whitebark pine and alpine larch stands that appear to be small and isolated; assess their condition and response to recent fire and use that information to evaluate risk and benefits of possible fire scenarios from naturally ignited fire. Elements to consider in this inventory also include:
  - Community composition, size class, evidence of blister rust, mountain pine beetle activity and tree mortality, and encroachment by other tree species.
  - Fuels and susceptibility to stand replacement, opportunities for maintenance of whitebark pine in low or mixed severity fire, and need for stand replacement fire to provide additional sites for natural regeneration.
- Incorporate information about cedar old growth into fire use planning for the ERU to favor conditions supporting low and mixed severity fire in adjacent drier areas, and to consider the risk of loss of the cedar old growth under conditions when high severity fire is more likely. The cedar old growth is a special element because of its age and occurrence near the southerly boundary of the distribution of cedar. Because it was likely established during a period of moister climate, the likelihood of successful reestablishment after stand replacing fire is low.

In lower Pettibone and Bear Creeks, in vegetation response unit (VRU) 3:

- Conserve frequent and very frequent low severity and mixed severity fire regimes; this is a high priority, including the mixed conifer cover type. Low and mixed severity fire would contribute to the maintenance of low stand densities in the mixed conifer and ponderosa pine-Douglas-fir cover types and would maintain representation of ponderosa pine as a seral component. Mixed severity fire would continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch. However, fire will result in the likely expansion of existing weed populations.

- Inventory weed populations. Treat to reduce weed abundance and increase reestablishment of native grasses and forbs, if needed.

WILDLIFE

Theme: Conserve wildlife security and restore wildlife species integrity. Very high priority.

Wildlife Findings

Bear Creek is a primary Selway River tributary and provides important habitat connectivity between the Selway River country and the Bitterroot Valley. A wide, flat valley bottom at low elevations in Bear Creek is a unique feature that is important to wildlife habitat. This habitat is also characteristic of important grizzly bear spring range. Only Moose Creek has a more significant representation of this uncommon habitat feature in the subbasin.

Mesic habitats dominate the Pettibone and Bear ERU. Forest types in the mesic habitats include mixed conifer, shrublands, spruce-fir, and lodgepole pine. Most of the mesic habitats are divided between early and mid-seral structures. Old growth is well represented. The mesic environments exhibit suitable habitat for lynx and fishers. Western red cedar old growth patches occur along Bear Creek and provide nesting and foraging habitat for pileated woodpeckers and other woodpeckers. Mesic meadows contribute significant elk calving habitat to the subbasin. Winter and spring mountain goat range in Bear Creek is notable. Occurrence of tailed frogs is documented in the ERU. Bear Creek is recognized for stream characteristics consistent with harlequin duck breeding habitat.

Xeric habitats are limited in the ERU and are characterized by grasslands and ponderosa pine-Douglas-fir forest types. Like the adjacent White Cap Creek, xeric habitats extend far into high elevations in Bear Creek. Most of the xeric habitats are in early and mid-seral structure. Old growth is significantly represented. The xeric habitats provide important elk winter range. Total winter elk counts in the ERU indicate the population is stable, but bulls are declining at a higher rate than the average for the backcountry as a whole. Mule deer also winter in these xeric habitats. The ungulate winter range in xeric habitats also provides foraging opportunities for carnivores. The significant xeric old growth habitat indicates potential white-headed woodpecker and flammulated owl habitat in ponderosa pine communities.

Alpine habitats are limited but contribute important diversity to the ERU. Spruce-fir and lodgepole pine are the dominant forest types, in association with shrublands and montane park. Whitebark pine and alpine larch are poorly represented. Half of the alpine habitat is early seral structure with mid-seral structure also prominent. Old growth is well represented. Wolverines favor these remote, alpine environments. The Pettibone and Bear ERU and the Bitterroot and White Cap Creek divide ridges, which bound the drainage, contain the most significant alpine rock component in the subbasin, indicative of important summer range for mountain goats. The alpine habitats in the Pettibone and Bear ERU, in combination with the alpine habitats in the adjacent White Cap and Moose Creek ERUs, constitute the west side of the Bitterroot divide country and contribute the most significant grizzly bear habitat in the subbasin. Important grizzly habitat components include whitebark pine communities, montane parklands, talus slopes and wet avalanche chutes along with lower elevation spring range associated with ungulate spring range. Twenty-six high lakes populate the alpine habitats and whitebark pine is found at most of them.

Ponderosa pine and Douglas-fir forest habitats are less common relative to historic occurrence and mid-seral structure has increased since fire suppression became effective. In alpine areas, recently burned habitat and whitebark pine that provide important wildlife habitat are less common. Montane park has increased and occupies areas that whitebark pine once did. Spotted knapweed is prevalent and is impacting native forage for ungulates on winter range. Bull elk populations are declining at a higher rate than the average for the backcountry in general. Mountain goat populations are declining. The kid population dropped significantly between 1991 and 1994. Grizzly bears, historically common in Bear Creek, were eliminated or nearly eliminated by the mid 1900s. The native salmon runs and whitebark pine, that were important grizzly bear food sources historically, have also declined significantly. Most of the high lakes are stocked with introduced trout and most are devoid of amphibians. Amphibians and other native species are at risk or obliterated at lakes stocked with introduced fish.

Several trails access high elevation habitats and species. Disturbance sensitive species, including mountain goats and wolverines, may be influenced by localized human activity. Limited surveys indicate that mountain goats are declining. The status of other wilderness sensitive species, including wolverines, is unknown. A public airfield at Shearer Guard Station and a private inholding with an airstrip across the Selway River from the mouth of Bear Creek receive substantial use and probably influence the level of human use in the ERU. Currently, several outfitters operate from 14 camps in Pettibone and Bear Creeks. Numerous outfitter violations have occurred in recent years.

Wildlife Recommendations

- Restore fire, where feasible, to reestablish natural disturbance dynamics with priority in alpine and xeric habitats.
- Reduce weed populations and conserve existing weed-free areas.
- Reduce the introduced trout populations where possible, especially eastern brook trout, to alleviate impacts to native terrestrial species.
- Review existing trail systems and camps associated with species populations vulnerable to disturbance, especially in alpine elevations, on winter range, and in meadow habitats and calving areas.
- Investigate the mountain goat and bull elk decline.
- Assess the decline and migration pattern of the mountain goat population.
- Evaluate potential white-headed woodpecker and flammulated owl populations in old growth ponderosa pine.
- Determine the status of harlequin duck breeding in Bear Creek.
- Pursue federal acquisition of private inholding property when it arrives on the market. The potential for increased development at the Selway Lodge private inholding is significant. Additional dwellings, residents and air traffic would impact wilderness wildlife security in the area.

RECREATION AND TRAILS

Recreation theme: Restore wilderness values consistent with opportunity class.

Trails theme: Maintain existing trail system and reduce adverse effects of existing trail system. Reduce off-trail impacts.

Recreation and Trails Findings

Pettibone and Bear ERU is entirely within the Selway-Bitterroot Wilderness, and with the exception of the Brushy Fork and Cub Creek drainages, is classified as opportunity class II. All trail corridors are opportunity class III. The heart of the Selway-Bitterroot Wilderness is accessible from Montana, and trailheads at Bear Creek Pass and Lost Horse Pass are popular for hunters and hikers.

Visitor use from canyons on the Montana side is increasing dramatically. Hikers can conveniently drive to trailheads and enjoy short weekend trips. Bear Creek Pass is a favorite campsite and offers access to several lakes within a short distance. Day hikes and overnight camping are very popular.

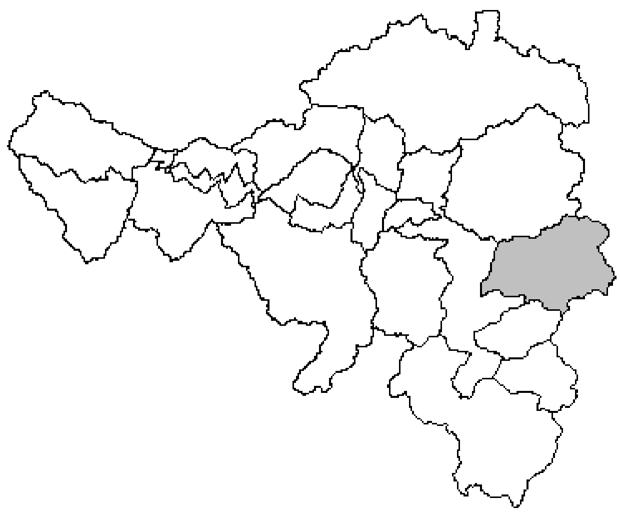
At Coquina Lake, trails and campsites exceed impacts and numbers specified by the wilderness management direction. Also, sites at Bear and Granite Creeks and along lower Spruce Creek do not meet standards. Indian Lake, on the northern boundary of the ERU is identified as a problem area. An outfitter base camp has been relocated there, and garbage dumps remain in some other dispersed sites near the lakeshore. There is intermittent outfitter and hunter activity in and around the Brushy Fork area, and inventory and monitoring has been infrequent. Campsite revegetation with noxious weeds is very common.

Some main system trails are currently maintained at level I. Budget constraints do not allow level I maintenance on all mainline trails. There are problem areas on Bear Creek and Spruce Creek trails. While priority to drainage structures and erosion is preferred according to forest management direction, it is not usually accomplished because of the urgent need for passable trails for the public. Time and budget constraints often only allow for trail clearing, without adequate attention to drainage.

Recreation and Trails Recommendations

- Monitor sites and trails that do not meet standards; rehabilitate and naturalize.
- Monitor and inspect outfitter operations in the opportunity class I area of Brushy Fork and Cub Creek.
- Inventory trail conditions and maintain trails to forest trail maintenance standards.
- Coordinate management of the unit more closely with the West Fork District of the Bitterroot National Forest, since it is more easily accessed from Montana.

WHITE CAP CREEK



Area Theme: Restore wilderness values.
Size: 84,785 acres.
Location: East side of Selway River with Pettibone and Bear ERU to the north and Indian Creek ERU to the south.
Land Classification: Wilderness and unclassified.
Land Administration: USFS.
Primary Watersheds: White Cap, Wapiti, Lookout, Cedar, Paloma, Canyon, Cooper, and Peach Creeks.
Landmarks: Paradise Guard Station, Mount Paloma, Cedar Saddle, and Triple Lakes.

OVERVIEW

The entire White Cap Creek ecological reporting unit (ERU), managed by the Bitterroot National Forest, is within designated wilderness except for 1.65 miles of road that accesses Paradise Guard Station. This watershed, especially the upper reaches, supports very high aquatic potential, water quality and existing aquatic condition. The watershed provides significant habitat for steelhead/redband trout. More than 30 glacial chain or cirque lakes are present in high elevations. The high elevation ridges along the Bitterroot divide were historically the stronghold of whitebark pine and alpine larch. Whitebark pine was an important food source for grizzly bears that were largely extirpated in the early 1900s. The White Cap ERU contributes to the most significant grizzly bear habitat in the subbasin along the Bitterroot divide. The most important spring and winter mountain goat range in the subbasin is within the White Cap ERU. White Cap also contributes to the notable summer range in the alpine elevations in conjunction with adjacent ERUs. Non-indigenous fish species threaten native amphibian populations in alpine lakes. The largest concentration of xeric old growth and significant mesic old growth in the subbasin occurs here, although the old trees are not necessarily large. These habitats indicate important potential habitat for white-headed woodpeckers and lynx. The significant xeric winter range habitats used by bighorn sheep, elk, and mule deer are heavily infested with weeds.

The White Cap ERU is classified as wilderness opportunity classes I, II, and III. Most backcountry recreation is associated with hunting and outfitting. The road accessing Paradise Guard Station and the developed campground near the guard station are common destinations for campers, anglers, hikers, stock users, and floaters. The main launch site for floaters on the Selway River is located at the mouth of White Cap Creek, as is the trailhead for Selway Trail # 4.

Considerable recreational activity is associated with the lower portion of the ERU, given its roaded access. Some snowmobile activity occurs in the winter. Invasive weed species are well established and threaten weed-free areas. Whitebark pine is poorly represented, and open high ridges are probably outside their typical fire return interval. More than 20 percent of the watershed shows vegetation indicators of fuel accumulations potentially higher than historic conditions because of fire suppression and development of favorable stand conditions. Areas in the ERU do not meet forest wilderness management standards for maximum number of recreation sites and impact ratings. Several non-system trails also exist that do not meet standards.

Integrated Area Theme

Restore Wilderness Values

Wilderness is an integral social and ecological resource, and the central focus of management must be on the function of the whole. Restoration of wilderness character includes both ecological and social components. It requires the ability to define natural ecosystem dynamics and management to ensure human use, in all its forms, does not disrupt the naturally functioning ecosystem processes that characterize wilderness.

Six outfitter camps are established in White Cap Creek, and use is concentrated near Cooper's Flat where numbers of sites and impact ratings exceed the maximum allowed by the wilderness management direction. Four other sites and trails do not meet management standards for opportunity classes I, I and III.

Compatible Themes

Conserve Terrestrial Processes and Restore Species

Conservation of mixed and lethal severity fire regimes is important in high elevations to maintain whitebark pine and alpine larch. Low and mixed severity fire in the lower elevations would contribute to lower stand densities, closer to historic levels, and provide some early seral herbaceous, snag and shrub habitat. Conservation of terrestrial processes and restoration of biotic integrity, particularly in low elevation grasslands, supports the area theme of restoration of wilderness values because these elements are also integral and fundamental components of the wilderness resource.

Conserve Aquatic Processes and Conserve Aquatic Species

Habitat potential for steelhead/redband trout, bull trout, and westslope cutthroat trout is high or very high in this ERU. These species exist throughout the watershed in significant densities. Conservation of both aquatic species and processes is a high priority. This theme is consistent with restoration of wilderness values.

Restore Wildlife Security and Conserve Wildlife Species

Restoration of wildlife security and conservation of wildlife species is a very high priority in this ERU. Winter and spring motorized use on Road 6223 may impact security of bighorn sheep and other wintering animals. Wintering mountain goat populations have declined and artificial salting may threaten security through habituation. The extensive weed infestations on winter range have impacted forage for wintering populations. Non-indigenous fish populations threaten native amphibian populations at high lakes. The wildlife theme, restore wildlife security and conserve wildlife species, is compatible with the unit theme, because wildlife resources are integral components of wilderness values.

Maintain Existing Trail System and Reduce Adverse Effects

This theme supports the unit theme, particularly where non-system, out-of-standard trail issues are addressed.

Integrated Area Recommendations

- Evaluate human activities to assure compliance with wilderness management direction.
- Implement an integrated management strategy that includes protection for watersheds, rare or vulnerable species and game species, scenic beauty, and non-motorized recreation.

- Evaluate impacts to bighorn sheep and other wintering populations from motorized traffic in winter and spring.
- Inventory invasive weed populations; reduce and prevent weed establishment in weed-free areas.
- Investigate the decline in the mountain goat population and evaluate impacts from artificial salting.
- Restore natural fire regimes, where feasible, to reestablish natural disturbance patterns.

Functional Findings and Recommendations

Aquatic

Theme: Conserve aquatic processes and conserve species integrity. High priority.

Aquatic Findings

Glaciated granitic high elevation slopes and glacial valley bottoms characterize the upper elevations of the White Cap watershed. The lower elevations are characterized by low elevation granitic breaklands. Streams gradients are generally high or moderate. Both stream and ambient temperatures in this ERU are much cooler than the main Selway River. Numerous mountain lakes are scattered across the headwaters. The hydrologic regime for the watershed is controlled by high elevation snowmelt runoff. Habitat potential is very high for steelhead/redband trout and bull trout and high for westslope cutthroat trout. Potential for spring chinook salmon is moderate.

Glacial movement down the main fork of White Cap Creek and Canyon Creek formed U-shaped valleys, which are somewhat unique in the subbasin. This process resulted in wider streamside zones than many of the steep narrow canyons elsewhere in the subbasin. Productivity may be less in this watershed due to low average stream temperatures during the summer. The presence of numerous debris jams throughout the watershed is probably critical in maintaining current productivity levels as well as increasing habitat complexity and creating pool habitat.

Fire suppression has resulted in a moderate departure in the historic hydrologic regime and erosional processes. The road located in the lowest reaches of the stream may have increased sediment yield, but this increase is probably not significant. Lakeshore and streamside riparian areas may have been affected by high human use and pack stock grazing in some areas.

The existing aquatic species assemblage is similar to the historic assemblage. Local impacts to westslope cutthroat subpopulations may have occurred downstream from lakes stocked with non-native cutthroat. The status of these populations is unknown. Impacts include potential interbreeding and hybridization at the subpopulation scale.

Aquatic Recommendations

Conserve aquatic process:

- Restore natural fire disturbance patterns.
- Conserve high water quality and watershed condition.
- Restore natural fire regimes within the ERU that will contribute to restoration of natural sediment processes and hydrologic regimes.

Conserve species integrity:

- Conduct a comprehensive survey of all mountain lakes in the watershed.
- Map aquatic species distribution within mountain lakes.
- Assess degree of potential hybridization in cutthroat trout subpopulations below lakes where Yellowstone cutthroat trout were historically stocked.

- Review outfitter base camp locations and fords to determine where there are potential risks, if any, to spawning and rearing habitat for at risk fish species.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore species. Very high priority.

Landscape Ecology Findings

The dominant character of this ERU is steep canyons dominated by xeric, mesic and lodgepole pine forests, and alpine glaciated ridges supporting spruce-fir, lodgepole pine forests and rocky ridges. Overall integrity of landscape composition and pattern is moderate. Integrity of process is low and integrity of species is moderate, with extensive areas of exotic grasses and forbs, and loss of whitebark pine.

At upper elevations, recent burns are less well represented than historically. Whitebark pine is poorly represented in small stands isolated from one another on ridge tops. Open high elevation ridges are probably outside their typical fire return interval. Although fires have occurred with some regularity in upper White Cap Creek, whitebark pine is still reduced from historic levels.

At lower elevations, Douglas-fir-ponderosa pine forests are less well represented than historically. Large trees are poorly represented, and pole sized trees are more highly represented. Old growth is more common in this ERU than in others of the upper Selway, but the old trees are not necessarily large. Canopy density has increased. Much of this part of White Cap Creek is two to five intervals outside the typical fire return interval in both very frequent and frequent fire regimes. More than 20 percent of the White Cap Creek drainage shows vegetation indicators of fuel accumulations potentially higher than typical of presettlement conditions. Douglas-fir beetle and mountain pine beetle activity have increased because of fire suppression and development of favorable stand conditions. Susceptibility to weed invasion is high, and knapweed and other non-native species are well established around the Paradise Guard Station, campground, and low elevation trails.

Landscape Ecology Recommendations

In upper White Cap Creek:

- Conserve mixed and lethal severity fire regimes; this is a high priority in order to maintain whitebark pine and alpine larch, and disturbance dynamics in high elevation forests.
- Consider mixed and lethal fire that would contribute to the restoration of whitebark pine and larch by reducing encroachment of subalpine fir and spruce, and would provide sites for regeneration of lodgepole, whitebark pine, and larch.
- Provide for regeneration selection for rust resistance to occur, which is critical to the persistence of whitebark pine.
- Consider fire regimes that would maintain recruitment of montane park, early seral shrub, and seedling and sapling communities.
- Inventory the existing whitebark pine and alpine larch stands that appear to be small and isolated; assess their condition, response to recent fire, and use that information to evaluate risk and benefits of possible fire scenarios from naturally ignited fire. Consider also in this inventory: community composition, size class, evidence of blister rust and mountain pine beetle activity and tree mortality, encroachment by other tree species, fuels and susceptibility to stand replacement, and opportunities for maintenance of whitebark pine in low or mixed severity fire and need for stand replacement fire to provide additional sites for natural regeneration.

In lower elevation areas of White Cap Creek:

- Restore frequent and very frequent low severity and mixed severity fire regimes; this is a high priority, including the mixed conifer cover type.

- Consider low and mixed severity fire that would contribute to the restoration of lower stand densities in the mixed conifer cover type, closer to historic levels, and would maintain representation of ponderosa pine as a seral component.
- Consider mixed severity fire that would continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch. Fire may be more severe than historically in some areas because of tree mortality from Douglas-fir and mountain pine beetle. Fire will result in likely expansion of existing weed populations.
- Inventory weed populations. Treat to reduce weed abundance and increase reestablishment of native grasses and forbs.

WILDLIFE

Theme: Restore wildlife security and conserve wildlife species integrity. Very high priority.

Wildlife Findings

Mesic habitats represent half of the White Cap ERU. The dominant forest types in the mesic habitats are spruce-fir with mixed conifer and some lodgepole pine also occurring. Most of the mesic habitat is in early seral and mid-seral structures. Old growth is significantly represented. The mesic habitats in White Cap are indicative of significant suitable lynx habitat. Lynx have recently been observed adjacent to the ERU. Wolverines may inhabit these areas in winter. Pileated woodpeckers and goshawks occur in the mesic forest. An adult tailed frog and an Idaho Giant salamander are documented in Barefoot Creek. Stream attributes of White Cap Creek are indicative of suitable harlequin duck habitat.

Xeric habitats are very prominent in White Cap Creek and represent about a third of the ERU. The xeric habitats support Douglas-fir-ponderosa pine forest types. Early seral structure comprises about half of the xeric habitats. Old growth represents a third of the xeric habitats and is the largest concentration of xeric old growth in the entire subbasin. This component contributes important white-headed woodpecker habitat potential to the subbasin. The primary winter range in xeric habitat is infested with weeds, and elk in White Cap ERU appear to be using the more recently burned mesic areas instead. Mule deer winter counts indicate the wintering population in the ERU has increased dramatically between 1995 and 1999. Road 6223 from Magruder to Paradise Guard Station is open to motorized traffic yearlong. Motorized use may impact wintering wildlife. Bighorn sheep winter in the ERU and have been observed in the roadway. The growing winter recreation trend may increase motorized traffic in winter. Status of winter furbearer trapping activity is unknown. The White Cap ERU has the most significant mountain goat spring and winter range in the subbasin in terms of area and numbers of goats observed.

Although limited in size, alpine habitats are significant in the ERU. Half of these habitats are in montane parkland and early seral structure. Mid-seral structure is also very well represented. Old growth is very limited. Whitebark pine and alpine larch persist in the alpine habitats but are poorly represented. Other forest types in the alpine habitat include spruce-fir, mixed conifer, and lodgepole pine. The alpine habitats in the White Cap ERU in combination with alpine habitats in the adjacent Pettibone and Bear Creeks and Moose Creek ERUs constitute the west side of the Bitterroot divide country and contribute the most significant grizzly bear habitat in the subbasin. Important grizzly bear habitat components include whitebark pine communities, montane parklands, and the alpine meadows along with lower elevation spring range associated with ungulate spring range. The White Cap ERU and the Bitterroot and Bear Creek divide ridges that bound the drainage contain the most significant alpine rock component in the subbasin. The large rock component and associated alpine habitats may provide the most important mountain goat summer range in the subbasin. Several summer goat observations are documented here. The alpine country in White Cap ERU is studded with numerous high lakes that contribute rare habitats to the subbasin. Alpine meadows appear to be very rare in the subbasin and the two largest patches occur in the White Cap ERU. Some of the lake habitats likely support whitebark pine communities and amphibian and reptile populations. Many of these lakes are reportedly stocked with introduced fish that can potentially impact native amphibian, reptile, and bird populations.

The long absence of fire in most of the ERU has resulted in higher stand densities and less early seral habitat, lower nutrient value in shrubs, and loss of ponderosa pine and open understories. The availability of dead, standing and down wood habitat may also be affected. Recently burned areas important to wildlife habitat and whitebark pine communities are less well represented than historically due to fire suppression. Weed infestation, particularly spotted knapweed, is prevalent in the xeric habitats. Weeds compete with native grass forage and reduce availability for wintering ungulates.

Winter snowmobile access to the Paradise area in lower White Cap Creek may impact wintering ungulates. The Paradise area is a heavily used summer recreation destination. In winter, the open road provides access for snowmobiles and mountain lion hunting. Wintering bighorn sheep and motorized traffic interface on Paradise Road 6223. The most recent mountain goat surveys show a significant reduction in the wintering goat population.

There is reportedly a large artificial salt lick on White Cap Creek between White Cap and Canyon Creeks goat ranges, less than a mile from the winter and spring range. Goats are easily habituated to saltlicks that make them more vulnerable to predators at the site of the salt lick. The salmon runs that were important grizzly bear food sources historically have declined significantly. Native amphibians are at risk or, in some cases, obliterated, at high lakes stocked with introduced fish, especially prolific brook trout. Status of wilderness sensitive species including wolverines and mountain goats is unknown.

Wildlife Recommendations

- Restore fire, where feasible, to reestablish natural disturbance dynamics.
- Reduce dense weed populations; this is critical on bighorn sheep, mountain goat, and elk winter range.
- Evaluate winter snowmobile use on Paradise Road 6223 and significance to wintering bighorn sheep and elk.
- Assess potential impacts to the goat population from habituation to artificial salt licks between summer and spring-winter range and associated camp locations. Restore artificial salt licks. The most significant goat herd in the subbasin occurs in the White Cap ERU but the population appears to be declining.
- Determine whether harlequin ducks breed in White Cap Creek, which provides suitable habitat.
- Evaluate the status of lynx in White Cap Creek where lynx presence is known adjacent to the ERU.
- Determine the status of potential populations of white-headed woodpeckers and flammulated owls. The largest contiguous patch of ponderosa pine old growth occurs in the White Cap ERU and indicates significant habitat potential for these species.
- Evaluate terrestrial high lakes environments and species to prioritize restoration needs, including amphibian populations.
- Reduce potential introduced eastern brook and other stocked trout populations in high lakes and outlet streams, where possible, to alleviate impacts to native terrestrial species.
- Consider proposed grizzly bear reintroduction when establishing additional use in the ERU that contributes significant grizzly bear habitat.

ROADS

Theme: Maintain backcountry access to provide for administrative and recreation needs.

Roads Findings

The White Cap ERU contains 1.65 miles of road for a road density of 0.01 mi/mi^2. This is a portion of Road 6223 that accesses Paradise Guard Station; this road is low in the drainage. The Bitterroot National Forest administers this road.

Roads Recommendations

- Maintain Road 6223 for administrative and recreation access.

RECREATION AND TRAILS

Recreation Themes: Restore wilderness values consistent with opportunity classes I, II, and III. Conserve recreation opportunity spectrum class (semi-primitive motorized experience, activity and setting).

Trails Themes: Maintain existing trail system and reduce adverse effects of existing trail system. Reduce off-trail impacts.

Recreation and Trails Findings

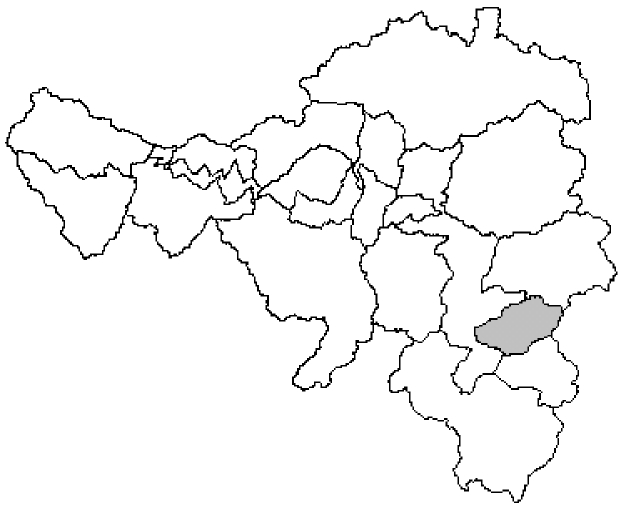
The entire area lies within the Selway-Bitterroot Wilderness, with the exception of approximately one-quarter mile of road to the Paradise Guard Station and an outfitter base camp nearby. Most recreation in the area is associated with hunting and outfitting, including winter use by snowmobiles on the adjacent roads. One outfitter operates out of six camps within the drainage. Trail # 24, which parallels White Cap Creek, is classified opportunity class III and all other system trails are in opportunity class II corridors that pass through opportunity class I areas. Cooper's Flat (on Trail # 24) is the site of a Forest Service Station and junction of four system trails. The area does not meet wilderness management direction standards for maximum number of sites and impact ratings. Sites at Triple Lakes and Clift Creek are also out-of-standards. A former Forest Service system trail at Snake Creek and a loop trail on Fritz Creek are non-system trails that do not meet standards.

Recreation and Trails Recommendations

- Rehabilitate and naturalize out-of-standards campsites and trails in order to meet wilderness management direction standards.
- Consider an agency presence at the Paradise Guard Station to monitor activity by visitors, outfitters, river users, and motoring recreationists.

White Cap Creek

INDIAN CREEK



Area Theme: Restore wilderness values.
Size: 31,991 acres.
Location: East of Selway River with White Cap Creek to the north and Deep Creek to the south.
Land Classification: Wilderness.
Land Administration: USFS.
Primary Watersheds: Indian, Schofield, Saddle Gulch, and Jack Creeks.
Landmarks: Indian Creek Campground, Beaver Jack Mountain, Burnt Strip Mountain, and Copper Point.

OVERVIEW

All of the Indian Creek ERU is classified as designated wilderness. It is part of the Selway-Bitterroot Wilderness managed by the Bitterroot National Forest. A very small section of Road 6223 (0.32 miles) accesses the SE areas of the ERU and ends at Paradise Guard Station. The entire Selway-Bitterroot Wilderness area in the watershed is classified as opportunity class I, and trail corridors are opportunity class II, characterized by an unmodified natural environment and outstanding opportunities for isolation and solitude free from the evidence of human activity. Management in opportunity class I strongly emphasizes sustaining the natural ecosystem. Substantial departures from opportunity class I occur.

Five outfitter camps are located in the ERU, and hunting activity is popular in the fall. Indian Creek supports high aquatic potential, water quality, and existing condition and high densities of steelhead trout. Westslope cutthroat and bull trout are also present, probably resident populations. In Indian Creek and its main tributary, Schofield Creek, both habitat and fish assemblages are similar to the historic conditions. Absence of large wildfires is the most significant change from the historic condition for sediment and water yield regimes as well as for vegetation and wildlife habitat.

Historically, the higher elevation ridges of this ERU supported whitebark pine and alpine larch communities. Currently, whitebark pine is poorly represented and absence of large fires since 1934 suggests the restoration of fire occurrence is needed. Lower elevations of Indian Creek are two to five intervals outside the typical fire return intervals and vegetation indicators of fuel accumulations are potentially higher than typical of presettlement conditions. Weed status is not well known, but highly susceptible habitat is extensive. Douglas-fir and ponderosa pine old growth habitats are significantly represented. Important winter range for bighorn sheep, elk, and mule deer is infested with weeds. Wintering bull elk populations have declined.

Integrated Area Theme

Restore Wilderness Values

Several areas are out of compliance with wilderness management direction. Terrestrial ecological processes show high departures from historical conditions in fire regimes at low to mid elevations, and landscape scale departures at high elevations. Terrestrial species integrity shows departures from historic conditions in both loss of whitebark pine at high elevations and weed encroachment at low elevation. Restoring wilderness values entails addressing both social and ecological departures.

Compatible Themes

Conserve Aquatic Processes and Species

Conservation of aquatic processes includes conserving the natural dynamics of hydrologic regimes and diversity of aquatic habitat, which will help restore wilderness values and is compatible with restoration of terrestrial disturbance regimes.

Restore Terrestrial Processes and Restore Species Integrity

This theme is implicit in the ecological component of restoring wilderness values.

Restore Wildlife Security and Conserve Species Integrity

Motorized traffic in winter and spring may impact security of wintering ungulates. Weeds are impacting winter range forage. Restoration of wildlife security and conservation of species integrity is implicit in the ecological component of restoring wilderness values.

Theme Interactions

Restoration of frequent fire at low elevations may enhance the spread of weed populations. Weed population monitoring and control activities would emphasize susceptible habitats affected by recent fire. Restoration of fire regimes at high elevations may pose risk to individual whitebark pine that has some level of rust resistance. Inventory is recommended to identify levels of rust resistance and modify fire use prescriptions accordingly.

Integrated Area recommendations

- Evaluate human activities that threaten wilderness values and develop and implement an integrated management strategy that addresses watershed protection, habitat for threatened or endangered plants and animal species, wildlife security, scenic beauty and non-motorized recreation.
- Assess impacts from motorized use on Road 6223 on wintering bighorn sheep, mountain goats, and elk.
- Monitor outfitter and other recreation activity and bring areas that do not meet wilderness management standards to the conditions that meet the desired future condition for opportunity classes II and I.
- Evaluate fuel conditions at low elevations to support wildland fire use prescriptions in order to restore natural fire regimes.
- Inventory invasive weed populations and implement measures to reduce infestations and prevent establishment in weed-free areas.

FUNCTIONAL FINDINGS AND RECOMMENDATIONS

AQUATICS

Theme: Conserve aquatic function and conserve species integrity. Very high priority.

Aquatic Findings

The Indian Creek watershed is characterized by low elevation canyon breaklands, low gradient glacial valley bottoms, and mountain uplands. Stream gradients are generally moderate and high. Similar to White Cap Creek, large wood and ubiquitous debris jams are notable features in most stream channels, reflecting both the fire history in the watershed and the ability of the streams to retain large wood. No mountain lakes are located in this ERU. Habitat potential for steelhead/redband trout and bull trout is very high. Habitat potential for spring chinook salmon and westslope cutthroat trout is low.

Large woody debris occurs throughout the watershed and is a critical component of habitat complexity and primary productivity. Given existing habitat and cold water temperatures, this watershed supports an important subpopulation of bull trout, although steelhead trout dominate the species assemblage in the lower reaches. The size class distribution of cutthroat and bull trout suggests a lack of migratory fish, despite access to the mainstem river.

On a watershed scale, the main change from historical conditions in terms of water yield and sediment regimes is absence of large wildfires. Fire suppression has decreased the occurrence of wildfire, which has affected hydrologic regimes related to pulse disturbances. High human use, trail construction and maintenance, and pack stock grazing in some areas may locally affect streamside riparian areas.

The existing species assemblage is similar to the historic assemblage, except abundance of anadromous fish is probably less. Lack of a stocking history in this watershed suggests that westslope cutthroat trout are not hybridized with non-indigenous species.

Aquatic Recommendations

Conserve aquatic processes:

- Conserve the natural erosional processes related to disturbances such as wildfire and flood events; these events are part of and help drive the natural hydrologic regimes.
- Conserve the high water quality in the watershed; this is part of wilderness designation and direction.

Conserve species integrity:

- Review outfitter and guide camps near potential spawning habitat, review the trail ford across mainstem Indian Creek to determine potential risk to fish, and monitor densities of age 0 bull trout to determine level of recruitment.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore species. Very high priority.

Landscape Ecology Findings

The dominant characteristic of this ERU is steep canyons forested in xeric and lodgepole pine forests, and alpine glaciated slopes supporting spruce-fir, lodgepole pine, and montane park communities. Overall integrity of landscape composition and pattern is moderate and integrity of processes is low. Species integrity is high, except that exotics and noxious weeds may be well established at low elevations and whitebark pine is much reduced at upper elevations.

At upper elevations, whitebark pine is very poorly represented. Representation of tree size classes appears to show more dominance of pole-sized stands, probably related to the dominance of lodgepole pine. Canopy density appears to be lower than historically. Open high elevation ridges are probably outside their typical fire return interval, and the occurrence of old lodgepole pine suggests some fuel accumulations higher than typical of presettlement conditions. The absence of any large fires since 1934 in this part of Indian Creek suggests that the restoration of fire occurrence at the landscape level is needed at high elevations.

At lower elevations, nonforest areas and large trees are poorly represented. The lack of large trees may be due to two factors: the severity of the 1919 burn and the lower productivity of this part of the Selway subbasin. Old growth is somewhat more common in this ERU than in others of the upper Selway. Canopy density has increased. Much of this part of Indian Creek is two to five intervals outside the typical fire return interval in both very frequent and frequent fire regimes. More than 20 percent of Indian Creek drainage shows vegetation indicators of fuel accumulations potentially higher than typical of presettlement conditions, almost all at lower elevations. Weed status is not well known in this ERU; susceptibility is thought to be high.

Landscape Ecology Recommendations

In the mid and high elevations of Indian Creek, vegetation response units (VRUs) 1, 2 and 9:

- Restore mixed and lethal severity fire regimes; this is a very high priority in order to restore whitebark pine and alpine larch and disturbance dynamics in mid and high elevation forests.
- Consider mixed and lethal fire that would contribute to the restoration of whitebark pine and larch by reducing encroachment of subalpine fir and spruce, and would provide sites for regeneration of lodgepole, whitebark pine, and larch.
- Provide for regeneration so selection for rust resistance can occur, which is critical to the persistence of whitebark pine.
- Consider fire that would maintain recruitment of montane park, early seral shrub, and seedling and sapling communities.
- Inventory to assess the condition and vulnerability of whitebark pine.

In the lower elevations of Indian Creek, vegetation response unit (VRU) 3:

- Restore frequent and very frequent low severity and mixed severity fire regimes; this is a very high priority, including the mixed conifer cover type.
- Consider low and mixed severity fire that would contribute to the restoration of lower stand densities in the mixed conifer cover type, closer to historic levels, and would maintain representation of ponderosa pine as a seral component.
- Consider mixed severity fire that would continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch; however, fire will result in likely expansion of existing weed populations.
- Inventory weed populations. Treat to reduce weed abundance and increase reestablishment of native grasses and forbs, if needed.

WILDLIFE

Themes: Restore wildlife security and conserve wildlife species integrity: Very high priority.

Wildlife Findings

Mesic habitats represent more than half of the ERU and are characterized by spruce-fir and lodgepole pine forests. Most of the mesic habitats are in mid-seral and early seral structure. Old growth is less well represented, but indicates high lynx habitat potential in association with early seral structure. Other species expected to occupy mesic habitats include fisher, pileated woodpecker, and goshawk.

Xeric habitats are prominent in lower Indian Creek and are characterized by Douglas-fir-ponderosa pine forests. Most of the xeric habitats are in early seral structure. Old growth and mid-seral structures are also well represented. The significant xeric old tree component indicates potential white-headed woodpecker and flammulated owl habitat. Bighorn sheep and elk winter in Indian Creek. The elk population is increasing more than the average of the backcountry ERUs. The winter mule deer population appears stable.

Alpine habitats represent a small but significant portion of the Indian Creek ERU. The alpine habitats are characterized by spruce-fir and lodgepole pine forests. Whitebark pine is very limited. Most of the alpine habitat is in mid-seral structure with early seral less well represented. Old growth is very limited. Mountain goats, grizzly bears, wolverines, moose, and elk potentially occupy these elevations in summer.

Whitebark pine communities have been impacted and recruitment of snags and down wood habitat has declined as a result of fire suppression in alpine habitats. Loss of ponderosa pine and early seral habitat, higher stand densities, and potentially higher fuel accumulations in xeric habitats have resulted from the absence of fire. Weed infestations compete with native bunchgrass and impact forage availability for ungulates. Bull elk have declined significantly in the ERU. Road 6223 follows the Selway River from Magruder to the Paradise Guard Station. Winter snowmobile access on the road may increase vulnerability of furbearers, including lynx, wolverines, and fishers.

Wildlife Recommendations

- Restore fire to whitebark pine and ponderosa pine habitats.
- Reduce existing weed infestations and prevent population expansions.
- Evaluate impacts of motorized traffic and camp locations to populations on winter range, including elk, bighorn sheep and mountain goats.
- Determine the cause of the bull elk decline.
- Investigate wolverine status in alpine habitats and on winter range.
- Evaluate potential populations of white-headed woodpeckers and flammulated owls in the significant ponderosa pine old growth.

ROADS

Theme: Maintain backcountry access to provide for administrative and recreational needs.

Roads Findings

The Indian Creek ERU contains 0.32 miles of road. This is a portion of Road 6223 accessing Paradise Guard Station along the Selway River. This road is low in the drainage and crosses the mouth of the drainage. The Bitterroot National Forest administers this road.

Roads Recommendations

- Maintain Road 6223 for administrative and recreational access.

RECREATION AND TRAILS

Recreation theme: Restore wilderness values consistent with opportunity classes I and II.

Trails theme: Maintain existing trail system and reduce adverse effects to existing trail system. Reduce off-trail impacts.

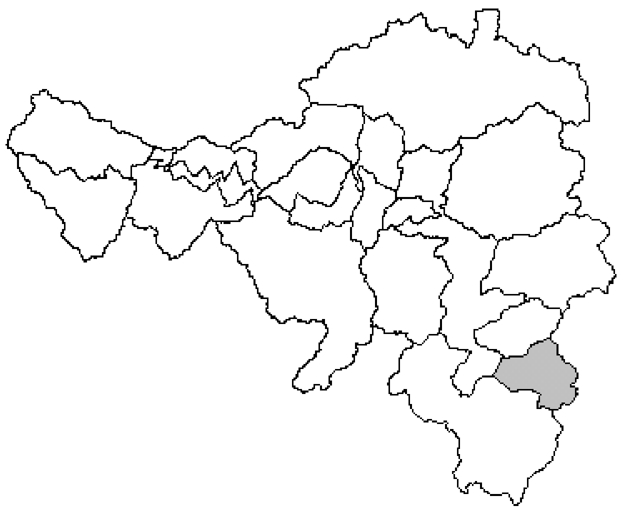
Recreation and Trails Findings

Indian Creek is located totally within the Selway-Bitterroot Wilderness and classified opportunity class I, except for trails that are opportunity class II. About six miles of Trail # 10 along Indian Ridge to Burnt Strip Mountain on the north is classified opportunity class III. Use is associated primarily with hunter and outfitter-guide operations (five outfitter camps exist in the area). Several areas are out of compliance with the Selway-Bitterroot Wilderness management direction: System Trail # 13 in opportunity class I; a portion of system Trail # 32 (Indian Creek) in opportunity class I with an identified problem area at Blue Hole (junction of Trails # 32, 36, and 10); Schofield Creek camp used by outfitters and hunters in opportunity class I; and Trail # 35 (Cayuse, also mentioned in Deep Creek ERU).

Recreation and Trails Recommendations

- Monitor outfitter activity and administer outfitter operating plans to bring area into compliance with the Selway-Bitterroot Wilderness management direction (priority).
- Close and naturalize (rehabilitate) non-system trails and naturalize damaged sites in opportunity class I areas.

DEEP CREEK



Area Theme: Restore wilderness values.
Size: 36,260 acres.
Location: Headwaters of Selway River forming the divide between Montana and Idaho.
Land Classification: Wilderness and unclassified.
Land Administration: USFS.
Primary Watersheds: Deep, Cache, Gabe, Cayuse, Pete and Vance.
Landmarks: Deep Creek Campground, Nez Perce Pass, Nez Perce Peak, and Cayuse Mountain.

OVERVIEW

The Deep Creek ecological reporting unit (ERU) is located adjacent to the Montana-Idaho border. Deep Creek flows near the Magruder Road in a non-wilderness corridor that runs between the Selway-Bitterroot Wilderness and the Frank Church-River of No Return Wilderness. Most of the ERU is within the designated wilderness. An unmodified natural environment characterizes the area; there are outstanding opportunities for solitude, free from the evidence of human activities, where management strongly emphasizes sustaining the natural ecosystem. The portion of the Deep Creek ERU within the wilderness areas is classified as opportunity class I, and the trails are classified opportunity class II. Some system trails and campsites do not meet forest wilderness management standards. Considerable recreation activity is associated with the roaded portions of this ERU. Access to the Selway River, wildernesses, hunting, fishing, and winter recreation is important.

Deep Creek supports high aquatic potential and water quality and moderate existing conditions and diversity of aquatic species. Deep Creek supports high potential for steelhead trout, bull trout, and westslope cutthroat trout, and moderate potential for spring chinook salmon. The existing species assemblage is probably similar to the historic assemblage, although numbers of anadromous fish are lower. The effect of 14.4 miles of streamside road is rated moderate to high and has reduced riparian functions.

The South Nez Perce Trail Road 468, also known as the Magruder Road, parallels Deep Creek from the Montana-Idaho border to the Selway River. Eight miles of road access Hell’s Half Acre. The Bitterroot National Forest administers these lands.

The upper elevations of this ERU consist of high elevation ridges that historically supported populations of whitebark pine. No large fires have occurred in upper Deep Creek since 1939, and whitebark pine no longer appears as a cover type. Much of lower Deep Creek is two to five intervals outside the typical fire return interval in both very frequent and frequent fire regimes. Invasive weed species, especially spotted knapweed, are well established along the Magruder

Road corridor and susceptibility to weed invasion is high in the adjacent dry habitats. The Deep Creek ERU contains significant xeric old growth habitats. Bighorn sheep and bull elk winter in the lower elevations.

INTEGRATED AREA THEME

RESTORE WILDERNESS VALUES

Wilderness is an integral social and ecological resource, and the central focus of management must be on the function of the whole. Restoration of wilderness character includes both ecological and social components. It requires the ability to define natural ecosystem dynamics, and management to ensure human use, in all its forms, does not disrupt the naturally functioning ecosystem processes that characterize wilderness.

The wilderness portion of this ERU is classified opportunity class I. Unauthorized nonsystem trails in opportunity class I areas are impacting the quality of wilderness. Sites impacted from heavy human use occur in opportunity class II areas and do not meet the standards for opportunity class II. The Magruder Road is the primary access to Deep Creek and provides access to wilderness trailheads. Many people drive the road for a “wilderness experience.” The growing numbers of visitors in the Magruder corridor and Deep Creek area have resulted in more impacted sites, as the use along the road increases. Safety along the Magruder corridor is a concern. Road improvements encourage more traffic and larger recreational vehicles and this results in a decrease in the quality of the backcountry visitor’s experience.

COMPATIBLE THEMES

RESTORE AQUATIC PROCESSES AND CONSERVE AQUATIC SPECIES INTEGRITY

Habitat potential for steelhead trout, bull trout, and westslope cutthroat trout is high in Deep Creek. Conservation of aquatic species will involve continued restoration of Road 468 along Deep Creek to restore fish habitat. Conservation of aquatic species integrity is compatible with the area theme. Restoration of natural fire dynamics will result in restoration of erosional processes and hydrologic regimes. Restoration of fire and associated disturbances such as floods and debris torrents will recruit large wood to streams, move sediment through streams, and reform channels.

RESTORE TERRESTRIAL PROCESSES

Restoration of very frequent and frequent, low and mixed severity fire regimes in low-elevation dry and moderately moist forests will recover open stands of ponderosa pine and Douglas-fir, and restoration of fire at high elevations will help recover whitebark pine. Natural fire patterns and the occurrence of fire-adapted plant communities would restore the essential wilderness character of vegetation structure and landscape dynamics, as well as pulse hydrologic disturbance and natural erosional processes. Activities suggested within the limits of Road 468 corridor along Deep Creek and its associated effects are the following: monitor erosion processes, level of wildlife disturbance, loss of the wilderness experience, and change in fire pattern, and restore the landscape processes as near to natural as possible. Reduction and control of weed populations would increase the likelihood of sustaining natural fire and erosion cycles.

RESTORE TERRESTRIAL SPECIES INTEGRITY

Whitebark pine is at risk in high elevation forests and restoring mixed and lethal severity fire regimes is a priority in higher elevations. Weed populations are encroaching on native bunchlands. Control of weed populations and restoration of species in heavily impacted areas supports the restore wilderness area theme. Also, reduction of weed populations would increase the likelihood of sustaining natural fire and erosion patterns.

RESTORE WILDLIFE SECURITY AND CONSERVE SPECIES

Motorized traffic on Deep Creek Road 468 may impact security of wintering bighorn sheep and bull elk. Lack of fire plus weed encroachment have impacted wildlife habitat significantly in the

ERU. Restoration of wildlife security and conservation of species strongly supports the area theme.

THEME INTERACTIONS

Maintaining Road 468 for recreation travel does not totally support the restore wilderness values area theme. Increased use on the road, location of the road in the stream zone and in winter wildlife habitat does not fully support the restore ecological integrity portion of the wilderness theme.

Restoration of frequent fire at low elevations may enhance the spread of weed populations. Weed population monitoring and control activities would emphasize susceptible habitats affected by recent fire. Restoration of fire regimes at high elevations may pose a risk to individual whitebark pines that have some level of rust resistance. Inventory is recommended to identify levels of rust resistance and modify fire use prescriptions accordingly.

INTEGRATED AREA RECOMMENDATIONS

- Monitor areas and trails that do not meet forest wilderness management standards and bring those areas to appropriate standards for opportunity classes I and II.
- Develop a management plan for reducing limits of acceptable change impacts and addressing problem areas that do not meet the desired future condition requirements for resource and social settings of opportunity class I.
- Continue to mitigate and reduce the impact of Road 468 along Deep Creek on riparian function and sediment input into fish habitat.
- Evaluate impacts to wintering bighorn sheep and bull elk from motorized traffic on the Road 468.
- Continue the sediment reduction project started in year 2000, cutslope and fillslope stabilization and revegetation, culvert replacement, and road surface graveling where the road is directly next to the stream.
- Monitor the effects of recreation and use of Road 468; monitor the use patterns seasonally and evaluate the increase in use over time.
- Inventory whitebark pine populations and associated species assemblages, and incorporate the restoration of natural fire patterns in high elevations, and restore frequent and very frequent, low and mixed severity fire regimes at low elevations to restore ponderosa pine and Douglas-fir habitats.
- Prioritize weed populations for control and develop a cooperative weed control plan between the Bitterroot and the Nez Perce National Forests to control weeds on roads and winter range in this ERU.

FUNCTIONAL FINDINGS AND RECOMMENDATIONS

AQUATICS

Theme: Restore aquatic processes and conserve species integrity. High priority.

Aquatic Findings

Low elevation breaklands, broad high elevation ridges, and mountain uplands characterize the Deep Creek watershed. Stream gradients generally range from high to moderate, with short reaches of low gradient. No mountain lakes occur in this watershed. Habitat potential is high for steelhead/redband trout, bull trout, and westslope cutthroat trout and moderate for spring chinook salmon.

There has probably been a moderate departure from historic to existing habitat conditions, which includes a reduction in large wood in the channel, reduced number of pools, increases in deposited sediment, and an overall simplification of habitat. These changes are probably caused by changes in watershed condition, most notably from the construction of Road 468 (Magruder Road), which parallels a significant portion of Deep Creek. Road 468 has changed the natural sediment regime by increasing road-accelerated sediment into Deep Creek. The road encroaches on the stream and in some reaches it is directly adjacent to the stream, with no vegetative buffer between the stream and the road. The effect of the road on riparian function is significant. Construction of Hell's Half Acre Road 224, which is not a streamside road, has affected watershed and riparian conditions less than Road 468.

There has also been a change from natural sediment and water yield regimes due to fire suppression, which has increased the interval between large pulse events occurring in response to significant wildfire.

The existing species assemblage in the Deep Creek watershed is similar or the same as the historic assemblage, except the abundance of anadromous fish is probably less.

Aquatic Recommendations

Restore aquatic processes:

- Continue to restore the watershed condition and the aquatic habitat in Deep Creek by reducing the effects of the Magruder Road. Specific actions include the following:
  - Improve drainage on the road
  - Revegetate areas of contributing sediment on cut slopes and fill slope
  - Gravel the road surface to reduce erosion
- Develop a long-term monitoring plan to evaluate the effect of the sediment reducing treatments applied to the road; effectiveness of sediment reduction, would contribute to a long-term restoration strategy.
- Review developed and dispersed recreation sites along Deep Creek to evaluate effects to riparian vegetation in streamside areas and location of erosion sources close to the stream.
- Restore natural hydrologic processes such as sediment and steamflow regimes by restoring historic pulse disturbance patterns such as wildfire.
- Survey Hell's Half Acre Road 224 to evaluate drainage and points of erosion.

Conserve species integrity:

- Include a comprehensive survey of species distribution in mainstem Deep Creek and fish-bearing tributaries.
- Develop, from the survey data, a more complete analysis of improvement needs or additional actions.
- Complete a species distribution map for bull trout and other species and identify reaches where spawning occurs.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore species. Very high priority.

Landscape Ecology Findings

The dominant characteristic of this ERU is steep canyons supporting xeric forests of lodgepole pine and recent burns, and convex ridges dominated by spruce-fir and lodgepole pine forests and recent burns. The convex ridges are uncommon in the subbasin. Overall integrity of the landscape composition, pattern, and process is moderate. Species integrity is moderate; exotics are widespread along the travel corridor and whitebark pine has declined.

At upper elevations, whitebark pine no longer occurs as a cover type. Representation of tree size classes appears to have shifted from pole dominated stands to greater dominance by medium trees. Canopy density appears to be lower than historic densities, which may be due to some loss of whitebark pine, or lower productivity compared to the areas where historic vegetation was sampled. Few areas are outside their typical fire return interval, and vegetation indicators do not suggest fuel accumulations higher than typical of presettlement conditions. The absence of large fires since 1939 in the upper Deep Creek area suggests the restoration of fire occurrence at the landscape level is needed.

At lower elevations, seedling and saplings and large trees are poorly represented. Old growth and large trees appear to be limited, but this may be a reflection of slow growth and low productivity, rather than age. Much of this portion of Deep Creek is two to five intervals outside the typical fire return interval in both very frequent and frequent fire regimes. More than 20 percent of Deep Creek drainage shows vegetation indicators of fuel accumulations potentially higher than typical of presettlement conditions, almost all at lower elevations. Because this is a heavily traveled corridor through dry habitats, susceptibility to weed invasion is high, and knapweed is well established.

Landscape Ecology Recommendations

In upper elevation forests in Deep Creek, vegetation response unit (VRU) 1:

- Restore mixed and lethal severity fire regimes; this is a high priority in order to restore whitebark pine and disturbance dynamics in mid and high elevation forests.
- Consider mixed and lethal fire that would contribute to the restoration of whitebark pine by reducing encroachment of subalpine fir and spruce, and would provide sites for regeneration of lodgepole and whitebark pine.
- Provide for regeneration so selection for rust resistance can occur, which is critical to the persistence of whitebark pine.
- Inventory to assess the current status and vulnerability of whitebark pine to develop prescriptions for fire use.
- Maintain fire for recruitment of montane park, early seral shrub, snags, lodgepole pine, larch, and seedling and sapling communities.

In lower elevation forests in Deep Creek, vegetation response unit (VRU) 3:

- Restore frequent and very frequent, low and mixed severity fire regimes; this is a high priority, including ponderosa pine, Douglas-fir, and mixed conifer cover types.
- Consider low and mixed severity fire that would contribute to the restoration of lower stand densities, closer to historic levels, would maintain representation of ponderosa pine as a seral component, and maintain or increase old pine or Douglas-fir old growth.
- Consider mixed severity fire that would continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch; fire will result in likely expansion of existing weed populations.
- Inventory weed populations. Maintain weed-free areas and treat to reduce weed abundance and increase reestablishment of native grasses and forbs; inventory and treatment are a very high priority.

WILDLIFE

Theme: Restore wildlife security and conserve wildlife species integrity. Very high priority.

Wildlife Findings

Mesic habitats dominate the ERU and are concentrated in upper Deep Creek and on the south face. They are characterized by spruce-fir and lodgepole pine forests. Most of the mesic habitats are in mid-seral and early seral structure. Old growth is less dominant but well represented. Recently burned areas also occur in these habitats. The old growth and the early seral structure provide potential lynx habitat. Other species expected to occupy the mesic habitats include fishers, pileated woodpeckers, and goshawks. This area is within the territory of the Selway wolf pack.

Deep Creek ERU reflects the prominence of xeric habitats in the upper Selway Canyon. The xeric habitats are characterized by ponderosa pine and Douglas-fir forests and are concentrated primarily in lower Deep Creek on the north side. Most of the xeric habitats are in mid-seral structure and early seral structure. Xeric old growth is less dominant but well represented. Large fires within the last few years have resulted in important recently burned habitats that black-backed woodpeckers are using. The significant xeric old tree component indicates potential white-headed woodpecker and flammulated owl habitat. Bighorn sheep winter in lower Deep Creek. Bull elk winter in this higher elevation ERU but other elk prefer lower elevations.

Alpine habitats are a small but significant feature in the ERU. Road 468, which comes from the Bitterroot valley and continues along Deep Creek, intersects the alpine environment of Nez Perce Pass on the Bitterroot divide. Spruce-fir and lodgepole pine forests characterize the alpine habitats in Deep Creek ERU. Whitebark pine is very limited. Most of the alpine habitat is in mid-seral structure. Early seral habitats are minor and old growth is extremely limited. Mountain goats and wolverines potentially occupy these elevations in summer.

The absence of fire has resulted in higher stand densities, less early seral habitat, and loss of ponderosa pine. In alpine habitats, lack of fire has negatively impacted whitebark pine communities important to grizzly bear habitat. Recruitment of snags and down wood habitat important to wildlife has also declined as a result. Weed infestations compete with native bunchgrass and impact forage availability for ungulates. Road 468 has significantly increased human presence and motorized use in the area. The road has probably influenced the security of disturbance sensitive species in alpine environments, including wolverines and mountain goats. The extensive winter snowmobile traffic may stress wintering animals with limited energy reserves.

Wildlife Recommendations

- Restore fire with priority in alpine habitat and ponderosa pine communities.
- Reduce weeds in xeric habitats and prevent initiation of new populations.
- Evaluate impacts to bighorn sheep, bull elk and mountain goat populations associated with yearlong motorized traffic on Road 468, especially in winter.
- Investigate the status of terrestrial populations in alpine environments, including wolverines.

ROADS

Theme: Maintain backcountry access to provide for backcountry administration and recreation.

Roads Findings

There are 22.59 miles of road in the Deep Creek ERU. These miles are composed principally of South Nez Perce Trail Road 468 (also known as Magruder Road) and Hell's Half Acre Road 224 that originates in Deep Creek ERU and traverses the hydrologic divide between Deep Creek ERU and Selway Headwaters ERU. The Bitterroot National Forest administers these roads.

The *Frank Church Wilderness Management Plan, 1985* recognizes access on Road 224 as a management issue. Following analysis, the wilderness management plan provided the following direction, "Allow the… Hell's Half Acre Road to remain open to the public. It is recommended that the roads remain in non-wilderness status."

The South Nez Perce Trail Road 468 is being considered for inclusion in the Forest Service public road system.

Roads Recommendations

- Maintain the roads in the Deep Creek ERU for recreation and administrative use.
- Address resource concerns related to watershed values on Road 468 through maintenance and reconstruction where necessary.

RECREATION AND TRAILS

Recreation themes: Restore wilderness values consistent with opportunity classes I and II. Conserve recreation opportunity spectrum class (semi-primitive motorized experience, activity and setting).

Trails theme: Maintain existing trail system and reduce adverse effects of existing trail system. Reduce off-trail impacts.

Recreation and Trails Findings

The Nez Perce Pass, on the Idaho-Montana border is the primary access to Deep Creek via Magruder Road/South Nez Perce Trail Road 468. Stock facilities, toilets, parking and an information board are available for visitors at the pass. Deep Creek divides the ERU and is the boundary of the Selway-Bitterroot Wilderness on the north and the Frank Church-River of No Return Wilderness to the south. Prior to the Central Idaho Wilderness Act of 1980, the area was prepared and marked for timber harvest. Civilian Conservation Corps workers built Magruder Road in preparation for logging operations and later (1964), it was improved, and a portion paved to Road 224 (Hell's Half Acre Road). After wilderness designation, road construction and timber harvest halted; since then, hunters and outfitters use the road in the fall and river recreationists en route to Paradise Guard Station for river launching, use it in the summer. Motorists take the challenge to make the 117-mile trip between two wildernesses from Red River to Darby on the primitive, steep, rough, and winding one-lane road. Persons who could not otherwise access designated wilderness, but desire a "wilderness experience" can reach those places because of the road, and they express gratitude for that opportunity. Hikers use the road to access the remote headwaters of the Selway River and other wilderness areas. Road use has facilitated the introduction and increased spread of spotted knapweed along the corridor. Snowmobile use is primarily associated with mountain lion hunting by outfitters and guides and by visitors who rent the Magruder Guard Station.

The area within the Selway-Bitterroot Wilderness portion of the ERU is remote and classified as opportunity class I; trails are classified as opportunity class II areas. The Old Nez Perce Trail # 13 transects opportunity class I and does not meet forest plan wilderness management standards. Trail # 35, a system trail through opportunity class I areas, does not meet standards, and sites along Cayuse Creek are excessive and too heavily impacted to meet opportunity class II standards.

After reconstruction of Road 468 in 1964, the old fire road was transformed into a wider and smoother thoroughfare that encouraged more visitors and higher vehicle speeds. Traffic counters have been installed to monitor the increasing traffic. Visitors express concern about the river recreation traffic, suggesting that excessive traffic and high speeds are dangerous and should be better managed.

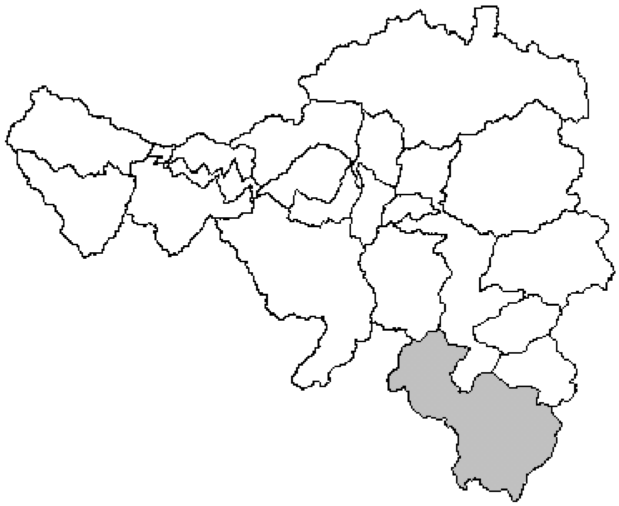
Several dispersed sites and one developed site are available in this ERU. The Forest Service administrative site at Magruder is no longer staffed. Previously, wilderness rangers and other FS personnel were available there for information and education.

Scimitar Creek Trail # 36 was relocated and drainage improved. The road to Hell's Half Acre is discussed in the Selway Headwaters ERU.

Recreation and Trails Recommendations

- Monitor areas and trails that do not meet forest wilderness management standards and restore to appropriate opportunity class I and II standards.
- Monitor traffic on Road 468 and address visitor safety.
- Consider the feasibility of making visitor information and an education specialist (who could also conduct monitoring) available at Magruder Guard Station.
- Within the limits of sustaining ecological integrity, insure a wilderness-type experience along Road 468 for those visitors who could not otherwise walk or ride into designated wilderness.
- Monitor snowmobile and OHV use and make and act to insure security to wildlife and sensitive vegetation, if necessary.

SELWAY HEADWATERS



Area Theme: Restore wilderness values.
Size: 143,555 acres.
Location: Headwaters of the Selway River.
Land Classification: Wilderness and unclassified.
Land Administration: USFS.
Primary Watersheds: Selway River, Little Clearwater River, Burnt Knob, Salamander, Flat, Chuckling and Magruder Creeks.
Landmarks: Magruder Corridor, Magruder Guard Station, Sabe Mountain, and Southern Nez Perce Trail.

OVERVIEW

The Selway Headwaters ecological reporting unit (ERU) is entirely wilderness, including portions of the Frank Church-River of No Return Wilderness and the Selway-Bitterroot Wilderness, with the exception of 13.9 miles of the Southern Nez Perce Trail (Magruder Road) and the road to Hell's Half Acre. The Upper Selway River provides a source of high quality water, and habitat in the streams is highly variable and generally productive. The Swet Fire of 1996 and the Lonely and Hamilton Fires of 2000 are influencing erosion processes and sediment yields. Several high mountain lakes in this ERU have been stocked with rainbow trout, westslope cutthroat trout, and Yellowstone cutthroat trout. Several fires have occurred in the 129-year reporting period, but the ERU is so large that many areas have not burned. The Selway Headwaters ERU is characterized by high elevation wildlife habitats and only provides important winter range for mountain goats. The area provides bighorn sheep summer range, and lynx and wolverines have been recently reported in the ERU. Wolves also inhabit the area.

INTEGRATED AREA THEME

RESTORE WILDERNESS VALUES

Wilderness is an integral social and ecological resource, and the central focus of management must be on the function of the whole. Restoration of wilderness character includes both ecological and social components. It requires the ability to define natural ecosystem dynamics and management to ensure human use, in all its forms, does not disrupt the naturally functioning ecosystem processes that characterize wilderness.

Magruder Road 468 and Hell's Half Acre Road 224 provide access for extensive fall hunting activities, numerous outfitter camps, and recreational vehicle use. Human activity has resulted in excessive impacts to sensitive opportunity class I areas that are characterized by an unmodified natural environment and outstanding opportunity for isolation and solitude where management strongly emphasizes sustaining the natural ecosystem. Non-system trails are established and several sites are defined as problem areas or do not meet standards for social and resource settings.

COMPATIBLE THEMES

CONSERVE AQUATIC PROCESSES AND CONSERVE SPECIES

Human influence has resulted in fire suppression and a limited amount of road construction and maintenance. Restoring natural disturbances such as wildfires and floods in the Little Clearwater basin is a priority. Larger streams in the Upper Selway support very high potential for all four imperiled salmonid species. Non-indigenous trout species stocked in mountain lakes may be responsible for introgression of non-native species in streams below. Genetic analysis of westslope cutthroat trout would determine the degree of introgression. Conservation of aquatic processes and species supports the area theme of not disrupting naturally functioning ecosystem processes that characterize wilderness.

RESTORE TERRESTRIAL PROCESSES AND RESTORE SPECIES

Restoration of mixed and lethal fire regimes is a very high priority in order to restore whitebark pine and lodgepole pine in high elevations. In low elevations, naturally ignited very frequent and frequent low and mixed severity fire regimes are a very high priority in order to recover open stands of ponderosa pine and Douglas-fir, and increase age-class diversity. Restoring the full array of terrestrial processes contributes to ecosystem integrity, an important component of wilderness character.

RESTORE WILDLIFE SECURITY AND CONSERVE SPECIES INTEGRITY

Restoration of natural disturbance processes to provide for wildlife habitat is a very high priority. Whitebark pine, lodgepole pine, and ponderosa pine are focal species. Roads within the ERU are open year-long to motorized traffic and access high elevation habitats and species, including mountain goats, wolverines, and lynx. Potential impacts should be evaluated. Mountain goat kids appear to be declining. Much unauthorized salting is occurring in the ERU and may habituate vulnerable species. Non-indigenous fish in high lakes may threaten native amphibian populations.

THEME INTERACTIONS

Sustaining fire dynamics in low elevation forests may enhance the spread of weed populations and threaten the visual quality of the scenery as perceived by visitors.

INTEGRATED AREA RECOMMENDATIONS

- Evaluate human activities to assure consistency with management direction. Inventory out-of-standards sites and trails to provide a basis for rehabilitation of those areas.
- Implement an integrated management strategy that includes protection for watersheds, rare and vulnerable species and game species, scenic beauty, and non-motorized recreation.
- Educate recreational users to prevent further degradation of the area.
- Evaluate potential impacts to mountain goats and other vulnerable species from year-round motorized traffic and unauthorized salting.
- Evaluate impacts to native amphibian populations from non-indigenous fish at high lakes.
- Inventory the following functional resources: aquatic species, effects of the Swet, Lonely and Hamilton fires on aquatic processes, whitebark pine populations, and the population status of wildlife species.
- Restore naturally ignited infrequent, mixed and lethal fire regimes in high elevation forests to restore whitebark pine and disturbance dynamics.

- Restore frequent and very frequent low severity and mixed fire regimes at lower elevations.

FUNCTIONAL FINDINGS AND RECOMMENDATIONS

AQUATICS

Theme: Conserve aquatic processes and conserve species integrity. Very high priority.

Aquatic Findings

The Selway Headwaters ERU encompasses the upper Selway River above Deep Creek and includes the Little Clearwater River. Low elevation breaklands, mountain uplands, glaciated ridges, and glaciated valley bottoms characterize watersheds in the ERU. Streams are highly diverse, with gradients ranging from high to low. Numerous mountain lakes are located in the ERU. The hydrologic regime is dominated by late spring runoff. This ERU is, in general, steeper and at a higher elevation than the mid and lower portions of the subbasin. The climate is less influenced by moist maritime air, and the frost-free season is well less than 90 days in most years. Habitat potential for all aquatic species is high or very high. Streams in the ERU provide very important spawning and early rearing habitat for all four imperiled salmonid species.

This ERU has most notably experienced large, significant wildfires twice in the past decade. Monitoring data show changes in watershed condition following the first of these fires, which occurred in 1996. During subsequent heavy rain events, tributary streams ran black with ash. The mainstem Selway River, normally clear at even the highest flow event, was visibly turbid during rain events and the spring runoff period between 1997 and 1999. Since then, recovery in both river and tributary conditions has been documented. Fire intensity and size were well within the natural range for this landscape.

Aside from these fire events, a departure from the historic aquatic disturbance regime has occurred in other portions of the ERU. Fire size, frequency, and severity in these high elevation watersheds differ from other areas in the subbasin. The sediment pulses as a result of fire disturbances were not as frequent nor as large compared to mid and low canyon watersheds. This is a natural regime correlated with a short, snow-free period at the higher elevations, which shortens the potential burning season in most years. Historically, only about 5 to 10 percent of the vegetation burned during fires. The hydrologic response to the large fire in 1996 was similar to the historic response.

Habitat in streams within the ERU is highly variable and generally productive. Although limited data have been collected in area streams, some broad conclusions can be made. Current condition of habitat is similar to the historic condition. Existing species assemblage is similar to the historic assemblage, although abundance of anadromous fish is probably less. Non-native cutthroat trout have been stocked in some mountain lakes, and introgression in westslope cutthroat trout subpopulations below these lakes is possible.

Aquatic Recommendations

Conserve aquatic processes:

- Monitor the areas burned by the Swet, Lonely and Hamilton Fires, which likely have active erosional processes occurring. Include field visits to evaluate the time period for recovery of debris torrents and other erosion sources, monitoring the turbidity in the Selway River above Moose Creek, and investigate the source of sediment in the river after intense rainstorms.
- Conserve the natural erosional processes related to natural disturbances such as wildfire and floods in the ERU, and restore these processes in the Little Clearwater River as a priority.

Conserve species integrity:

- Analyze the genetic integrity of westslope cutthroat trout subpopulations below mountain lakes to determine degree of introgression, if any.
- Survey mountain lakes that currently lack data to determine status.
- Continue monitoring bull trout in areas affected by the Swet Fire.
- Monitor fish and habitat in the Little Clearwater River downstream from areas burned in 2000.
- Survey unsurveyed streams on the west side of the river.

LANDSCAPE ECOLOGY

Theme: Restore terrestrial processes and restore species. High priority.

Landscape Ecology Findings

The dominant character of this ERU is steep canyons in xeric and mesic forests, recent burns, convex ridges, and alpine glaciated slopes dominated by spruce-fir and lodgepole pine forests and recent burns. Overall integrity of landscape composition, pattern, and process is moderate. Species integrity is high except for declines of whitebark pine and weed infestations along roads and trails.

At upper elevations, large severe fires occurred in 1996 and 2000, which are not represented by current vegetation, fuel and fire maps. Seedlings and saplings are less well represented than historically. Old growth may be more extensive than Map 44 shows, because many lodgepole stands are older than they might appear. Few areas are outside their typical fire return interval, and vegetation indicators do not suggest fuel accumulations higher than typical of presettlement conditions. This area is very large, and although several fires have occurred in the 129-year period of record, many areas have not burned. Conservation of fire regimes is needed at the landscape level.

At lower elevations, large fires also occurred in 1996 and 2000, which are not represented by current vegetation, fuel and fire maps. Seedlings, saplings and large trees are poorly represented. The lack of large trees is due to lower productivity rather than age. Old growth is probably more extensive than indicated, since old trees may not be large. Much of this part of Selway Headwaters is two to five intervals outside the typical fire return interval in both very frequent and frequent fire regimes. More than 20 percent of the Little Clearwater drainage and 10 to 20 percent of the Swet-Wilkerson area show vegetation indicators of fuel accumulations potentially higher than typical of presettlement conditions, but fuel conditions in the area of Swet Creek and Little Clearwater River have changed due to the recent fires. Susceptibility to weed invasion is considered moderate. There are some occurrences of weeds along the main river trail and campsites.

Landscape Ecology Recommendations

- Restore mixed and lethal severity fire regimes; this is a very high priority in upper elevation areas of Selway Headwaters ERU in order to restore whitebark pine and disturbance dynamics in high elevation forests.
- Consider mixed and lethal fire that would contribute to the restoration of whitebark pine by reducing encroachment of subalpine fir and spruce, and would provide sites for regeneration of lodgepole and whitebark pine. Only by providing for regeneration can selection for rust resistance occur, which is critical to the persistence of whitebark pine.
- Inventory to assess the extent and status of whitebark pine, because this ERU is thought to have a substantial whitebark pine population. Use that information to evaluate risk and benefits of possible fire scenarios from naturally ignited fire. Consider the following elements in this inventory:

  - Community composition, size class, evidence of blister rust and mountain pine beetle activity and tree mortality, and encroachment by other tree species.
  - Fuels and susceptibility to stand replacement, and opportunities for maintenance of whitebark pine in low or mixed severity fire and need for stand replacement fire to provide additional sites for natural regeneration.
- Restore frequent and very frequent low severity and mixed severity fire regimes; this is a high priority in lower elevations of Selway Headwaters, including the mixed conifer cover type.
- Consider low and mixed severity fire that would contribute to the restoration of lower stand densities in the mixed conifer cover type, closer to historic levels, and would maintain representation of ponderosa pine as a seral component.
- Consider mixed severity fire that would continue to provide some early seral herbaceous, snag, and shrub habitat and provide establishment sites for recruitment of shade intolerant tree species including pine and larch. However, fire will result in likely expansion of existing weed populations.
- Inventory weed populations. Treat to reduce weed abundance and increase reestablishment of native grasses and forbs, if needed.

WILDLIFE

Theme: Restore wildlife security and conserve wildlife species integrity. Very high priority.

Wildlife Findings

Mesic habitats dominate Selway Headwaters ERU. Forest types include Engelmann spruce, subalpine fir, mixed conifer, and lodgepole pine. Most of the mesic habitats are in mid-seral structure with early seral structure well represented. Old growth is more limited but may be underestimated. These mesic habitats exhibit suitable habitat for lynx and fishers. A lynx was recently observed in the ERU. Wolverine tracks in winter have also been reported here. Fire has occurred in the ERU within the last 10 years, providing nesting and foraging habitat for black-backed, pileated and other woodpeckers. Significant winter and spring mountain goat range occurs in the ERU. Mountain goat kid recruitment on spring and winter range appeared to be declining in the last survey. Bighorn sheep summer here and move downriver in the fall to Sheep Creek. The Selway wolf pack, trail crews, and outfitters are co-existing here.

Xeric habitats in Selway Headwaters are limited and consist primarily of grand fir, Douglas-fir, and ponderosa pine habitats. Almost half of the xeric habitats are in mid-seral structure with early seral structure and old growth well represented. Selway Headwaters ERU is too high in elevation to provide important winter range. Elk are using the 1996 Swet Fire area significantly in summer. Few mule deer use this area in winter. The xeric old growth habitat indicates potential white-headed woodpecker and flammulated owl habitat in ponderosa pine communities.

Alpine habitats are well represented in the ERU. The mid-seral structure dominates, with early seral structure well represented. Old growth is limited. More alpine mid-seral structure is represented here than in other ERUs in the subbasin. High elevation, early seral structure is also relatively high compared to the subbasin as a whole. Fires occurred in the alpine habitats in the 1980s. Alpine lake environments are unique. There are more than twenty lakes in the Selway Headwaters. Status of terrestrial populations associated with the lake environments is unknown. Wolverines and mountain goats favor remote, alpine country. Whitebark pine stands persist in the higher elevations and were an important component in the diet of the grizzly bear. Wet avalanche chutes and talus slopes in alpine environments also provide important grizzly bear feeding habitat. Mountain goats travel between Salmon Mountain and Wilkerson Creek. Swet Lake has provided an important elk calving area in the past. Magruder Road 468 and Hell's Half Acre Road

224 are used by snowmobiles in winter. There is potential for increased off-road snowmobile activity. Horse Creek provides habitat connectivity between the upper Selway River and the Salmon River Canyon to the south and the Bitterroot Valley to the north.

Xeric habitats in the Selway Headwaters ERU exhibit the most significant departure from expected fire return intervals in the subbasin. Fuel loads have increased and seedlings and saplings are less well represented than historically. Alpine habitats are also significantly beyond the expected fire return interval. Whitebark pine has declined due to fire suppression and blister rust disease. Most of the more than 20 alpine lakes in the ERU are stocked with introduced fish with associated impacts to amphibian populations. The Little Clearwater River drainage is heavily used by hunters and indiscriminate salting is occurring. Roads access high elevation habitats and species. The disturbance sensitive species, including mountain goats and wolverines, may be influenced by motorized activity. Limited surveys indicate that mountain goats are declining.

Wildlife Recommendations

- Restore fire, where feasible, to reestablish natural disturbance dynamics in alpine and xeric habitats.
- Reduce weed populations.
- Conserve existing weed-free areas.
- Evaluate terrestrial high lakes environments and species, especially amphibian status at stocked lakes.
- Review existing trail and road systems associated with species populations vulnerable to disturbance, especially in alpine elevations, on winter range, and in riparian habitats and calving areas. The highest priority is the mountain goat population, which appears to be declining.
- Evaluate potential impacts of camp locations and salting practices on mountain goats, elk and other vulnerable species. Restore artificial salt licks.
- Initiate inventories for wolverines and lynx, which have been observed in the ERU, in appropriate habitats. Assess status and migration pattern of the mountain goat and bighorn sheep populations.

ROADS

Theme: Maintain backcountry access to provide for administration and recreation.

Roads Findings

There are 13.9 miles of roads in the Selway Headwaters ERU. These miles are composed of portions the South Nez Perce Trail Road/Magruder Road 468 (the Bitterroot National Forest administers this portion of the road) and Hell's Half Acre Road 224. Road 468 is being considered for inclusion in the Forest Service public road system.

Roads Recommendations

- Maintain the roads in the Selway Headwaters ERU for recreational and administrative use.
- Address resource concerns related to watershed values on Road 468 through maintenance and reconstruction where necessary.

RECREATION AND TRAILS

Recreation Themes: Restore wilderness values consistent with opportunity class I in the Selway-Bitterroot Wilderness. Conserve and restore wilderness values consistent with recreation opportunity spectrum primitive characterizations and as outlined in the Frank Church-River of No Return Wilderness Management Plan.

Trails theme: Maintain existing trails system and reduce adverse effects of existing trail system. Reduce off-trail impacts.

Recreation and Trails Findings

The Bitterroot National Forest manages the entire area that includes portions of the Selway-Bitterroot Wilderness as well as the Frank Church-River of No Return Wilderness. Wilderness management directions vary and differences will be noted here.

The Selway-Bitterroot Wilderness area commences at the Raven Creek Campground on the Selway River, continues northwest to Spot Mountain, to Three Prong Mountain on the Bitterroot-Nez Perce National Forest boundary and south to Dry Saddle, to Sabe Saddle and along Magruder Road 468 to Observation Point; then north along Magruder Ridge to the Magruder Massacre Site. One outfitter operates four camps within this zone, and use is almost exclusively fall hunting activity. Three areas do not meet the Selway-Bitterroot Wilderness management direction standards. The Southern Nez Perce Trail # 13 or Parker Trail transects the area, which is classified opportunity class I. Numbers of sites and impact ratings to not meet standards on Little Clearwater River and Salamander Butte. On Lonely Creek, a non-system trail exists that accesses two campsites in opportunity class I that do not meet standards.

Within the Frank Church-River of No Return Wilderness (South from Salmon Mountain to Waugh Mountain, east to the Montana-Idaho border, and north to Trail # 8, then west across road to Hell’s Half Acre and along Pasture Ridge, to Magruder and Kim Creek Saddle), the recreation opportunity spectrum standards are used to determine desired future conditions. Campsites are inspected on a three-year basis according to the Fissell inventory method, and on a five-year rotation using the Cole method. Visitor use surveys are conducted annually. Most recreational activity is limited to fall hunting and outfitter operations, and about a dozen outfitter camps are scattered throughout the area. Summer use by hikers and anglers is also popular, but the area is relatively little used. Hell’s Half Acre Road 224 is treacherous and receives use by outfitters, the Forest Service, and recreational vehicles. There is potential for increased “high marking” use by snowmobiles. The lookout is staffed during fire season. The trail along the Selway is not always as indicated by Forest Service maps, and there is trail damage below Thompson Flats.

Magruder Road is rough, winding, narrow and steep through this section, but that does not deter travel by motor home, horse trailers and small, low clearance vehicles. Travel is limited to late summer because of high altitude snow. Bicycle traffic is increasing throughout the area, especially on the state divide trail. Popular trailheads at Dry Saddle and Salmon Mountain provide access for hunting and serious hikers. There is potential for increased snowmobile and off-road vehicle use on the Montana-Idaho state divide, at Salmon Mountain, Sabe Mountain and Hell’s Half Acre. A Forest Service rental cabin is located at Horse Heaven.

Trails are maintained to the maximum extent practical, and cleared on an annual basis. Erosion control and safety are intended to be the highest Forest Service priority.

Recreation and Trails Recommendations

- Study and evaluate data collected in trail surveys and provide for more systematic maintenance to include levels I, II, and III.
- Close and rehabilitate sites and trails that do not meet management direction standards in the Selway-Bitterroot Wilderness.
- Monitor and identify sites or trails that may not meet standards consistent with the recreation opportunity spectrum, and take appropriate action to bring sites

and trails to desired conditions in the Frank Church-River of No Return Wilderness.

- Monitor snowmobile, bicycle and off-road vehicle use in prohibited areas, and take appropriate action to prevent erosion and threats to riparian areas and to ensure security for wildlife and sensitive vegetation.
- Facilitate education and self-monitoring among groups and individual motor vehicle users.

GLOSSARY AND ACRONYMS

GLOSSARY

adfluvial: fish that spawn in tributary streams where the young rear from 1 to 4 years before migrating to a lake system, where they grow to maturity.

adjunct: watersheds with a moderate-low habitat potential for the species. Currently the population is depressed or weak and the habitat has been degraded.

adjunct habitat: watersheds with a moderate-low habitat potential for the species. Currently the habitat condition is good, while the population is depressed or weak.

adjunct population: watersheds with a moderate-low habitat potential for the species. Currently the population is strong, while the habitat has been degraded.

adjunct secure: watersheds with a moderate-low habitat potential for the species. Currently the habitat condition is high, and the population is strong.

aggradational: river valley or streambed whose level is rising because it is depositing streambed material or debris.

Aleutian lows: low pressure systems associated with the Gulf of Alaska that typically bring fall, winter, and early spring storms to the Pacific Northwest.

alevins: a newly-hatched salmon or trout prior to absorption of the yolk sac.

allopatric: species, taxa or life-history forms occurring in separate or disjunct geographic areas.

ammocoetes: larval stage of lampreys, usually lasting four to seven years.

anadromous: fishes that spawn in fresh water, but spend a significant portion of their life in the ocean.

arterial road: a forest road that provides service to large land areas and usually connects with other arterial roads or public highways.

backcountry: an area that is remote and generally primitive regardless of land classification such as Wilderness or Roadless.

bankfull stage: the stream flow level at which flooding occurs; generally considered to have a 1 to 2 year return interval.

bedload: sediment in or beside the stream bed.

channel types: stream channel classification system based on observable characteristics; in this document based on Rosgen (1996).

collector road: a forest road that serves smaller land areas than an arterial road and usually connects forest arterial roads to local forest roads or terminal facilities.

connected: populations between which both upstream and downstream movements of all life stages of individuals are possible and can occur.

critical contributing-high quality: watersheds that do not contain suitable habitat (or are naturally blocked) and contribute hydrologically to downstream habitat for the species, where the habitat condition is good.

critical contributing-degraded: watersheds that do not contain suitable habitat (or are naturally blocked) and contribute hydrologically to downstream habitat for the species, where the habitat condition has been degraded.

dendritic: a stream drainage pattern found in areas of relatively uniform geologic structure and characterized by a branching, tree-like form.

diurnal winds: winds that blow up slope and up canyon during the day and down slope and down canyon after sunset.

ecologically significant unit (ESU): a population of fish that (1) is substantially reproductively isolated from other populations and (2) represents an important component in the evolutionary legacy of the species.

episodic disturbance: disturbances (like most fire or flood) that occur patchily in time and space.

escapement: adult fish that return to spawn.

extirpated: eradicated or abolished from an area.

fire frequency intervals: Fire frequency intervals were assigned based on habitat type group and landform setting. For example, habitat type group 3 (mostly grand fir-twinflower and grand fir-beargrass) was assigned to fire interval B in VRU 3 and to fire interval C in VRU 6. The frequency ranges are the same as used in the *Interior Columbia River Basin Assessment*. The assignment of different habitat type groups to a severity and frequency class may differ from the *ICRB Science Assessment* in that local data were used.

A	5 to 25 years: Very frequent
B	26 to 75 years: Frequent
C	76 to 150 years: Infrequent
D	151 to 300 years: Very infrequent
E	>300 years: Extremely infrequent
0	Rock and water with no logical fire frequency

fluvial: fish that spawn in tributary streams where the young rear from 1 to 4 years before migrating to a river system, where they grow to maturity; *relating to or inhabiting a river or stream; produced by the action of a river or stream.*

fragmentation: the breaking up of a larger population of fish, wildlife, or plant communities of a particular structure, into smaller disconnected subpopulations.

fry: first-year fish.

general winds: large-scale winds caused by high and low pressure system, but generally influenced and modified in the lower atmosphere by terrain features.

guild: an association of similar species with traits related to a particular ecological niche.

habitat stronghold: refugia watersheds are those that contain high quality habitat with depressed or weak populations. The habitat in these areas has a high to very high potential to support the species. The population level in these areas is not considered to be a function of habitat, but other factors.

historic stronghold: watersheds with a high-very high habitat potential where the fish populations are weak and the habitat has been degraded.

hydrography: the graphical representation of streamflow through time.

impact zones: areas designated under the Clean Air Act as being below air quality standards.

introgression: infiltration of the genes of one species into the gene pool of another through repeated backcrossing of an interspecific hybrid with one of its parents.

inversion: atmospheric condition where normal properties of air layers are reversed (warm air traps cooler air underneath preventing it from rising).

juvenile rearing: habitat used by young fish for feeding and growth.

mesic: relatively moist.

metapopulation: a collection of localized populations that are generally distinct, yet are genetically interconnected through movement of individuals among populations.

migratory: describes the life history pattern in which fish spawn and spend their early rearing years in specific tributaries, but migrate to larger rivers, lakes or reservoirs as adults during their non-spawning time.

migratory habitat: habitat used during the migratory stage of a species.

nodal habitat: waters which provide migratory corridors, overwintering areas or other critical life history requirements.

nodal-high quality: subadult and adult rearing habitat (also referred to as migration/rearing habitat), where the habitat condition is good.

nodal-degraded: subadult and adult rearing habitat (often referred to as migration/rearing habitat), where the habitat condition has been degraded.

non-contributing: watersheds that do not contain suitable habitat (or are blocked) and do not contribute hydrologically to downstream habitat for the species.

Pacific highs: high pressure weather systems that typically bring warm, dry conditions to the Pacific Northwest during the summer.

patches: contiguous areas of similar vegetation structure.

population: an interbreeding group of fish that spawn in a particular river system (or part of it) and are reproductively isolated.

population resistance: ability of a population to resist adverse changes or extirpation.

population resilience: ability of a population to recover following a catastrophic event resulting in loss of individuals.

population stronghold: watersheds that contain strong fish populations with a high to very high habitat potential where the aquatic habitat that has been degraded.

prescribed fire:

prescription watershed: Nez Perce National Forest term for watershed numbered at the 6th code scale; they are the smallest watersheds that are currently permanently delineated.

press disturbance: disturbance (like sediment from roads or channel alteration from mining or grazing) that alters the long-term resilience of an ecosystem. Those described in this assessment are generally chronic, often widespread, and may exceed the capacity for recovery without assistance.

pulse disturbance: disturbance like most fires, floods, and some droughts that are within the range of natural disturbances to which an ecosystem is adapted, are temporary in time and often patchy in space, and natural recovery is usually possible without assistance.

refound/refounding: colonization by one or more individuals of an area where a subpopulation has been extirpated.

resident: fish that spend their entire life cycle usually in tributary or small headwater streams in which they were hatched.

ROS (recreation opportunity spectrum) Classes: a framework for stratifying and defining classes of outdoor recreation environment, activities, and experience opportunities. The settings, activities, and opportunities for obtaining experiences have been arranged along a continuum or spectrum divided into seven classes: primitive, roaded modified, roaded natural, rural, semi-primitive motorized, semi-primitive non-motorized, and urban.

seral: of or relating to an ecological sequence from initial stages to climax.

subadult/adult rearing: habitat used by young and adult fish for feeding and growth.

stronghold: stronghold watersheds are those that contain both high quality (good condition) habitat and strong fish populations. The habitat in these areas has high-very high habitat potential to support the species.

substrate: organic or inorganic materials composing a stream or lake bottom; usually considered up to bankfull stage.

sympatric: distinct species, taxa or life-history forms occupying the same or overlapping geographic areas without interbreeding.

transitory range: areas suitable for grazing after a disturbance removes or reduces forest canopy. Transitory range is available only until regrowth of the forest occurs.

tributary: stream or river flowing into a lake or larger stream or river.

vagrants: species with wandering and nomadic lifestyles.

xeric: relatively dry.

ACRONYM DEFINITIONS

ALTA - Aquatic Landtype Association

ATV - All Terrain Vehicle

BLM - Bureau of Land Management

C – Centigrade or Celcius

CEDA - Clearwater Economic Development Association

CRB - Columbia River Basin

dbh - Diameter (tree) at Breast Height

EAWS - Ecosystem Analysis at the Watershed Scale

ECA - Equivalent Clearcut Acres

EHE - Elk Habitat Effectiveness

EHU - Elk Habitat Unit

EIS - Environmental Impact Statement

ERU - Ecological Reporting Unit

ESA - Endangered Species Act

ESU - Ecologically Significant Unit

FS - Forest Service

FWS - United States Fish and Wildlife Service

GIS - Geographic Information System

HUC - hydrologic unit code

HTG - Habitat Type Group

ICRB - Interior Columbia River Basin

IDF&G - Idaho Department of Fish and Game

LTA - Landtype Associations

MF – Middle Fork

MMBF - Million Board Feet

NAAQS - National Ambient Air Quality Standards

NEPA - National Environmental Policy Act

NEZSED - Nez Perce National Forest sediment model

NF - National Forest

NIOG - North Idaho Old Growth

NMFS - National Marine Fisheries Service

NWPPC - Northwest Power Planning Council

OHV - Off-Highway Vehicle

ORV - Off-Road Vehicle

PACFISH - Pacific Anadromous Fish Strategy

PUA - Planning Unit Assessment

R1EDIT - USDA Forest Service Region 1 timber inventory (stand exam) storage and reporting system.

RAP - Restore Aquatic Processes

RMS - Roads Management System (Region 1 standard roads database)

RNA - Research Natural Area

ROS - Recreation Opportunity Spectrum

SBW - Selway-Bitterroot Wilderness

SF - South Fork

SMS - Scenery Management System

TMDL - Total Maximum Daily Load

UCRB - Upper Columbia River Basin

USDA - United States Department of Agriculture

USDI - United States Department of Interior

VMS - Visual Management System

VRU - Vegetation Response Unit

WAG - Watershed Advisory Group

WQLS - Water Quality Limited Streams

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